

Hewlett-Packard -- Portable Computer Division
Corvallis, Oregon

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XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
X
X          HP-71 HP-IL Module          X
X
X      Internal Design Specification    X
X
X
X          VOLUME II                    X
X
X      Source Listings                  X
X
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
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XX  XX  XXXXXX  XXXXXXXX  XX
XX  XX  XXXXXXXX  XXXXXXXX  XX
XX  XX  XX  XX  XX  XX  XX
XX  XX  XX  XX  XX  XX  XX
XX  XX  XX  XX  XX  XX  XX
XXXXXXXXXX  XXXXXXXX  XXXXXX  XX  XX
XXXXXXXXXX  XXXXXXXX  XXXXXX  XX  XX
XX  XX  XX  XX  XX  XX  XX
XX  XX  XX  XX  XX  XX  XX
XX  XX  XX  XX  XX  XX  XX
XX  XX  XX  XX  XX  XX  XX
XX  XX  XX  XX  XX  XX  XX
XX  XX  XX  XX  XX  XX  XX
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XX  XX  XXXX  XX  XXXXXX  XXXXXX
XX  XX  XX  XX  XX  XX  XX
XX  XX  X  X  XX  XX  XX
XXX  XX  XX  XX  XXX  XX  XX
X  XXXX  XXXXXX  XXX  XXXXXX  XXXXXX
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HP Part No. 82401-90023
ROM Release 1B -- March 1984
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INTRODUCTION	CHAPTER 1
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This volume contains the complete source code listings for the HP-71 HP-IL Module. The program modules which comprise the 16K-byte ROM are presented here in address order according to their position in the ROM, from lowest address to highest address. For purposes of presentation the modules are assembled relative to a ROM starting address of F0000 hex. In actuality the ROM is soft-configurable, and may be automatically configured by the HP-71 to others sections of the address space.

The following sections give a list of the program module names in address order, followed by an alphabetical list of the module names. A module's source file is denoted with an ampersand (&) in the file name, and its object (binary) file with a percent sign (%) in the file name.

Interface information to an entry point or poll is described in a documentation header in the source file that contains that entry point or handles that poll. In this preliminary version of this document, supported entry points are not yet indicated in the source listings as they are in the HP-71 operating system source listings. However, the poll interfaces and certain entry point interfaces will be supported.

It is the intent of HP to preserve such supported interfaces, as well as the absolute address position of each supported entry point, through any future updates of the HP-71 HP-IL Module. In general this allows external software which uses these interfaces to work predictably without regard to the version of the HP-71 HP-IL Module with which it is run. However, HP reserves the right to adjust the supported interfaces in any manner it chooses.

LIST OF MODULES IN ADDRESS ORDER

CHAPTER 2

Address Range	Module	Title
NZ%RST	F0000 - F0007	ROM Start (Header)
NZ%TBL	F0008 - F0409	Lexical Analyzer Tables--ID=FF
NZ%ERR	F040A - F06B4	Error Message Table
NZ%DIR	F06B5 - F07C1	Directory Section
NZ%GPR	F07C2 - F0F99	General Routines
NZ%BAS	F0F9A - F1F33	BASIC Routines
SC%ENT	F1F34 - F2C95	ENTER Execution
NZ%UTL	F2C96 - F2ED6	User Utility Routines
NZ%BIF	F2ED7 - F362D	Basic interface
NZ%IOB	F362E - F3636	I/O Buffer Routines
NZ%DSP	F3637 - F3BF6	Display Driver
NZ%BUT	F3BF7 - F4292	BASIC Utilities
NZ%CAS	F4293 - F511A	Cassette Routines
NZ%HND	F511B - F5E90	Poll Handlers
NZ%CAT	F5E91 - F66D1	HP-IL CAT
NZ%IOR	F66D2 - F6BD7	I/O (NEW Mailbox)
NZ%FRA	F6BD8 - F6D55	HP-IL Frame Routines
NZ%LOW	F6D56 - F6E18	Low-level User HP-IL
NZ%FXQ	F6E19 - F74FC	File Execution
NZ%PAR	F74FD - F7BD2	HP-IL Parse Routines
NZ%DEC	F7BD3 - F7EFO	HP-IL Decompile Routines
JP%ZER	F7FFC - F7FFD	Zero File - ROM Checksum
JP%ZER	F7FFE - F7FFF	Zero File - End of chain
NZ%SYM	No Address	Symbolic Assignments

LIST OF MODULES SORTED BY MODULE NAME

CHAPTER 3

Module	Address Range	Title
JPXZER	F7FFC - F7FFD	Zero File - ROM Checksum
JPXZER	F7FFE - F7FFF	Zero File - End of chain
NZXBAS	F0F9A - F1F33	BASIC Routines
NZXBIF	F2ED7 - F362D	Basic interface
NZXBUT	F3BF7 - F4292	BASIC Utilities
NZXCAS	F4293 - F511A	Cassette Routines
NZXCAT	F5E91 - F66D1	HP-IL CAT
NZXDEC	F7BD3 - F7EFO	HP-IL Decompile Routines
NZXDIR	F06B5 - F07C1	Directory Section
NZXDSP	F3637 - F3BF6	Display Driver
NZXERR	F040A - F06B4	Error Message Table
NZXFRA	F6BD8 - F6D55	HP-IL Frame Routines
NZAFXQ	F6E19 - F74FC	File Execution
NZXGPR	F07C2 - F0F99	General Routines
NZXHND	F511B - F5E90	Poll Handlers
NZXIOB	F362E - F3636	I/O Buffer Routines
NZXIOR	F66D2 - F6BD7	I/O (NEW Mailbox)
NZXLOW	F6D56 - F6E18	Low-level User HP-IL
NZXPAR	F74FD - F7BD2	HP-IL Parse Routines
NZXRST	F0000 - F0007	ROM Start (Header)
NZXSVM	No Address	Symbolic Assignments
NZXTBL	F0008 - F0409	Lexical Analyzer Tables--ID=FF
NZXUTL	F2C96 - F2ED6	User Utility Routines
SCXENT	F1F34 - F2C95	ENTER Execution

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*****
*****
**
** H H PPPP III L 1 BBBB **
** H H P P I L ::: 11 B B **
** H H P P I L ::: 1 B B **
** HHHHH PPPP I L 1 BBBB **
** H H P I L ::: 1 B B **
** H H P I L ::: 1 B B **
** H H P III LLLLL 111 BBBB **
**
*****
*****

```

```

/SLOAD: Duplicate entry point A-MULT found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CATC++ found in modules NZ%PAR and TIXR6S
/SLOAD: Duplicate entry point CONVUC found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSLC1 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSLC10 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSLC11 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSLC12 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSLC13 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSLC14 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSLC15 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSLC2 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSLC3 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSLC4 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSLC5 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSLC6 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSLC7 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSLC8 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSLC9 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSRC1 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSRC10 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSRC11 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSRC12 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSRC13 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSRC14 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSRC15 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSRC2 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSRC3 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSRC4 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSRC5 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSRC6 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSRC7 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSRC8 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point CSRC9 found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point D1=AVE found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point D1@AVS found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point EXPEX+ found in modules NZ%BUT and TIXR6S
/SLOAD: Duplicate entry point FIND found in modules NZ%BAS and TIXR6S
/SLOAD: Duplicate entry point FINDF+ found in modules NZ%CAS and TIXR6S
/SLOAD: Duplicate entry point GETST- found in modules NZ%IOR and TIXR6S
/SLOAD: Duplicate entry point NUMCK found in modules NZ%PAR and TIXR6S
/SLOAD: Duplicate entry point OUT3TC found in modules NZ%PAR and TIXR6S
/SLOAD: Duplicate entry point OUTBYT found in modules NZ%PAR and TIXR6S
/SLOAD: Duplicate entry point OUTNBC found in modules NZ%PAR and TIXR6S
/SLOAD: Duplicate entry point POP1N found in modules NZ%LOW and TIXR6S
/SLOAD: Duplicate entry point RANGE found in modules NZ%GPR and TIXR6S
/SLOAD: Duplicate entry point RDINFO found in modules NZ%BUT and TIXR6S
/SLOAD: Duplicate entry point READIN found in modules NZ%BAS and TIXR6S

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/SLOAD: Duplicate entry point RESPTR found in modules NZ%PAR and IIXR6S
/SLOAD: Duplicate entry point SENDIT found in modules NZ%IOR and IIXR6S
SLOAD Rev. 2309/Ver. 1.40

Output module:

IIXHP7:II:MS::-1 Start=F0000 End=F7FFF Length=08000 Syms=2489 Refs=1605
Date=Tue Jan 24, 1984 5:40 pm Title=(IIXR6S) HPIL Interface ROM

Source modules:

NZXRST::MS Start=F0000 End=F0007 Length=00008
Date=Tue Jan 17, 1984 12:21 pm Title=Rom start (header) <830927.1416>

NZXTBL::MS Start=F0008 End=F0409 Length=00402
Date=Tue Jan 24, 1984 5:39 pm Title=Lexical Analyzer Tables--ID=FF

NZXERR::MS Start=F040A End=F06B4 Length=002AB
Date=Tue Jan 17, 1984 12:05 pm Title=

NZXDIR::MS Start=F06B5 End=F07C1 Length=0010D
Date=Tue Jan 17, 1984 12:03 pm Title=DIRECTORY SECTION <840106.1804>

NZXGPR::MS Start=F07C2 End=FOF99 Length=007D8
Date=Tue Jan 17, 1984 12:08 pm Title=GENERAL ROUTINES <840106.1701>

NZXBAS::MS Start=FOF9A End=F1F33 Length=00F9A
Date=Tue Jan 17, 1984 11:42 am Title=BASIC ROUTINES <840116.1657>

SCXENT::MS Start=F1F34 End=F2C95 Length=00D62
Date=Tue Jan 17, 1984 1:23 pm Title=ENTER Execution <840113.1057>

NZXUTL::MS Start=F2C96 End=F2ED6 Length=00241
Date=Tue Jan 17, 1984 12:22 pm Title=User Utility Routines <830927.1255>

NZXBIF::MS Start=F2ED7 End=F362D Length=00757
Date=Tue Jan 24, 1984 5:33 pm Title=Basic interface <840124.1345>

NZXIOB::MS Start=F362E End=F3636 Length=00009
Date=Tue Jan 17, 1984 12:16 pm Title=I/O Buffer routines <830927.1450>

NZXDSP::MS Start=F3637 End=F3BF6 Length=005C0
Date=Tue Jan 17, 1984 12:03 pm Title=Display driver <831108.0941>

NZXBUT::MS Start=F3BF7 End=F4292 Length=0069C
Date=Tue Jan 17, 1984 11:52 am Title=BASIC UTILITIES <840104.1515>

NZXCAS::MS Start=F4293 End=F511A Length=00E88
Date=Tue Jan 17, 1984 11:55 am Title=CASSETTE ROUTINES<831221.1632>

NZXHND::MS Start=F511B End=F5E90 Length=00D76
Date=Tue Jan 17, 1984 12:12 pm Title=POLL HANDLERS <840106.0805>

NZXCAT::MS Start=F5E91 End=F66D1 Length=00841
Date=Tue Jan 17, 1984 11:59 am Title=HPIL CAT <840106.1936>

NZXIOR::MS Start=F66D2 End=F6BD7 Length=00506
Date=Tue Jan 17, 1984 12:16 pm Title=I/O(NEW Mailbox)<831101.2117>

NZXFRA::MS Start=F6BD8 End=F6D55 Length=0017E
Date=Tue Jan 17, 1984 12:06 pm Title=PII Frame Routines<831012.1534>

NZXLOW::MS Start=F6D56 End=F6E18 Length=000C3
Date=Tue Jan 17, 1984 12:17 pm Title=Low-level USER HP-IL <830927.1414>

NZXFQO::MS Start=F6E19 End=F74FC Length=006E4
Date=Tue Jan 17, 1984 12:06 pm Title=File Execution <840113.1351>

NZXPAR::MS Start=F74FD End=F7BD2 Length=006D6
Date=Tue Jan 17, 1984 12:18 pm Title=NZ'S PARSE ROUTINES <831128.2333>

NZXDEC::MS Start=F7BD3 End=F7EFO Length=0031E
Date=Tue Jan 17, 1984 12:02 pm Title=PIL DECOMPILE ROUTINES<831027.1220>

NZSYM::MS Module Contains No Code
Date=Tue Jan 17, 1984 12:21 pm Title=Symbolic Assignments <831220.1633>

SAXRMT Start=F7FFC End=F7FFD Length=00002
Date=Mon Nov 22, 1982 8:48 am Title=ROM/IRAM tail end

SAXRMT Start=F7FFE End=F7FFF Length=00002
Date=Mon Nov 22, 1982 8:48 am Title=ROM/IRAM tail end

TIXR6S Module Contains No Code
Date=Tue Jan 17, 1984 10:07 am Title=Titan External Symbol File

Saturn Long Cross Reference Listing

#CK	=	03356	TIZR6S	-
#Timeo	=	0001E	NZ%SYM	- F160E NZ%BAS(00744) Type=0.0 Nibs=2
-LINE	=	15275	TIZR6S	-
1/X15	=	0C33E	TIZR6S	-
?A=CLN	=	F7EE6	NZ%DEC	-
?A=CM+	=	F7EDB	NZ%DEC	- F75A6 NZ%PAR(000A9) Type=1.1 Nibs=4 Dist=00935 + F76E0 NZ%PAR(001E3) Type=1.1 Nibs=3 Dist=007FB
?A=CMA	=	F7ED8	NZ%DEC	-
?PRFI+	=	17380	TIZR6S	-
?PRFIL	=	1737E	TIZR6S	-
A-MULT	=	F0E22	NZ%GPR	- F5276 NZ%HND(0015B) Type=1.1 Nibs=4 Dist=04454 + F650A NZ%CAT(00679) Type=1.1 Nibs=4 Dist=056E8
ACCEPT	=	0450F	TIZR6S	-
ACOS12	=	0DBD3	TIZR6S	-
ACOS15	=	0DBD7	TIZR6S	-
ACTIVE	=	2F5A8	TIZR6S	-
AD15M	=	0C366	TIZR6S	-
AD15S	=	0E19D	TIZR6S	-
AD15s	=	0C369	TIZR6S	-
AD2-12	=	0C35F	TIZR6S	-
AD2-15	=	0C363	TIZR6S	-
ADDF	=	0C372	TIZR6S	-
ADDFONE	=	0C330	TIZR6S	-
ADDP	=	03A03	TIZR6S	-
ADDRSS	=	0F527	TIZR6S	-
ADHEAD	=	181B7	TIZR6S	-
ADJA	=	1289A	TIZR6S	-
ADJN	=	12825	TIZR6S	-
ADRS40	=	0F52B	TIZR6S	-
ADRS50	=	0F551	TIZR6S	-
ADRS80	=	0F567	TIZR6S	-
ADRSUB	=	0F4CF	TIZR6S	-
ALLDUN	=	04BEF	TIZR6S	-
ALMSRV	=	1257D	TIZR6S	-
ALRM1	=	2F719	TIZR6S	-
ALRM2	=	2F725	TIZR6S	-
ALRM3	=	2F731	TIZR6S	-
ALRM4	=	2F73D	TIZR6S	-
ALRM5	=	2F749	TIZR6S	-
ALRM6	=	2F755	TIZR6S	-
ALRNOG	=	F0EA8	NZ%GPR	-
ALRNOS	=	F0EDA	NZ%GPR	-
ANN1.5	=	2E101	TIZR6S	-
ANNAD1	=	2E100	TIZR6S	-
ANNAD2	=	2E102	TIZR6S	-
ANNAD3	=	2E34C	TIZR6S	-
ANNAD4	=	2E34E	TIZR6S	-
ARG12	=	0D67B	TIZR6S	-
ARG15	=	0D67F	TIZR6S	-
ARGERR	=	0BF19	TIZR6S	-
ARGF	=	0D6A4	TIZR6S	-
ARGPR+	=	0E8EB	TIZR6S	-
ARGPRP	=	0E8EF	TIZR6S	-
ARGST-	=	0E910	TIZR6S	-

ARGSTA =	0E90C	TIXR6S	-
ARITH =	061E0	TIXR6S	-
ARLNOS =	FOEC2	NZ%GPR	-
ARRYCK =	0366A	TIXR6S	-
ARYDC =	05178	TIXR6S	-
ARYELM =	0B5A7	TIXR6S	-
ARYSIZ =	0B61B	TIXR6S	-
ASCICK =	0514E	TIXR6S	-
ASCI =	0079B	TIXR6S	-
ASGNIO =	F19CD	NZ%BAS	- F0116 NZ%TBL(0010E) Type=1.2 Nibs=5 Dist=018B7
ASGNd =	F7D06	NZ%DEC	- F19C3 NZ%BAS(00A29) Type=1.2 Nibs=5 Dist=06343
ASGNp =	F769C	NZ%PAR	- F19C8 NZ%BAS(00A2E) Type=1.2 Nibs=5 Dist=05CD4
ASIN12 =	0DBC8	TIXR6S	-
ASIN15 =	0DBCC	TIXR6S	-
ASLC1 =	FOF11	NZ%GPR	-
ASLC10 =	FOF19	NZ%GPR	-
ASLC11 =	FOF1C	NZ%GPR	-
ASLC12 =	FOF1F	NZ%GPR	- F576C NZ%HND(00651) Type=1.1 Nibs=4 Dist=0484D + F6F34 NZ%FXQ(0011B) Type=1.1 Nibs=4 Dist=06015
ASLC13 =	FOF22	NZ%GPR	-
ASLC14 =	FOF25	NZ%GPR	-
ASLC15 =	FOF28	NZ%GPR	-
ASLC2 =	FOF0E	NZ%GPR	- F1AEB NZ%BAS(00B51) Type=1.1 Nibs=4 Dist=00BDD
ASLC3 =	FOF0B	NZ%GPR	- F49CA NZ%CAS(00737) Type=1.1 Nibs=4 Dist=03ABF + F5248 NZ%HND(0012D) Type=1.1 Nibs=4 Dist=0433D
ASLC4 =	FOF08	NZ%GPR	- F1421 NZ%BAS(00487) Type=1.1 Nibs=3 Dist=00519 + F35CA NZ%BIF(006F3) Type=1.1 Nibs=4 Dist=026C2 + F43BD NZ%CAS(0012A) Type=1.1 Nibs=4 Dist=034B5 + F43CF NZ%CAS(0013C) Type=1.1 Nibs=4 Dist=034C7 + F453C NZ%CAS(002A9) Type=1.1 Nibs=4 Dist=03634 + F56AC NZ%HND(00591) Type=1.1 Nibs=4 Dist=047A4 - F18A5 NZ%BAS(0090B) Type=1.1 Nibs=4 Dist=009A0 - F56CC NZ%HND(005B1) Type=1.1 Nibs=4 Dist=047CA
ASLC5 =	FOF05	NZ%GPR	-
ASLC6 =	FOF02	NZ%GPR	-
ASLC7 =	FOEFF	NZ%GPR	-
ASLC8 =	FOEFC	NZ%GPR	-
ASLC9 =	FOF16	NZ%GPR	- F4936 NZ%CAS(006A3) Type=1.1 Nibs=4 Dist=03A20
ASLW3 =	0ED21	TIXR6S	-
ASLW4 =	0ED1E	TIXR6S	-
ASLW5 =	0ED1B	TIXR6S	-
ASNMT =	0F5E0	TIXR6S	-
ASRC1 =	FOF28	NZ%GPR	-
ASRC10 =	FOF02	NZ%GPR	- F4711 NZ%CAS(0047E) Type=1.1 Nibs=4 Dist=0380F + F56E4 NZ%HND(005C9) Type=1.1 Nibs=4 Dist=047E2
ASRC11 =	FOF05	NZ%GPR	-
ASRC12 =	FOF08	NZ%GPR	-
ASRC13 =	FOF0B	NZ%GPR	-
ASRC14 =	FOF0E	NZ%GPR	-
ASRC15 =	FOF11	NZ%GPR	-
ASRC2 =	FOF25	NZ%GPR	- F1AC7 NZ%BAS(00B2D) Type=1.1 Nibs=4 Dist=00BA2
ASRC3 =	FOF22	NZ%GPR	- F49BF NZ%CAS(0072C) Type=1.1 Nibs=4 Dist=03A9D + F55E3 NZ%HND(004C8) Type=1.1 Nibs=4 Dist=046C1
ASRC4 =	FOF1F	NZ%GPR	- F137B NZ%BAS(003E1) Type=1.1 Nibs=3 Dist=0045C + F140C NZ%BAS(00472) Type=1.1 Nibs=3 Dist=004ED + F14CB NZ%BAS(00531) Type=1.1 Nibs=3 Dist=005AC + F4AA6 NZ%CAS(00813) Type=1.0 Nibs=4 Dist=03B87 + F5574 NZ%HND(00459) Type=1.1 Nibs=4 Dist=04655 + F6EAF NZ%FXQ(00096) Type=1.1 Nibs=4 Dist=05F90
ASRC5 =	FOF1C	NZ%GPR	- F18B3 NZ%BAS(00919) Type=1.1 Nibs=4 Dist=00997 + F2B9D SC%ENT(00C69) Type=1.1 Nibs=4 Dist=01C81 + F415E NZ%BUT(00567) Type=1.1 Nibs=4 Dist=03242

	+ F467E NZ%CAS(003EB) Type=1.1 Nibs=4 Dist=03762
	+ F5593 NZ%HND(00478) Type=1.1 Nibs=4 Dist=04677
	+ F5A1A NZ%HND(008FF) Type=1.1 Nibs=4 Dist=04AFE
ASRC6 = FOF19 NZ%GPR	-
ASRC7 = FOF16 NZ%GPR	-
ASRC8 = FOEFC NZ%GPR	- F4E72 NZ%CAS(00BDF) Type=1.1 Nibs=4 Dist=03F76
ASRC9 = FOEFF NZ%GPR	- F49A6 NZ%CAS(00713) Type=1.1 Nibs=4 Dist=03AA7
ASRW3 = 0ED10 TI%R6S	-
ASRW4 = 0ED0D TI%R6S	-
ASRW5 = 0ED0A TI%R6S	-
ATAN15 = 0DBBE TI%R6S	-
ATNCHK = FOBC5 NZ%GPR	- F34FF NZ%BIF(00628) Type=1.1 Nibs=4 Dist=0293A
ATNCLR = 00510 TI%R6S	-
ATNDIS = 2F441 TI%R6S	-
ATNFLG = 2F442 TI%R6S	- F0BD1 NZ%GPR(0040F) Type=0.0 Nibs=5
	+ F2B43 SC%ENT(00C0F) Type=0.0 Nibs=5
	+ F2F81 NZ%BIF(000AA) Type=0.0 Nibs=5
	+ F67A4 NZ%IOR(000D2) Type=0.0 Nibs=5
	+ F6A0D NZ%IOR(0033B) Type=0.0 Nibs=5
	+ F6AE2 NZ%IOR(00410) Type=0.0 Nibs=5
	-
AUTINC = 2F6CB TI%R6S	-
AVE=C = 18BBB TI%R6S	-
AVE=D1 = 18BB8 TI%R6S	- F21BD SC%ENT(00289) Type=0.1 Nibs=5
AVM+16 = F40C2 NZ%BUT	-
AVMEME = 2F599 TI%R6S	- FOF76 NZ%GPR(007B4) Type=0.0 Nibs=5
AVMEMS = 2F594 TI%R6S	- FOF7F NZ%GPR(007BD) Type=0.0 Nibs=5
AVS2DS = 09708 TI%R6S	-
Attn = 0000C NZ%SYM	- F0BC7 NZ%GPR(00405) Type=0.0 Nibs=1
	+ F679C NZ%IOR(000CA) Type=0.0 Nibs=1
	+ F69B1 NZ%IOR(002DF) Type=0.0 Nibs=1
	+ F69F5 NZ%IOR(00323) Type=0.0 Nibs=1
	+ F6A26 NZ%IOR(00354) Type=0.0 Nibs=1
	+ F6A88 NZ%IOR(003B6) Type=0.0 Nibs=1
	+ F6AAA NZ%IOR(003D8) Type=0.0 Nibs=1
	+ F6B62 NZ%IOR(00490) Type=0.0 Nibs=1
	+ F6B93 NZ%IOR(004C1) Type=0.0 Nibs=1
	-
BACK = 1BAAF TI%R6S	-
BACK1B = 13B0C TI%R6S	-
BACK2B = 13B0A TI%R6S	-
BACK3B = 13B08 TI%R6S	-
BAKCHR = F3FC2 NZ%BUT	- F1ADD NZ%BAS(00B43) Type=1.1 Nibs=4 Dist=024E5
	+ F74D0 NZ%FXQ(006B7) Type=1.0 Nibs=4 Dist=0350E
	-
BASCHA = 07741 TI%R6S	-
BASCHK = 0773E TI%R6S	-
BASE = 0F953 TI%R6S	-
BASICs = 000B5 TI%R6S	-
BDISPJ = F3637 NZ%DSP	- F3001 NZ%BIF(0012A) Type=1.2 Nibs=5 Dist=00636
BEEP = 0EA6E TI%R6S	-
BF2DSP = 01C0E TI%R6S	- F1871 NZ%BAS(008D7) Type=0.1 Nibs=5
	+ F1914 NZ%BAS(0097A) Type=0.1 Nibs=5
	+ F5F35 NZ%CAT(000A4) Type=0.1 Nibs=5
	-
BF2STK = 18663 TI%R6S	-
BIASA+ = 0D52D TI%R6S	-
BIASC+ = 0D540 TI%R6S	-
BIG = 0B747 TI%R6S	-
BINAND = F1E66 NZ%BAS	- F0098 NZ%TBL(00090) Type=1.2 Nibs=5 Dist=01DCE
BINCMF = F1EB7 NZ%BAS	- F00A1 NZ%TBL(00099) Type=1.2 Nibs=5 Dist=01E16
BINEOR = F1E96 NZ%BAS	- F00AA NZ%TBL(000A2) Type=1.2 Nibs=5 Dist=01DEC
BINIOR = F1E86 NZ%BAS	- F00B3 NZ%TBL(000AB) Type=1.2 Nibs=5 Dist=01DD3

BIT = F1ECF NZ%BAS	- F00BC NZ%TBL(000B4) Type=1.2 Nibs=5 Dist=01E13
BLANK = F7B2A NZ%PAR	-
BLANKC = F0F5E NZ%GPR	- F1811 NZ%BAS(00877) Type=1.1 Nibs=4 Dist=008B3
	+ F38C6 NZ%DSP(0028F) Type=1.1 Nibs=4 Dist=02968
	+ F4429 NZ%CAS(00196) Type=1.1 Nibs=4 Dist=034CB
	+ F58DE NZ%HND(007C3) Type=1.1 Nibs=4 Dist=04980
	+ F63C3 NZ%CAT(00532) Type=1.1 Nibs=4 Dist=05465
	+ F7433 NZ%FXQ(0061A) Type=1.1 Nibs=4 Dist=064D5
	-
BLDBIT = 019BC TIXR6S	-
BLDCAT = F6395 NZ%CAT	-
BLDCOM = 16279 TIXR6S	- F213E SCXENT(0020A) Type=0.1 Nibs=5
BLDDSP = 01898 TIXR6S	-
BLDLCD = 0189C TIXR6S	-
BLNKCK = 051C1 TIXR6S	-
BOPNM- = 1B864 TIXR6S	-
BP+C = 0EB40 TIXR6S	-
BRT30 = 0DBE3 TIXR6S	-
BRTF = 0DC15 TIXR6S	-
BSCEX2 = 0743A TIXR6S	-
BSCEXC = 07437 TIXR6S	-
BSCEXT = 075CF TIXR6S	-
BSERR = 0939A TIXR6S	- F1A32 NZ%BAS(00A98) Type=0.1 Nibs=5
BitsOK = 00001 TIXR6S	-
BldIM+ = 1BA6A TIXR6S	-
BldIMA = 1BA66 TIXR6S	-
BldIMG = 1BA68 TIXR6S	-
	-
C+A2D1 = 1C053 TIXR6S	-
CALBIN = 18D8C TIXR6S	-
CALL = 18DAE TIXR6S	-
CALLP = 0389C TIXR6S	-
CALSTK = 2F5AD TIXR6S	-
CAT\$20 = 06746 TIXR6S	-
CATC++ = F7B11 NZ%PAR	-
CATCH+ = 03F69 TIXR6S	- F7B16 NZ%PAR(00619) Type=0.1 Nibs=5
CATCHR = 03F70 TIXR6S	-
CATEDT = 06435 TIXR6S	-
CHAIN+ = 07C12 TIXR6S	-
CHAIN- = 07C1C TIXR6S	- F56FA NZ%HND(005DF) Type=0.1 Nibs=5
CHECKD = F6864 NZ%IOR	-
CHEDIT = 14C99 TIXR6S	-
CHIRP = 0EC5A TIXR6S	-
CHKRIO = F411B NZ%BUT	- F7217 NZ%FXQ(003FE) Type=1.1 Nibs=4 Dist=030FC
CHKASN = F3CEC NZ%BUT	- F0FBC NZ%BAS(00022) Type=1.1 Nibs=4 Dist=02D30
	+ F22AE SCXENT(0037A) Type=1.1 Nibs=4 Dist=01A3E
	+ F2FEA NZ%BIF(00113) Type=1.1 Nibs=4 Dist=00D02
	+ F3643 NZ%DSP(0000C) Type=1.1 Nibs=3 Dist=006A9
	+ F53ED NZ%HND(002D2) Type=1.1 Nibs=4 Dist=01701
	- F5601 NZ%HND(004E6) Type=1.1 Nibs=4 Dist=012F3
	+ F5786 NZ%HND(0066B) Type=1.1 Nibs=4 Dist=01478
	-
CHKBIT = F430E NZ%CAS	- F1FC5 SCXENT(00091) Type=0.1 Nibs=5
	+ F2233 SCXENT(002FF) Type=0.1 Nibs=5
CHKEND = F6881 NZ%IOR	- F11F2 NZ%BAS(00258) Type=1.1 Nibs=4 Dist=030FF
CHKEOL = 13D6D TIXR6S	+ F14F3 NZ%BAS(00559) Type=1.1 Nibs=4 Dist=02DFE
	+ F3596 NZ%BIF(006BF) Type=1.1 Nibs=4 Dist=00D5B
	+ F51C8 NZ%HND(000AD) Type=1.1 Nibs=4 Dist=00ED7
	+ F60E8 NZ%CAT(00257) Type=1.1 Nibs=4 Dist=01DF7
CHKSEC = F5CEB NZ%HND	- F4BD6 NZ%CAS(00943) Type=1.1 Nibs=4 Dist=01115
CHKSET = F31DE NZ%BIF	- F0C31 NZ%GPR(0046F) Type=1.1 Nibs=4 Dist=025AD

CHKST+ = F31F5 NZXBIF	- F6E06 NZ%LOW(000B0) Type=1.1 Nibs=4 Dist=03C11
CHKSTS = F0C24 NZ%GPR	- F2AA1 SC%ENT(00B6D) Type=1.1 Nibs=4 Dist=01E7D
	+ F3069 NZXBIF(00192) Type=1.1 Nibs=4 Dist=02445
CHKmen = 012C7 TIXR6S	-
CHN#SV = 2F96F TIXR6S	- F2219 SC%ENT(002E5) Type=0.0 Nibs=5
CHNHED = 0F579 TIXR6S	-
CHNLST = 2F5BE TIXR6S	-
CK"ON" = 076AD TIXR6S	-
CK=ATN = F6A03 NZ%IOR	-
CK=ATn = F6A08 NZ%IOR	- F5F66 NZ%CAT(000D5) Type=1.1 Nibs=4 Dist=00AA2
CKBITL = F5784 NZ%HND	- F5E92 NZ%CAT(00001) Type=1.1 Nibs=3 Dist=0070E
CKHPI+ = F5790 NZ%HND	-
CKHPIL = F578D NZ%HND	-
CKINF- = 18534 TIXR6S	- F661B NZ%CAT(0078A) Type=0.1 Nibs=5
CKINFO = 18542 TIXR6S	-
CKLOP# = F297B SC%ENT	- F153E NZ%BAS(005A4) Type=1.1 Nibs=4 Dist=0143D
	+ F1981 NZ%BAS(009E7) Type=1.1 Nibs=4 Dist=00FFA
CKSREQ = 00721 TIXR6S	-
CKSTR = F7A84 NZ%PAR	-
CKSUM2 = 0AA81 TIXR6S	-
CKSUM3 = 153A9 TIXR6S	-
CKSUM4 = 1DBA6 TIXR6S	-
CKnode = F28FF SC%ENT	- F15CA NZ%BAS(00630) Type=1.1 Nibs=4 Dist=01335
CLASSA = 0D590 TIXR6S	-
CLCBFR = 2F576 TIXR6S	-
CLCSTK = 2F585 TIXR6S	-
CLEAR = F1585 NZ%BAS	- F010D NZ%TBL(00105) Type=1.2 Nibs=5 Dist=01478
CLEARn = F4318 NZ%CAS	-
CLEARd = F7CC7 NZ%DEC	- F157B NZ%BAS(005E1) Type=1.2 Nibs=5 Dist=0674C
CLEARp = F761E NZ%PAR	- F1580 NZ%BAS(005E6) Type=1.2 Nibs=5 Dist=0609E
CLLOOP = F431D NZ%CAS	-
CLMODE = F24CE SC%ENT	- F5A73 NZ%HND(00958) Type=1.1 Nibs=4 Dist=035A5
CLOSEA = 120E4 TIXR6S	-
CLOSEF = 12087 TIXR6S	-
CLRFRC = 0C6F4 TIXR6S	-
CLRPRM = 04827 TIXR6S	-
CLRTSR = 0FD00 NZ%SYM	-
CMD1ST = 01654 TIXR6S	-
CMDFND = 01693 TIXR6S	-
CMDINI = 016D1 TIXR6S	-
CMDPR" = 01627 TIXR6S	-
CMDPTR = 2F6D4 TIXR6S	-
CMDS20 = 01672 TIXR6S	-
CMOSTV = 0168F TIXR6S	-
CMOSTW = 2F438 TIXR6S	-
CMPT = 125B2 TIXR6S	-
CNFFND = 109AC TIXR6S	- F3C91 NZ%BUT(0009A) Type=0.1 Nibs=5
CNFLCT = 0BD15 TIXR6S	-
CNTADR = 2F67E TIXR6S	-
CNTRLd = F7EA2 NZ%DEC	- F2A69 SC%ENT(00B35) Type=1.2 Nibs=5 Dist=05439
CNTRLp = F7B9A NZ%PAR	- F2A6E SC%ENT(00B3A) Type=1.2 Nibs=5 Dist=0512C
CNVUCR = 152A7 TIXR6S	-
CNVWUC = 03FB8 TIXR6S	- F7BCE NZ%PAR(006D1) Type=0.1 Nibs=5
COLDST = 00000 TIXR6S	-
COLLAP = 091FB TIXR6S	-
COMCK = 036CD TIXR6S	-
COMCK+ = 032AE TIXR6S	-
CONCOM = 0467E TIXR6S	-
CONF = 10212 TIXR6S	-
CONFST = 2F9E6 TIXR6S	-

CONTRL = F2A73 SCZENT	- F01CA NZXTBL(001C2) Type=1.2 Nibs=5 Dist=028A9
CONVUC = F0E6D NZXGPR	- F2E3C NZXUTL(001A6) Type=1.1 Nibs=4 Dist=01FCF
CONWUC = F7BCC NZXPAR	-
COPYU = 08269 TIXR6S	-
CORUPT = 09083 TIXR6S	-
COS12 = 0D721 TIXR6S	-
COS15 = 0D725 TIXR6S	-
COUNTC = 1C346 TIXR6S	- F270D SCZENT(007D9) Type=0.1 Nibs=5
CPL#10 = 07887 TIXR6S	-
CPLXER = F2631 SCZENT	- F2629 SCZENT(006F5) Type=1.2 Nibs=3 Dist=00008
CR = 2C000 TIXR6S	-
CRDFIL = 1D21D TIXR6S	-
CREATE = 115A7 TIXR6S	-
CRETf+ = 084C4 TIXR6S	-
CRFSB- = 11664 TIXR6S	-
CRLFND = 0229E TIXR6S	- F664E NZXCAT(007BD) Type=0.1 Nibs=5
CRLF0F = 02296 TIXR6S	-
CRLFSD = 022A2 TIXR6S	-
CRIF = 116C1 TIXR6S	- F5975 NZXHND(0085A) Type=0.1 Nibs=5
CSL9R0 = 1BA0D TIXR6S	-
CSLC1 = F0F42 NZXGPR	-
CSLC10 = F0F4A NZXGPR	- F465F NZXCAS(003CC) Type=1.1 Nibs=4 Dist=03715
	+ F5BDC NZXHND(00AC1) Type=1.0 Nibs=4 Dist=04C92
CSLC11 = F0F4D NZXGPR	-
CSLC12 = F0F50 NZXGPR	- F1C1F NZXBAS(00C85) Type=1.1 Nibs=4 Dist=00CCF
CSLC13 = F0F53 NZXGPR	-
CSLC14 = F0F56 NZXGPR	-
CSLC15 = F0F59 NZXGPR	-
CSLC2 = F0F3F NZXGPR	- F139B NZXBAS(00401) Type=1.1 Nibs=3 Dist=0045C
	+ F4FC3 NZXCAS(00D30) Type=1.1 Nibs=4 Dist=04084
	+ F5731 NZXHND(00616) Type=1.1 Nibs=4 Dist=047F2
CSLC3 = F0F3C NZXGPR	- F12D3 NZXBAS(00339) Type=1.1 Nibs=3 Dist=00397
	+ F4AA0 NZXCAS(0080D) Type=1.0 Nibs=4 Dist=03B64
	+ F5462 NZXHND(00347) Type=1.1 Nibs=4 Dist=04526
CSLC4 = F0F39 NZXGPR	- F1677 NZXBAS(006DD) Type=1.0 Nibs=3 Dist=0073E
	+ F3E1C NZXBUT(00225) Type=1.1 Nibs=4 Dist=02EE3
	+ F40FD NZXBUT(00506) Type=1.0 Nibs=4 Dist=031C4
	+ F54B4 NZXHND(00399) Type=1.0 Nibs=4 Dist=0457B
CSLC5 = F0F36 NZXGPR	- F2176 SCZENT(00242) Type=1.1 Nibs=4 Dist=01240
	+ F217E SCZENT(0024A) Type=1.1 Nibs=4 Dist=01248
	+ F274B SCZENT(00817) Type=1.1 Nibs=4 Dist=01815
	+ F3092 NZXBIF(001BB) Type=1.1 Nibs=4 Dist=0215C
	+ F66B6 NZXCAT(00825) Type=1.0 Nibs=4 Dist=05780
	+ F7A9B NZXPAR(0059E) Type=1.1 Nibs=4 Dist=06B65
CSLC6 = F0F33 NZXGPR	- F5286 NZXHND(0016B) Type=1.1 Nibs=4 Dist=04353
CSLC7 = F0F30 NZXGPR	- F519F NZXHND(00084) Type=1.1 Nibs=4 Dist=0426F
CSLC8 = F0F2D NZXGPR	- F4CBF NZXCAS(00A2C) Type=1.1 Nibs=4 Dist=03D92
CSLC9 = F0F47 NZXGPR	- F3E80 NZXBUT(00289) Type=1.1 Nibs=4 Dist=02F39
	+ F52E4 NZXHND(001C9) Type=1.1 Nibs=4 Dist=0439D
CSLW3 = 0ED43 TIXR6S	-
CSLW4 = 0ED40 TIXR6S	-
CSLW5 = 0ED3D TIXR6S	-
CSPEED = 2F977 TIXR6S	-
CSRC1 = F0F59 NZXGPR	-
CSRC10 = F0F33 NZXGPR	- F5C69 NZXHND(00B4E) Type=1.0 Nibs=4 Dist=04D36
	+ F66BC NZXCAT(0082B) Type=1.0 Nibs=4 Dist=05789
CSRC11 = F0F36 NZXGPR	-
CSRC12 = F0F39 NZXGPR	- F6F05 NZXFXQ(000EC) Type=1.1 Nibs=4 Dist=05FCC
CSRC13 = F0F3C NZXGPR	-
CSRC14 = F0F3F NZXGPR	-

CSRC15 = FOF42 NZXGPR -
 CSRC2 = FOF56 NZXGPR - F4F63 NZXCAS(00C00) Type=1.1 Nibs=4 Dist=0400D
 + F7130 NZXFXQ(00317) Type=1.1 Nibs=4 Dist=061DA
 CSRC3 = FOF53 NZXGPR - F3EBB NZXBUT(002C4) Type=1.1 Nibs=4 Dist=02F68
 + F4A91 NZXCAS(007FE) Type=1.0 Nibs=4 Dist=03B3E
 + F547E NZXHND(00363) Type=1.1 Nibs=4 Dist=0452B
 CSRC4 = FOF50 NZXGPR - F167E NZXBAS(006E4) Type=1.0 Nibs=3 Dist=0072E
 + F40F4 NZXBUT(004FD) Type=1.0 Nibs=4 Dist=031A4
 + F5257 NZXHND(0013C) Type=1.1 Nibs=4 Dist=04307
 + F52A5 NZXHND(0018A) Type=1.1 Nibs=4 Dist=04355
 CSRC5 = FOF4D NZXGPR - F2195 SCZENT(00261) Type=1.1 Nibs=4 Dist=01248
 + F219E SCZENT(0026A) Type=1.1 Nibs=4 Dist=01251
 + F2586 SCZENT(00652) Type=1.1 Nibs=4 Dist=01639
 + F273B SCZENT(00807) Type=1.1 Nibs=4 Dist=017EE
 + F309F NZXBIF(001C8) Type=1.1 Nibs=4 Dist=02152
 + F5486 NZXHND(0036B) Type=1.1 Nibs=4 Dist=04539
 + F551C NZXHND(00401) Type=1.1 Nibs=4 Dist=045CF
 + F5726 NZXHND(0060B) Type=1.1 Nibs=4 Dist=047D9
 + F66AC NZXCAT(0081B) Type=1.0 Nibs=4 Dist=0575F
 + F7AB2 NZXPAR(005B5) Type=1.1 Nibs=4 Dist=06B65
 CSRC6 = FOF4A NZXGPR -
 CSRC7 = FOF47 NZXGPR -
 CSRC8 = FOF2D NZXGPR - F49B6 NZXCAS(00723) Type=1.1 Nibs=4 Dist=03A89
 + F4B69 NZXCAS(008D6) Type=1.1 Nibs=4 Dist=03C3C
 CSRC9 = FOF30 NZXGPR - F4DB6 NZXCAS(00B23) Type=1.1 Nibs=4 Dist=03E86
 + F53AE NZXHND(00293) Type=1.1 Nibs=4 Dist=0447E
 CSRW3 = 0ED32 TIXR6S -
 CSRW4 = 0ED2F TIXR6S -
 CSRW5 = 0ED2C TIXR6S -
 CURBOT = 10059 TIXR6S -
 CURDVC = 0A60B TIXR6S -
 CURREN = 2F56C TIXR6S -
 CURRL = 2F7E8 TIXR6S -
 CURRST = 2F55D TIXR6S -
 CURSFL = 151DF TIXR6S - F6647 NZXCAT(007B6) Type=0.1 Nibs=5
 CURSFR = 151D7 TIXR6S -
 CURSOR = 2F47E TIXR6S - F3939 NZXDSP(00302) Type=0.0 Nibs=4
 + F3ACB NZXDSP(00494) Type=0.0 Nibs=5
 + F3BE4 NZXDSP(005AD) Type=0.0 Nibs=5
 CURSRD = 100A4 TIXR6S -
 CURSRT = 096C1 TIXR6S -
 CURSRU = 1009A TIXR6S -
 CURTOP = 10063 TIXR6S -
 CVUCW = 03FBC TIXR6S -
 ChainE = F7FFE Define - F0028 NZXTBL(00020) Type=1.2 Nibs=5 Dist=07FD6
 Checks = F7FFC Define -
 CkLoop = 1B669 TIXR6S -
 CkLpNC = 1B66D TIXR6S -
 CkTape = 00005 NZXSYM -
 Clear = 00005 TIXR6S - F3BB9 NZXDSP(00582) Type=0.0 Nibs=1
 Clear? = F3BAA NZXDSP -
 CloseR = 00008 NZXSYM - F12EF NZXBAS(00355) Type=0.0 Nibs=1
 Cslc10 = F5BDA NZXHND - F6091 NZXCAT(00200) Type=1.1 Nibs=3 Dist=004B7
 + F61D1 NZXCAT(00340) Type=1.1 Nibs=3 Dist=005F7
 + F6349 NZXCAT(004B8) Type=1.1 Nibs=3 Dist=0076F
 CurOff = 00006 TIXR6S -
 DO+2RD = 13A32 TIXR6S -
 DO=AVS = 09B2C TIXR6S -
 DO=FIB = 13AC5 TIXR6S - F5433 NZXHND(00318) Type=0.1 Nibs=5

D0=FRO = F5C9C NZ%HND	- F660A NZ%CAT(00779) Type=1.1 Nibs=4 Dist=0096E
	+ F6629 NZ%CAT(00798) Type=1.1 Nibs=4 Dist=0098D
D0=PCA = 09B37 TI%R6S	- F2563 SC%ENT(0062F) Type=0.1 Nibs=5
D0@CUR = F3BCA NZ%DSP	-
D0ASC+ = 0982C TI%R6S	-
D0ASCI = 09833 TI%R6S	-
D12ROA = 1BA3C TI%R6S	-
D1=AVE = F0F74 NZ%GPR	- F2C0C SC%ENT(00CD8) Type=1.1 Nibs=4 Dist=01C98
	+ F3F54 NZ%BUT(0035D) Type=1.1 Nibs=4 Dist=02FE0
	+ F40CD NZ%BUT(004D6) Type=1.1 Nibs=4 Dist=03159
	+ F4614 NZ%CAS(00381) Type=1.1 Nibs=4 Dist=036A0
	+ F5FFB NZ%CAT(0016A) Type=1.1 Nibs=4 Dist=05087
D1=AVS = F0F7D NZ%GPR	- F253C SC%ENT(00608) Type=1.1 Nibs=4 Dist=015BF
	+ F6239 NZ%CAT(003A8) Type=1.1 Nibs=4 Dist=052BC
	+ F6ED1 NZ%FXQ(000B8) Type=1.1 Nibs=4 Dist=05F54
D1=DSP = F3281 NZ%BIF	- F1A04 NZ%BAS(00A6A) Type=1.1 Nibs=4 Dist=0187D
D1=DST = F328A NZ%BIF	- F11BF NZ%BAS(00225) Type=1.1 Nibs=4 Dist=020CB
	+ F195E NZ%BAS(009C4) Type=1.1 Nibs=4 Dist=0192C
	+ F1994 NZ%BAS(009FA) Type=1.1 Nibs=4 Dist=018F6
	- F11B4 NZ%BAS(0021A) Type=1.1 Nibs=4 Dist=020DF
	-
D1=DSX = F3293 NZ%BIF	- F5DC5 NZ%HND(00CAA) Type=1.1 Nibs=4 Dist=01399
D1=S20 = F5C93 NZ%HND	- F354F NZ%BIF(00678) Type=1.1 Nibs=4 Dist=01EBF
D1=SCR = F4A2C NZ%CAS	-
D1=SDO = F1690 NZ%BAS	- F2652 SC%ENT(0071E) Type=1.0 Nibs=4 Dist=016CC
D1=SRO = F1687 NZ%BAS	+ F3533 NZ%BIF(0065C) Type=1.1 Nibs=4 Dist=025AD
D1@AVE = F0F86 NZ%GPR	+ F66C2 NZ%CAT(00831) Type=1.0 Nibs=4 Dist=0573C
	+ F6EE2 NZ%FXQ(000C9) Type=1.1 Nibs=4 Dist=05F5C
	+ F6F21 NZ%FXQ(00108) Type=1.1 Nibs=4 Dist=05F9B
	+ F74B8 NZ%FXQ(0069F) Type=1.1 Nibs=4 Dist=06532
	- F46C4 NZ%CAS(00431) Type=1.1 Nibs=4 Dist=03732
	+ F6190 NZ%CAT(002FF) Type=1.1 Nibs=4 Dist=051FE
	-
D1@AVS = F0F92 NZ%GPR	- F28EB SC%ENT(009B7) Type=0.1 Nibs=5
	- F2251 SC%ENT(0031D) Type=0.1 Nibs=5
	-
D1C=R3 = 03047 TI%R6S	-
D1FSTK = 1955D TI%R6S	-
D1MST+ = 13E21 TI%R6S	-
D1MSTK = 1954E TI%R6S	-
D=AVME = 1A476 TI%R6S	-
D=AVMS = 1A460 TI%R6S	-
D=WORD = 04C0E TI%R6S	-
DATLEN = 0B584 TI%R6S	-
DATPTR = 2F692 TI%R6S	-
DAY2JD = 13407 TI%R6S	-
DAYYMD = 13335 TI%R6S	-
DBLPI4 = 0DAFC TI%R6S	-
DBLSUB = 0DADD TI%R6S	-
DCHX=C = 1B2D0 TI%R6S	-
DCHXF = 1B223 TI%R6S	-
DCHXW = 0ECD0 TI%R6S	-
DCONTR = 2E3FE TI%R6S	-
DCPLIN = 10108 TI%R6S	-
DCRMNT = 1C177 TI%R6S	- F2782 SC%ENT(0084E) Type=0.1 Nibs=5
DD1CTL = 2E3FF TI%R6S	-
DD1END = 2E34C TI%R6S	-
DD1ST = 2E300 TI%R6S	-
DD2CTL = 2E2FF TI%R6S	-
DD2END = 2E260 TI%R6S	-
DD2ST = 2E200 TI%R6S	-
DD3CTL = 2E1FF TI%R6S	-
DD3END = 2E160 TI%R6S	-
DD3ST = 2E104 TI%R6S	-

DDL	=	F6BBA	NZXIOR	-	FOBAE	NZXGPR(003EC)	Type=1.1	Nibs=4	Dist=0600C
				+	F166F	NZXBAS(006D5)	Type=1.0	Nibs=4	Dist=0554B
				+	F4A39	NZXCAS(007A6)	Type=1.0	Nibs=4	Dist=02181
				+	F5C8F	NZXHND(00B74)	Type=1.0	Nibs=4	Dist=00F2B
DDT	=	F6BC9	NZXIOR	-	FOB60	NZXGPR(0039E)	Type=1.1	Nibs=4	Dist=06069
				+	F12FF	NZXBAS(00365)	Type=1.0	Nibs=4	Dist=058CA
				+	F4A54	NZXCAS(007C1)	Type=1.0	Nibs=4	Dist=02175
				+	F6388	NZXCAT(004F7)	Type=1.1	Nibs=4	Dist=00841
DEBNCE	=	00CF7	TIZR6S	-					
DECHEX	=	1B2D2	TIZR6S	-					
DECP	=	0328F	TIZR6S	-					
DEFADC	=	052FC	TIZR6S	-					
DEFADR	=	2F967	TIZR6S	-	F2C56	SCXENT(00D22)	Type=0.0	Nibs=5	
DELAYT	=	2F948	TIZR6S	-					
DELAYp	=	02AC6	TIZR6S	-					
DEST	=	0F7B0	TIZR6S	-					
DEVID	=	F1B39	NZXBAS	-	FOOCE	NZXTB(000C6)	Type=1.2	Nibs=5	Dist=01A6B
DEVPAR	=	F1C85	NZXBAS	-					
DEVPR\$	=	F1CCB	NZXBAS	-	F60CC	NZXCAT(0023B)	Type=1.1	Nibs=4	Dist=04401
DEVSPp	=	F78B2	NZXP	-	F06D1	NZDIR(0001C)	Type=1.2	Nibs=5	Dist=071E1
DEVYp	=	F1C3C	NZXBAS	-	FOOD7	NZXTB(000CF)	Type=1.2	Nibs=5	Dist=01B65
DISINT	=	2F470	TIZR6S	-					
DISPDC	=	05450	TIZR6S	-	F7C2D	NZXDEC(0005A)	Type=0.1	Nibs=5	
DISPIS	=	F1142	NZXBAS	-	F0170	NZXTB(00168)	Type=1.2	Nibs=5	Dist=00FD2
DISPP	=	035A4	TIZR6S	-	F7518	NZXP(0001B)	Type=0.1	Nibs=5	
DISPt	=	00000	TIZR6S	-					
DIVF	=	0C488	TIZR6S	-					
DMNSN	=	0AE39	TIZR6S	-					
DONNA	=	09656	TIZR6S	-					
DPART2	=	17E83	TIZR6S	-					
DPART3	=	17EF8	TIZR6S	-					
DPOS	=	2F94D	TIZR6S	-					
DPVCTR	=	0AC50	TIZR6S	-					
DRANGE	=	1B076	TIZR6S	-					
DROPDC	=	05470	TIZR6S	-					
DSLEEP	=	0056D	TIZR6S	-					
DSP\$00	=	185DB	TIZR6S	-					
DSPBFE	=	2F540	TIZR6S	-					
DSPBFS	=	2F480	TIZR6S	-	F37B4	NZXDSP(0017D)	Type=0.0	Nibs=2	Offset= -2
				+	F37D3	NZXDSP(0019C)	Type=0.0	Nibs=5	
				+	F3ABF	NZXDSP(00488)	Type=0.0	Nibs=5	
DSPBUF	=	09723	TIZR6S	-					
DSPCAT	=	F6606	NZXCAT	-					
DSPCHA	=	01C3E	TIZR6S	-					
DSPCHC	=	01C3C	TIZR6S	-					
DSPCHX	=	2F674	TIZR6S	-	F3295	NZXBIF(003BE)	Type=0.0	Nibs=5	
DSPCL?	=	020B6	TIZR6S	-	F391C	NZXDSP(002E5)	Type=0.1	Nibs=5	
DSPCNA	=	09721	TIZR6S	-					
DSPCNB	=	0971F	TIZR6S	-					
DSPCNO	=	09716	TIZR6S	-					
DSPDGT	=	2F6DD	TIZR6S	-					
DSPFMT	=	2F6DC	TIZR6S	-					
DSPLI+	=	1010F	TIZR6S	-					
DSPLIN	=	10127	TIZR6S	-					
DSPMSK	=	2F540	TIZR6S	-					
DSPRST	=	02443	TIZR6S	-					
DSPSET	=	2F7B1	TIZR6S	-	F30A8	NZXBIF(001D1)	Type=0.0	Nibs=5	
				+	F328C	NZXBIF(003B5)	Type=0.0	Nibs=5	
				+	F364F	NZXDSP(00018)	Type=0.0	Nibs=4	
				+	F36E0	NZXDSP(000A9)	Type=0.0	Nibs=4	

DSPSTA = 2F475	TIxR6S	+ F392D NZxDSP(002F6)	Type=0.0	Nibs=4	
		+ F3997 NZxDSP(00360)	Type=0.0	Nibs=5	
		+ F3C61 NZxBUT(0006A)	Type=0.0	Nibs=5	
		- F390F NZxDSP(002D8)	Type=0.0	Nibs=5	
		+ F3923 NZxDSP(002EC)	Type=0.0	Nibs=4	Offset= 3
		+ F39D2 NZxDSP(0039B)	Type=0.0	Nibs=5	Offset= 3
		+ F3BAC NZxDSP(00575)	Type=0.0	Nibs=5	Offset= 3
DSPUPD = 01ADA	TIxR6S	-			
DSTRDC = 05280	TIxR6S	-			
DTOH = F0D67	NZxGPR	- F28A1 SCxENT(0096D)	Type=1.1	Nibs=4	Dist=01B3A
		+ F70E5 NZxFXQ(002CC)	Type=1.1	Nibs=4	Dist=0637E
		+ F712A NZxFXQ(00311)	Type=1.1	Nibs=4	Dist=063C3
		+ F7198 NZxFXQ(0037F)	Type=1.1	Nibs=4	Dist=06431
DV15M = 0C4AC	TIxR6S	-			
DV15S = 0C4B2	TIxR6S	-			
DV2-12 = 0C4A8	TIxR6S	-			
DV2-15 = 0C4AC	TIxR6S	-			
DVCPn* = F79B0	NZxPAR	-			
DVCPy* = F79B7	NZxPAR	-			
DVCSPp = F79BA	NZxPAR	-			
DVLBp = F788D	NZxPAR	-			
DVSPp = F78B5	NZxPAR	-			
DVZNIB = 2F6FC	TIxR6S	-			
DWIDTH = 2F94F	TIxR6S	-			
DXP100 = 0CF7F	TIxR6S	-			
DZP = 00003	TIxR6S	-			
DdlPwr = F5C73	NZxHND	- F4EA3 NZxCAS(00C10)	Type=1.1	Nibs=4	Dist=00DD0
		+ F501C NZxCAS(00D89)	Type=1.1	Nibs=4	Dist=00C57
DdtRd = F4A3D	NZxCAS	- F5A27 NZxHND(0090C)	Type=1.1	Nibs=4	Dist=00FER
DevID = 0003F	NZxSYM	- F0A23 NZxGPR(00261)	Type=0.0	Nibs=2	
		+ F3D86 NZxBUT(0018F)	Type=0.0	Nibs=2	
		+ F7256 NZxFXQ(0043D)	Type=0.0	Nibs=2	
DevTyp = 0001F	NZxSYM	- F09BF NZxGPR(001FD)	Type=0.0	Nibs=2	
		+ F3D5E NZxBUT(00167)	Type=0.0	Nibs=2	
		+ F4033 NZxBUT(0043C)	Type=0.0	Nibs=3	
		+ F4250 NZxBUT(00659)	Type=0.0	Nibs=2	
		+ F70F5 NZxFXQ(002DC)	Type=0.0	Nibs=2	
Device = 0000A	NZxSYM	- F0C0B NZxGPR(00449)	Type=0.0	Nibs=1	Offset= -8
		+ F0C62 NZxGPR(004A0)	Type=0.0	Nibs=1	
Digit = 00001	NZxPAR	-			
DispOK = 0000B	NZxSYM	- F2FAD NZxBIF(000D6)	Type=0.0	Nibs=1	
		+ F3669 NZxDSP(00032)	Type=0.0	Nibs=1	
		+ F368A NZxDSP(00053)	Type=0.0	Nibs=1	
		+ F369A NZxDSP(00063)	Type=0.0	Nibs=1	
		+ F36DD NZxDSP(000A6)	Type=0.0	Nibs=1	
		+ F3994 NZxDSP(0035D)	Type=0.0	Nibs=1	
		+ F3C6E NZxBUT(00077)	Type=0.0	Nibs=1	
DsAddr = 00000	NZxSYM	-			
DsDevI = 00002	NZxSYM	-			
DsDevT = 00001	NZxSYM	-			
DsLoop = 00005	NZxSYM	- F09B9 NZxGPR(001F7)	Type=0.0	Nibs=1	Offset= -1
		+ F1F6A SCxENT(00036)	Type=0.0	Nibs=1	
		+ F357D NZxBIF(006A6)	Type=0.0	Nibs=1	
DsNull = 00004	NZxSYM	- F09A3 NZxGPR(001E1)	Type=0.0	Nibs=1	Offset= -1
		+ F3DF5 NZxBUT(001FE)	Type=0.0	Nibs=1	
DsVolL = 00003	NZxSYM	-			
EDIT80 = 0A5A5	TIxR6S	-			
EDITWF = 0A533	TIxR6S	-			
EFIELD = 00000	TIxR6S	-			

ENABLE = F29DF SCXENT	- F01B8 NZXTBL(001B0) Type=1.2 Nibs=5 Dist=02827
ENABLd = F7D22 NZXDEC	- F29D5 SCXENT(00AA1) Type=1.2 Nibs=5 Dist=0534D
ENABLp = F7B47 NZXPAR	- F29DA SCXENT(00AA6) Type=1.2 Nibs=5 Dist=0516D
END = F0877 NZXGPR	- F39CC NZXDSP(00395) Type=1.1 Nibs=4 Dist=03155
ENDALL = 0769A TIXR6S	-
ENDBIN = 0764B TIXR6S	-
ENDFN = F0855 NZXGPR	- F1B8A NZXBAS(00BF0) Type=1.1 Nibs=4 Dist=01335
	+ F1C63 NZXBAS(00CC9) Type=1.1 Nibs=4 Dist=0140E
ENDING = 1C040 TIXR6S	- F26F8 SCXENT(007C4) Type=0.1 Nibs=5
ENDST = F084B NZXGPR	- F1642 NZXBAS(006A8) Type=1.0 Nibs=4 Dist=00DF7
	+ F2D70 NZXUTL(000DA) Type=1.0 Nibs=4 Dist=02525
ENDSUB = 195A8 TIXR6S	-
ENDTAP = F456E NZXCAS	- F13E8 NZXBAS(0044E) Type=1.1 Nibs=4 Dist=03186
	+ F5C2A NZXHND(00B0F) Type=1.0 Nibs=4 Dist=016BC
ENTER = F1F58 SCXENT	- F0143 NZXTBL(0013B) Type=1.2 Nibs=5 Dist=01E15
ENTERp = F751D NZXPAR	- F1F53 SCXENT(0001F) Type=1.2 Nibs=5 Dist=055CA
ENTUSG = F2561 SCXENT	- F075D NZXDIR(000A8) Type=1.2 Nibs=5 Dist=01E04
EOLCK = 02A7E TIXR6S	- F79BF NZXPAR(004C2) Type=0.1 Nibs=5
	+ F7BB4 NZXPAR(006B7) Type=0.1 Nibs=5
EOLCKR = 02A7A TIXR6S	-
EOLDC = 05402 TIXR6S	-
EOLLEN = 2F95A TIXR6S	- F110D NZXBAS(00173) Type=0.0 Nibs=5
	+ F2DB1 NZXUTL(0011B) Type=0.0 Nibs=5
EOLSCN = 08AA7 TIXR6S	-
EOLSTR = 2F95B TIXR6S	-
EOLXC* = 052EC TIXR6S	-
EOLXCK = 05405 TIXR6S	-
ERR# = 2F7E4 TIXR6S	-
ERRADR = 2F688 TIXR6S	-
ERRL# = 2F7EC TIXR6S	-
ERRLCH = 2F97C TIXR6S	-
ERRM\$f = 09806 TIXR6S	-
ERROR = F34E5 NZXBIF	- F1F46 SCXENT(00012) Type=1.0 Nibs=4 Dist=0159F
	+ F5CB9 NZXHND(00B9E) Type=1.0 Nibs=4 Dist=027D4
ERROR! = F34D8 NZXBIF	- F7591 NZXPAR(00094) Type=1.0 Nibs=4 Dist=040B9
ERRORP = F34CE NZXBIF	- F76C0 NZXPAR(001C3) Type=1.0 Nibs=4 Dist=041F2
ERRORR = F34CB NZXBIF	- F7B0D NZXPAR(00610) Type=1.0 Nibs=4 Dist=04642
ERRORX = F34C1 NZXBIF	- F1607 NZXBAS(0066D) Type=1.0 Nibs=4 Dist=01EBA
	+ F1F74 SCXENT(00040) Type=1.0 Nibs=4 Dist=0154D
	+ F2D38 NZXUTL(000A2) Type=1.0 Nibs=3 Dist=00789
	+ F2E28 NZXUTL(00192) Type=1.0 Nibs=3 Dist=00699
	+ F2EA5 NZXUTL(0020F) Type=1.0 Nibs=3 Dist=0061C
	+ F3EED NZXBUT(002F6) Type=1.0 Nibs=4 Dist=00A2C
	+ F52FE NZXHND(001E3) Type=1.0 Nibs=4 Dist=01E3D
	+ F6DBC NZXLOW(00066) Type=1.0 Nibs=4 Dist=038FB
ERRRTN = 074ED TIXR6S	-
ERRSUB = 2F683 TIXR6S	-
ESCSEQ = 023C1 TIXR6S	-
ESCSTA = 2F47B TIXR6S	- F372F NZXDSP(000F8) Type=0.0 Nibs=5
EX-115 = 0CF48 TIXR6S	-
EX12 = 0D5C6 TIXR6S	-
EX15M = 0D5CA TIXR6S	-
EX15S = 0D5CE TIXR6S	-
EXAB1 = 0D3E7 TIXR6S	-
EXAB2 = 0D40E TIXR6S	-
EXACT = 128B0 TIXR6S	-
EXCAD+ = 08631 TIXR6S	-
EXCHR_e = 02E81 TIXR6S	-
EXCPAR = 187E8 TIXR6S	-
EXDCLP = 0592E TIXR6S	-

EXF	=	0D5DF	TIZR6S	-
EXP15	=	0CF5A	TIZR6S	-
EXPEX+	=	F4101	NZXBUT	- F74F3 NZ%FXQ(006DA) Type=1.0 Nibs=4 Dist=033F2
EXPEX-	=	0F178	TIZR6S	-
EXPEXC	=	0F186	TIZR6S	- F4109 NZXBUT(00512) Type=0.1 Nibs=5
EXPP10	=	03FE3	TIZR6S	-
EXPPAR	=	03FD9	TIZR6S	- F7A62 NZ%PAR(00565) Type=0.1 Nibs=5
EXPLS	=	03FDC	TIZR6S	-
EXPR	=	0F23C	TIZR6S	-
EXPRDC	=	05922	TIZR6S	- F7E73 NZ%DEC(002A0) Type=0.1 Nibs=5
EXPSKP	=	1A9AC	TIZR6S	-
EndNum	=	000E6	TIZR6S	-
Endtap	=	F5C28	NZ%HND	- F600C NZ%CAT(0017B) Type=1.1 Nibs=3 Dist=003E4
Eo10K	=	00009	NZ%PAR	- F7705 NZ%PAR(00208) Type=0.0 Nibs=1
				+ F77E0 NZ%PAR(002E3) Type=0.0 Nibs=1
				+ F780E NZ%PAR(00311) Type=0.0 Nibs=1
Error	=	F5CB7	NZ%HND	- F5F20 NZ%CAT(0008F) Type=1.0 Nibs=3 Dist=00269
				+ F60DE NZ%CAT(0024D) Type=1.0 Nibs=3 Dist=00427
Except	=	0000C	TIZR6S	- F2B35 SC%ENT(00C01) Type=0.0 Nibs=1
				+ F318B NZ%BIF(002B4) Type=0.0 Nibs=1
ExprOK	=	00008	NZ%PAR	- F76D5 NZ%PAR(001D8) Type=0.0 Nibs=1
				+ F77E3 NZ%PAR(002E6) Type=0.0 Nibs=1
				+ F77EB NZ%PAR(002EE) Type=0.0 Nibs=1
F->SCR	=	F4A12	NZ%CAS	- F12C4 NZ%BAS(0032A) Type=1.1 Nibs=4 Dist=0374E
F-R0-0	=	2F89B	TIZR6S	-
F-R0-1	=	2F8A0	TIZR6S	- F6151 NZ%CAT(002C0) Type=0.0 Nibs=5
				+ F6161 NZ%CAT(002D0) Type=0.0 Nibs=5
F-R0-2	=	2F8A5	TIZR6S	-
F-R0-3	=	2F8AA	TIZR6S	-
F-R1-0	=	2F8AB	TIZR6S	-
F-R1-1	=	2F8B0	TIZR6S	-
F-R1-2	=	2F8B5	TIZR6S	-
F-R1-3	=	2F8BA	TIZR6S	-
FASCFD	=	110C3	TIZR6S	-
FCHAIN	=	F0008	Define	-
FCHLBL	=	0782C	TIZR6S	-
FCSTRT	=	0E757	TIZR6S	-
FGTBL	=	00C9B	TIZR6S	-
FIBAD-	=	11478	TIZR6S	-
FIBADR	=	11457	TIZR6S	-
FIBOFF	=	12132	TIZR6S	- F3098 NZ%BIF(001C1) Type=0.1 Nibs=5
FILCRD	=	1C879	TIZR6S	-
FILDC*	=	05759	TIZR6S	- F7C4F NZ%DEC(0007C) Type=0.1 Nibs=5
FILEF	=	09FB0	TIZR6S	-
FILEP	=	03E9C	TIZR6S	-
FILEP!	=	03F0F	TIZR6S	-
FILEP+	=	03F07	TIZR6S	-
FILEP-	=	03F00	TIZR6S	-
FILEP1	=	03EFC	TIZR6S	-
FILFIL	=	011CE	TIZR6S	-
FILSK+	=	06F1D	TIZR6S	-
FILSPp	=	F7862	NZ%PAR	- F06E0 NZ%DIR(0002B) Type=1.2 Nibs=5 Dist=07182
FILSPx	=	F3528	NZ%BIF	- F06E5 NZ%DIR(00030) Type=1.2 Nibs=5 Dist=02E43
FILSp	=	F7857	NZ%PAR	-
FILXQ\$	=	09B95	TIZR6S	-
FILXQ^	=	09B76	TIZR6S	-
FIND	=	F1BDB	NZ%BAS	- F00C5 NZ%TBL(000BD) Type=1.2 Nibs=5 Dist=01B16
FINDA	=	023E3	TIZR6S	- F25CD SC%ENT(00699) Type=0.1 Nibs=5
				+ F3754 NZ%DSP(0011D) Type=0.1 Nibs=5

FINDDO = 023E0 TIXR6S	+ F5FC7 NZ%CAT(00136) Type=0.1 Nibs=5
FINDF = 09F77 TIXR6S	-
	- F562D NZ%HND(00512) Type=0.1 Nibs=5
	+ F5929 NZ%HND(0080E) Type=0.1 Nibs=5
FINDF+ = F473B NZ%CAS	- F5C6F NZ%HND(00B54) Type=1.0 Nibs=4 Dist=01534
FINDFL = F4734 NZ%CAS	- F550F NZ%HND(003F4) Type=1.1 Nibs=4 Dist=00DDB
	+ F57A6 NZ%HND(0068B) Type=1.1 Nibs=4 Dist=01072
FINDFx = F47C7 NZ%CAS	- F5163 NZ%HND(00048) Type=1.1 Nibs=4 Dist=0099C
	+ F5DB4 NZ%HND(00C99) Type=1.1 Nibs=4 Dist=015ED
FINDL = OFFE4 TIXR6S	-
FINDLB = 07786 TIXR6S	-
FINITA = 0CD03 TIXR6S	-
FINITC = 0CD0F TIXR6S	-
FINLIN = 18A3A TIXR6S	-
FIRSTC = 2F47C TIXR6S	-
FIXDC = 05493 TIXR6S	-
FIXP = 02A6E TIXR6S	-
FIXSPC = 00000 Define	-
	- F11CA NZ%BAS(00230) Type=0.0 Nibs=1
	+ F11E6 NZ%BAS(0024C) Type=0.0 Nibs=1
	+ F133B NZ%BAS(003A1) Type=0.0 Nibs=1
	+ F1CAB NZ%BAS(00D11) Type=0.0 Nibs=1
	+ F1D37 NZ%BAS(00D9D) Type=0.0 Nibs=1
	+ F222B SC%ENT(002F7) Type=0.0 Nibs=1
	+ F226E SC%ENT(0033A) Type=0.0 Nibs=1
	+ F24AB SC%ENT(00577) Type=0.0 Nibs=1
	+ F2978 SC%ENT(00A44) Type=0.0 Nibs=1
	+ F2A64 SC%ENT(00B30) Type=0.0 Nibs=1
	+ F2C8F SC%ENT(00D5B) Type=0.0 Nibs=1
	+ F44F8 NZ%CAS(00265) Type=0.0 Nibs=1
	+ F6143 NZ%CAT(002B2) Type=0.0 Nibs=1
	-
FLADDR = 0126B TIXR6S	-
FLDEVX = 01154 TIXR6S	-
FLGREG = 2F6E9 TIXR6S	-
FLIP10 = 0DB9C TIXR6S	-
FLIP11 = 0DBAB TIXR6S	-
FLIP8 = 0DB8D TIXR6S	-
FLOAT = 1B322 TIXR6S	-
FLOAT! = F6D56 NZ%LOW	-
	- F1C5D NZ%BAS(00CC3) Type=1.1 Nibs=4 Dist=050F9
	+ F1D87 NZ%BAS(00DED) Type=1.1 Nibs=4 Dist=04FCF
	+ F1E77 NZ%BAS(00EDD) Type=1.1 Nibs=4 Dist=04EDF
	-
FLOAT+ = F6D59 NZ%LOW	-
FLOAT- = F6D62 NZ%LOW	-
FLTDH = 1B223 TIXR6S	- F1F2F NZ%BAS(00F95) Type=0.1 Nibs=5
FLTYpp = 03E71 TIXR6S	-
FNDCH- = F0C10 NZ%GPR	- F15A7 NZ%BAS(0060D) Type=1.1 Nibs=4 Dist=00997
	+ F2AC0 SC%ENT(00B8C) Type=1.1 Nibs=4 Dist=01EBO
FNDCHK = F0C1B NZ%GPR	- F1DE2 NZ%BAS(00E48) Type=1.0 Nibs=4 Dist=011C7
	+ F28F5 SC%ENT(009C1) Type=1.0 Nibs=4 Dist=01CDA
FNDCLR = 1DAEF TIXR6S	-
FNDFCN = 1A0A1 TIXR6S	-
FNDMB+ = F3C3C NZ%BUT	- F560A NZ%HND(004EF) Type=1.1 Nibs=4 Dist=019CE
FNDMB- = F3C40 NZ%BUT	- F0C12 NZ%GPR(00450) Type=1.1 Nibs=4 Dist=0302E
	+ F6DEA NZ%LOW(00094) Type=1.1 Nibs=4 Dist=031AA
FNDMBD = F3C5F NZ%BUT	- F2A98 SC%ENT(00B64) Type=1.1 Nibs=4 Dist=011C7
FNDMBX = F3C75 NZ%BUT	- F0C1D NZ%GPR(0045B) Type=1.1 Nibs=4 Dist=03058
	+ F2EFF NZ%BIF(00028) Type=1.1 Nibs=4 Dist=00D76
	+ F3060 NZ%BIF(00189) Type=1.1 Nibs=4 Dist=00C15
	+ F3149 NZ%BIF(00272) Type=1.1 Nibs=4 Dist=00B2C
	+ F367E NZ%DSP(00047) Type=1.1 Nibs=3 Dist=005F7
FNPWDS = 0D3C0 TIXR6S	-

FNRTN1 = OF216 TIXR6S	- F1D91 NZXBAS(00DF7) Type=0.1 Nibs=5
FNRTN2 = OF219 TIXR6S	-
FNRTN3 = OF235 TIXR6S	-
FNRTN4 = OF238 TIXR6S	- F1E7D NZXBAS(00EE3) Type=0.1 Nibs=5
FORMAT = F4326 NZXCAS	- F14FC NZXBAS(00562) Type=1.1 Nibs=4 Dist=02E2A
FORSTK = 2F59E TIXR6S	- F21C4 SCXENT(00290) Type=0.0 Nibs=5
	+ F21E2 SCXENT(002AE) Type=0.0 Nibs=5
FORUPD = 0A6AE TIXR6S	-
FPOLL = 1250A TIXR6S	-
FRAC15 = 0C70E TIXR6S	-
FRAME+ = F07C2 NZXGPR	- F683C NZXIOR(0016A) Type=1.1 Nibs=4 Dist=0607A
	+ F6866 NZXIOR(00194) Type=1.1 Nibs=4 Dist=060AA
	+ F6883 NZXIOR(001B1) Type=1.1 Nibs=4 Dist=060C1
FRAME- = F07D0 NZXGPR	- F2411 SCXENT(004DD) Type=1.1 Nibs=4 Dist=01C41
	+ F5B8E NZXHND(00A93) Type=1.1 Nibs=4 Dist=053DE
	+ F6715 NZXIOR(00043) Type=1.1 Nibs=4 Dist=05F45
	+ F6950 NZXIOR(0027E) Type=1.1 Nibs=4 Dist=06180
FRAMEE = F6BD8 NZXFRA	- F2CD5 NZXUTL(0003F) Type=1.1 Nibs=4 Dist=03F03
	+ F77BE NZXPAR(002C1) Type=1.1 Nibs=4 Dist=00BE6
FRAMET = F6C81 NZXFRA	-
FRASPD = F7D5E NZXDEC	-
FRASPP = F7769 NZXPAR	-
FRANGE = 0B46A TIXR6S	-
FSPECe = 02F02 TIXR6S	-
FSPECp = 03CC5 TIXR6S	-
FSPECx = 09F2D TIXR6S	-
FTBSCH = 11093 TIXR6S	-
FTYPDC = 06902 TIXR6S	-
FTYPM = 11059 TIXR6S	- F5CB2 NZXHND(00B97) Type=0.1 Nibs=5
FUNCD0 = 2F8BB TIXR6S	- F0FEC NZXBAS(00052) Type=0.0 Nibs=5
	+ F1002 NZXBAS(00068) Type=0.0 Nibs=5
	+ F1059 NZXBAS(000BF) Type=0.0 Nibs=5
	+ F33AD NZXBIF(004D6) Type=0.0 Nibs=5
	+ F33D9 NZXBIF(00502) Type=0.0 Nibs=5
FUNCD1 = 2F8C0 TIXR6S	- F33C3 NZXBIF(004EC) Type=0.0 Nibs=5
	+ F33EC NZXBIF(00515) Type=0.0 Nibs=5
	+ F3401 NZXBIF(0052A) Type=0.0 Nibs=5
	+ F3418 NZXBIF(00541) Type=0.0 Nibs=5
FUNCRO = 2F89B TIXR6S	- F188A NZXBAS(008F0) Type=0.0 Nibs=5
	+ F1910 NZXBAS(00976) Type=0.0 Nibs=2
	+ F5949 NZXHND(0082E) Type=0.0 Nibs=2
	+ F5987 NZXHND(0086C) Type=0.0 Nibs=2 Offset= 5
	+ F599C NZXHND(00881) Type=0.0 Nibs=5 Offset= 5
	+ F5C9E NZXHND(00B83) Type=0.0 Nibs=5
FUNCR1 = 2F8AB TIXR6S	- F3433 NZXBIF(0055C) Type=0.0 Nibs=5
	+ F344D NZXBIF(00576) Type=0.0 Nibs=5
	+ F5936 NZXHND(0081B) Type=0.0 Nibs=2
	+ F697B NZXIOR(002A9) Type=0.0 Nibs=5
FXQPIL = F73E4 NZXFXQ	-
FXQPn+ = F742E NZXFXQ	-
FXQPnm = F742B NZXFXQ	-
Findf+ = F5C6D NZXHND	- F5E9E NZXCAT(0000D) Type=1.1 Nibs=3 Dist=00231
Format = 00005 NZXSYM	- F43E7 NZXCAS(00154) Type=0.0 Nibs=1
GADDR = F0994 NZXGPR	-
GADDR+ = F404F NZXBUT	- F734F NZXFXQ(00536) Type=1.1 Nibs=4 Dist=03300
GADRRM = F4040 NZXBUT	- F1CA1 NZXBAS(00D07) Type=1.1 Nibs=4 Dist=0239F
GADRST = F70F9 NZXFXQ	-
GDIRSB = F6346 NZXCAT	-
GDIRST = F48D8 NZXCAS	- F1203 NZXBAS(00269) Type=1.1 Nibs=4 Dist=036D5

GDISP\$ = 1C3C7 TIXR6S	-
GET = F67E6 NZXIOR	- F0D14 NZXGPR(00552) Type=1.0 Nibs=4 Dist=05AD2
GETALR = FOER2 NZXGPR	- F4901 NZXCAS(0066E) Type=1.1 Nibs=4 Dist=03A5F
	+ F491C NZXCAS(00689) Type=1.1 Nibs=4 Dist=03A7A
	+ F494D NZXCAS(006BA) Type=1.1 Nibs=4 Dist=03AAB
GETAVM = 1864D TIXR6S	-
GETBYT = F50F6 NZXCAS	- F584B NZXHND(00730) Type=1.1 Nibs=3 Dist=00755
	+ F6470 NZXCAT(005DF) Type=1.1 Nibs=4 Dist=0137A
GETCH# = 11427 TIXR6S	-
GETCON = ODAA3 TIXR6S	-
GETD = F685D NZXIOR	- F4840 NZXCAS(005AD) Type=1.0 Nibs=4 Dist=0201D
	+ F5AAB NZXHND(00990) Type=1.1 Nibs=4 Dist=00DB2
GETDID = F6E19 NZXFQ	- F10EE NZXBAS(00154) Type=1.1 Nibs=4 Dist=05D2B
	+ F1179 NZXBAS(001DF) Type=1.1 Nibs=4 Dist=05CA0
	+ F11D7 NZXBAS(0023D) Type=1.1 Nibs=4 Dist=05C42
	+ F132F NZXBAS(00395) Type=1.1 Nibs=4 Dist=05AER
	+ F15C1 NZXBAS(00627) Type=1.1 Nibs=4 Dist=05858
	+ F1F5A SCXENT(00026) Type=1.1 Nibs=4 Dist=04EBF
	+ F2A14 SCXENT(00AE0) Type=1.1 Nibs=4 Dist=04405
GETDIM = 0AD6B TIXR6S	-
GETDIR = F48B5 NZXCAS	- F13DE NZXBAS(00444) Type=1.1 Nibs=4 Dist=034D7
GETDIX = F6E37 NZXFQ	- F1CF0 NZXBAS(00D56) Type=1.1 Nibs=4 Dist=05147
GETDR! = F486C NZXCAS	- F5F50 NZXCAT(000BF) Type=1.1 Nibs=4 Dist=016E4
	+ F6114 NZXCAT(00283) Type=1.1 Nibs=4 Dist=018A8
GETDR" = F4873 NZXCAS	- F1218 NZXBAS(0027E) Type=1.1 Nibs=4 Dist=0365B
	+ F1355 NZXBAS(003BB) Type=1.1 Nibs=4 Dist=0351E
GETDR# = F4875 NZXCAS	-
GETDR+ = F488E NZXCAS	- F12A2 NZXBAS(00308) Type=1.1 Nibs=4 Dist=035EC
	+ F6357 NZXCAT(004C6) Type=1.1 Nibs=4 Dist=01AC9
GETDVW = F71C8 NZXFQ	-
GETDev = F0BF0 NZXGPR	- F28FB SCXENT(009C7) Type=1.0 Nibs=4 Dist=01D0B
	+ F4684 NZXCAS(003F1) Type=1.1 Nibs=4 Dist=03A94
	+ F46D6 NZXCAS(00443) Type=1.1 Nibs=4 Dist=03AE6
	+ F5AC5 NZXHND(009AA) Type=1.1 Nibs=4 Dist=04ED5
	+ F5BC0 NZXHND(00AA5) Type=1.1 Nibs=4 Dist=04FD0
	+ F5C1C NZXHND(00B01) Type=1.1 Nibs=4 Dist=0502C
GETEND = F687A NZXIOR	-
GETERR = F6826 NZXIOR	- F08EB NZXGPR(00129) Type=1.0 Nibs=4 Dist=05F3B
	+ F2D67 NZXUTL(000D1) Type=1.1 Nibs=4 Dist=03ABF
	+ F2F0F NZXBIF(00038) Type=1.1 Nibs=4 Dist=03917
	+ F362A NZXBIF(00753) Type=1.0 Nibs=4 Dist=031FC
	+ F6DFE NZXLOW(000A8) Type=1.1 Nibs=3 Dist=005D8
GETHEX = F3FD1 NZXBUT	- F14A8 NZXBAS(0050E) Type=1.1 Nibs=4 Dist=02B29
GETHS2 = F680C NZXIOR	- F0C26 NZXGPR(00464) Type=1.1 Nibs=4 Dist=05BE6
GETHSS = F31CF NZXBIF	- F1E4D NZXBAS(00EB3) Type=1.1 Nibs=4 Dist=01382
	+ F2BB7 SCXENT(00C83) Type=1.1 Nibs=3 Dist=00618
GETID = F68A3 NZXIOR	- F0A69 NZXGPR(002A7) Type=1.1 Nibs=4 Dist=05E3A
GETID+ = F688F NZXIOR	- F1B4A NZXBAS(00BB0) Type=1.1 Nibs=4 Dist=04D45
GETLOP = F2996 SCXENT	- F6DE4 NZXLOW(0008E) Type=1.1 Nibs=4 Dist=0444E
GETLPs = F1DAA NZXBAS	-
GETMBX = F3BF7 NZXBUT	- F0879 NZXGPR(000B7) Type=1.0 Nibs=4 Dist=0337E
	+ F108C NZXBAS(000F2) Type=1.1 Nibs=4 Dist=02B6B
	+ F162D NZXBAS(00693) Type=1.1 Nibs=4 Dist=025CA
	+ F34FA NZXBIF(00623) Type=1.1 Nibs=3 Dist=006FD
	+ F37E1 NZXDSP(001AA) Type=1.1 Nibs=3 Dist=00416
	+ F3809 NZXDSP(001D2) Type=1.1 Nibs=3 Dist=003EE
	+ F389C NZXDSP(00265) Type=1.1 Nibs=3 Dist=0035B
	+ F3951 NZXDSP(0031A) Type=1.1 Nibs=3 Dist=002A6
	+ F3982 NZXDSP(0034B) Type=1.1 Nibs=3 Dist=00275
	+ F39AB NZXDSP(00374) Type=1.1 Nibs=3 Dist=0024C

	+ F3A1A NZXDSP(003E3)	Type=1.1	Nibs=3	Dist=001DD
	+ F5427 NZXHND(0030C)	Type=1.0	Nibs=4	Dist=01830
	+ F61E3 NZXCAT(00352)	Type=1.1	Nibs=4	Dist=025EC
	+ F620B NZXCAT(0037A)	Type=1.1	Nibs=4	Dist=02614
	+ F6A20 NZXIOR(0034E)	Type=1.1	Nibs=4	Dist=02E29
	- F3B1D NZXDSP(004E6)	Type=0.1	Nibs=5	
GETMSK =	01BBA	TIZR6S		
GETNAM =	1A085	TIZR6S		
GETNE =	F67D0	NZXIOR		
GETPI+ =	F6EA9	NZFXQ		
GETPIL =	F6EA0	NZFXQ		
GETPR1 =	06BFB	TIZR6S		
GETPRO =	06BEE	TIZR6S		
GETSA =	0E551	TIZR6S		
GETST =	F681C	NZXIOR		
	- F356A NZXBIF(00693)	Type=1.1	Nibs=4	Dist=0393F
	- F1458 NZXBAS(004BE)	Type=1.1	Nibs=4	Dist=05A48
	- F08F1 NZXGPR(0012F)	Type=1.1	Nibs=4	Dist=05F2B
	+ F0C41 NZXGPR(0047F)	Type=1.1	Nibs=4	Dist=05BDB
	+ F50C6 NZXCAS(00E33)	Type=1.1	Nibs=4	Dist=01756
GETST* =	07716	TIZR6S		
GETST+ =	F3F41	NZXBUT		
GETST- =	F6833	NZXIOR		
GETSTC =	07726	TIZR6S		
GETSTR =	F3F19	NZXBUT		
	- F3172 NZXBIF(0029B)	Type=1.1	Nibs=4	Dist=036C1
	- F19CF NZXBAS(00A35)	Type=1.1	Nibs=4	Dist=0254A
	+ F6E1B NZFXQ(00002)	Type=1.1	Nibs=4	Dist=02F02
	+ F6EA2 NZFXQ(00089)	Type=1.1	Nibs=4	Dist=02F89
GETVAL =	0DAB2	TIZR6S		
GETX =	F6745	NZXIOR		
	- F23B2 SCXENT(0047E)	Type=1.1	Nibs=4	Dist=04393
	+ F5BA0 NZXHND(00A85)	Type=1.1	Nibs=4	Dist=00BA5
	- F483A NZXCAS(005A7)	Type=1.0	Nibs=4	Dist=03447
GETZER =	F13F3	NZXBAS		
GFTYPE =	F2E2B	NZXUTL		
GHEXB+ =	F4016	NZXBUT		
GHEXBT =	F4012	NZXBUT		
	- F1DC0 NZXBAS(00E26)	Type=1.1	Nibs=4	Dist=02256
	- F2EAF NZXUTL(00219)	Type=1.1	Nibs=4	Dist=01163
	+ F72BB NZFXQ(004A2)	Type=1.1	Nibs=4	Dist=032A9
	+ F7329 NZFXQ(00510)	Type=1.1	Nibs=4	Dist=03317
	+ F737A NZFXQ(00561)	Type=1.1	Nibs=4	Dist=03368
	- F16B1 NZXBAS(00717)	Type=1.1	Nibs=4	Dist=0173E
	+ F291A SCXENT(009E6)	Type=1.1	Nibs=3	Dist=004D5
	+ F296D SCXENT(00A39)	Type=1.1	Nibs=3	Dist=00482
GLOOP# =	F2DEF	NZXUTL		
GNXTCR =	03064	TIZR6S		
GOSUB =	079E9	TIZR6S		
GOSUBp =	029F6	TIZR6S		
GOTO =	079FA	TIZR6S		
GOTODC =	0552E	TIZR6S		
GOTOp =	029F6	TIZR6S		
GSBSTK =	2F5A3	TIZR6S		
GST!NO =	F2E7C	NZXUTL		
GT2BYO =	F50F2	NZXCAS		
GT2BYT =	F50F4	NZXCAS		
	- F64E9 NZXCAT(00658)	Type=1.1	Nibs=4	Dist=013F7
	- F1404 NZXBAS(0046A)	Type=1.0	Nibs=4	Dist=03CF0
	+ F5C63 NZXHND(00B48)	Type=1.0	Nibs=4	Dist=00B6F
	+ F63EA NZXCAT(00559)	Type=1.1	Nibs=4	Dist=012F6
GTEXT =	05079	TIZR6S		
GTEXT+ =	05199	TIZR6S		
GTEXT1 =	051A5	TIZR6S		
GTF LAG =	1365E	TIZR6S		
GTKYC+ =	08D9B	TIZR6S		
GTKYCD =	08D92	TIZR6S		
GTPTRS =	14636	TIZR6S		
GTPTRX =	14670	TIZR6S		
GTXT++ =	05192	TIZR6S		
GTYPE =	F0C94	NZXGPR		
	- F7CA7 NZXDEC(000D4)	Type=0.1	Nibs=5	
	- F7EA4 NZXDEC(002D1)	Type=0.1	Nibs=5	
	- F1C4A NZXBAS(00CB0)	Type=1.1	Nibs=4	Dist=00FB6
	+ F369F NZXDSP(00068)	Type=1.1	Nibs=4	Dist=02A0B
	+ F42F3 NZXCAS(00060)	Type=1.1	Nibs=4	Dist=0365F

GTYP+ = F4001 NZ%BUT	- F295F SC%ENT(00A2B) Type=1.1 Nibs=4 Dist=016A2
	+ F298F SC%ENT(00A5B) Type=1.1 Nibs=4 Dist=01672
GTYP+M = F4003 NZ%BUT	- F2E05 NZ%UTL(0016F) Type=1.1 Nibs=4 Dist=011FE
	+ F6DDB NZ%LOW(00085) Type=1.1 Nibs=4 Dist=02DD8
GTYPST = F7088 NZ%FXQ	-
GetEXP = 1C086 TI%R6S	-
Getmbx = F5425 NZ%HND	- F4C93 NZ%CAS(00A00) Type=1.1 Nibs=3 Dist=00792
	+ F4E42 NZ%CAS(00BAF) Type=1.1 Nibs=3 Dist=005E3
HASH1 = 1B0A1 TI%R6S	-
HASH2 = 1B0A3 TI%R6S	-
HDFLT = 1B31B TI%R6S	- F27D3 SC%ENT(0089F) Type=0.1 Nibs=5
HEXASC = 17148 TI%R6S	-
HEXDEC = 0ECAF TI%R6S	-
HMSSEC = 13274 TI%R6S	-
HNDLFL = 0CBC9 TI%R6S	-
HPSCRH = 2F97F TI%R6S	-
HTOD = F0DBC NZ%GPR	- F1805 NZ%BAS(0086B) Type=1.1 Nibs=4 Dist=00A49
	+ F1BF0 NZ%BAS(00C56) Type=1.1 Nibs=4 Dist=00E34
	+ F1C09 NZ%BAS(00C6F) Type=1.1 Nibs=4 Dist=00E4D
HTODX = F0DE4 NZ%GPR	- F6412 NZ%CAT(00581) Type=1.1 Nibs=4 Dist=0562E
	+ F6516 NZ%CAT(00685) Type=1.1 Nibs=4 Dist=05732
	+ F6D5B NZ%LOW(00005) Type=1.1 Nibs=4 Dist=05F77
HTRAP = 0CB2F TI%R6S	-
HUGE = 0B75D TI%R6S	-
HXDASC = 05FF4 TI%R6S	-
HXDCW = 0ECB4 TI%R6S	-
I/DAL+ = 1197B TI%R6S	-
I/DALL = 1197D TI%R6S	- F1A28 NZ%BAS(00A8E) Type=0.1 Nibs=5
	+ F2C39 SC%ENT(00D05) Type=0.1 Nibs=5
	+ F2EE5 NZ%BIF(0000E) Type=0.1 Nibs=5
	+ F3EA5 NZ%BUT(002AE) Type=0.1 Nibs=5
I/DCOL = 11979 TI%R6S	-
I/CON = 11920 TI%R6S	-
I/ODAL = 11A41 TI%R6S	- F1B31 NZ%BAS(00B97) Type=0.1 Nibs=5
I/OEX2 = 11A0F TI%R6S	-
I/OEXP = 11A11 TI%R6S	-
I/OFND = 118BA TI%R6S	- F4110 NZ%BUT(00519) Type=0.1 Nibs=5
I/OFSC = F362E NZ%IOB	- F3E92 NZ%BUT(0029B) Type=1.1 Nibs=4 Dist=00864
I/ORES = 118FF TI%R6S	- F302D NZ%BIF(00156) Type=0.1 Nibs=5
I/odal = F1B2F NZ%BAS	- F3E6F NZ%BUT(00278) Type=1.1 Nibs=4 Dist=02340
IDIV = 0EC7B TI%R6S	- F173D NZ%BAS(007A3) Type=0.1 Nibs=5
IDIVR = 0EC6E TI%R6S	-
IF12A = 0C739 TI%R6S	-
ILCNTe = 02E70 TI%R6S	-
IMDO+2 = 1BA2D TI%R6S	-
IMDO-2 = 1BA21 TI%R6S	-
Imerr = 1B989 TI%R6S	- F2633 SC%ENT(006FF) Type=0.1 Nibs=5
IMnit = 1B88F TI%R6S	-
IMoffs = 1BA58 TI%R6S	-
IMxq27 = 1BB9C TI%R6S	-
INADDR = 2F6D4 TI%R6S	-
INBS = 2F6C6 TI%R6S	-
INF*0 = 0C607 TI%R6S	-
INFR15 = 0C73D TI%R6S	-
INITD2 = F7C6C NZ%DEC	-
INITFL = F6979 NZ%IOB	- F50B9 NZ%CAS(00E26) Type=1.0 Nibs=4 Dist=018C0
INITIL = F43F6 NZ%CAS	-
INITPR = F75B8 NZ%PAR	-

INITXQ = F1456 NZXBAS	- F0104 NZXTBL(000FC)	Type=1.2 Nibs=5 Dist=01352
INITd = F7C3A NZXDEC	- F144C NZXBAS(004B2)	Type=1.2 Nibs=5 Dist=067EE
INITp = F7571 NZXPAR	- F1451 NZXBAS(004B7)	Type=1.2 Nibs=5 Dist=06120
INPOFF = 18B49 TIXR6S	-	
INTA = 2F410 TIXR6S	-	
INTB = 2F420 TIXR6S	-	
INTGR = 0F99B TIXR6S	-	
INTM = 2F430 TIXR6S	-	
INTR4 = 2F400 TIXR6S	-	
INTR50 = 000DB TIXR6S	-	
INTRPT = 0000F TIXR6S	-	
INVNaN = 0C65F TIXR6S	-	
INXNIB = 2F6F9 TIXR6S	-	
IOBFEN = 2F576 TIXR6S	-	
IOBFST = 2F571 TIXR6S	-	
IOFNDO = 118C1 TIXR6S	-	
IOFSCR = 1188E TIXR6S	- F3632 NZXIOB(00004)	Type=0.1 Nibs=5
IOp = F765B NZXPAR	- F17CE NZXBAS(00834)	Type=1.2 Nibs=5 Dist=05E8D
IS-DSP = 2F78D TIXR6S	- F1144 NZXBAS(001AA)	Type=0.0 Nibs=5
	+ F11A8 NZXBAS(0020E)	Type=0.0 Nibs=5
	+ F2FBC NZXBIF(000E5)	Type=0.0 Nibs=5 Offset= 3
	+ F30B6 NZXBIF(001DF)	Type=0.0 Nibs=4
	+ F3283 NZXBIF(003AC)	Type=0.0 Nibs=5
	+ F3639 NZXDSP(00002)	Type=0.0 Nibs=5
	+ F36EE NZXDSP(000B7)	Type=0.0 Nibs=2
	+ F3706 NZXDSP(000CF)	Type=0.0 Nibs=5 Offset= 3
	+ F3EF3 NZXBUT(002FC)	Type=0.0 Nibs=5 Offset= 3
IS-INP = 2F79B TIXR6S	-	
IS-PLT = 2F7A2 TIXR6S	-	
IS-PRT = 2F794 TIXR6S	- F0FA9 NZXBAS(0000F)	Type=0.0 Nibs=5
	+ F1166 NZXBAS(001CC)	Type=0.0 Nibs=5
IS-TBL = 2F78D TIXR6S	-	
ISRAM? = 10192 TIXR6S	-	
IVAERR = 0E920 TIXR6S	-	
IVARG = 0D749 TIXR6S	-	
IVEXPe = 02E35 TIXR6S	-	
IVLNIB = 2F6FD TIXR6S	-	
IVP = 00004 TIXR6S	-	
IVPARE = 02E3F TIXR6S	-	
IVVARE = 02E66 TIXR6S	-	
ImpByt = 00006 NZXSYM	- F4495 NZXCAS(00202)	Type=0.0 Nibs=1
InhEOL = 00004 TIXR6S	-	
Insert = 00007 TIXR6S	- F394D NZXDSP(00316)	Type=0.0 Nibs=1
	+ F396B NZXDSP(00334)	Type=0.0 Nibs=1
	+ F39EB NZXDSP(003B4)	Type=0.0 Nibs=1
	+ F3A41 NZXDSP(0040A)	Type=0.0 Nibs=1
	+ F3AA8 NZXDSP(00471)	Type=0.0 Nibs=1
InvalE = 00000 NZXPAR	-	
KCOL0 = 2F46F TIXR6S	-	
KCOL1 = 2F46E TIXR6S	-	
KCOL2 = 2F46D TIXR6S	-	
KCOL3 = 2F46C TIXR6S	-	
KCOL4 = 2F46B TIXR6S	-	
KCOL5 = 2F46A TIXR6S	-	
KCOL6 = 2F469 TIXR6S	-	
KCOL7 = 2F468 TIXR6S	-	
KCOL8 = 2F467 TIXR6S	-	
KCOL9 = 2F466 TIXR6S	-	
KCOLA = 2F465 TIXR6S	-	

KCOLB = 2F464 TIXR6S -
 KCOLC = 2F463 TIXR6S -
 KCOLD = 2F462 TIXR6S -
 KEY\$ = 1ACA8 TIXR6S -
 KEYBUF = 2F444 TIXR6S -
 KEYCOD = 1FD22 TIXR6S -
 KEYDEL = 08D2C TIXR6S -
 KEYFND = 08CB8 TIXR6S -
 KEYMRG = 08B8F TIXR6S -
 KEYNAM = 1AC04 TIXR6S -
 KEYPTR = 2F443 TIXR6S - F31A8 NZXBIF(002D1) Type=0.0 Nibs=5
 KEYRD = 14E11 TIXR6S -
 KEYSAV = 2F462 TIXR6S -
 KEYSCH = 00D4D TIXR6S -
 KYDN? = 00774 TIXR6S -

 LABELP = 03E9F TIXR6S -
 LABLDC = 05702 TIXR6S -
 LASTFN = 000B4 TIXR6S -
 LBLIN# = 2F871 TIXR6S -
 LBLINP = 02A04 TIXR6S -
 LBLNAM = 077E7 TIXR6S -
 LBLNIF = 02A0D TIXR6S -
 LCDINI = 00665 TIXR6S -
 LDCEXT = 04F5E TIXR6S -
 LDCM10 = 04F6F TIXR6S -
 LDCOMP = 04F69 TIXR6S -
 LDCSET = 05060 TIXR6S -
 LDCSPC = 2F6C1 TIXR6S -
 LDSST1 = 04F72 TIXR6S -
 LDSST2 = 04F9E TIXR6S -
 LEAVE = 04C01 TIXR6S -
 LEEWAY = 000D4 TIXR6S -
 LEXBF+ = 10DDF TIXR6S - F5C06 NZXHND(00AEB) Type=0.1 Nibs=5
 LEXPIL = 000FF Define - F1522 NZXBAS(00588) Type=0.0 Nibs=2
 + F3522 NZXBIF(0064B) Type=0.0 Nibs=2
 + F75F4 NZXPAR(000F7) Type=0.0 Nibs=2
 + F764E NZXPAR(00151) Type=0.0 Nibs=2
 + F7661 NZXPAR(00164) Type=0.0 Nibs=2
 + F767E NZXPAR(00181) Type=0.0 Nibs=2
 + F7B4D NZXPAR(00650) Type=0.0 Nibs=2
 + F7B79 NZXPAR(0067C) Type=0.0 Nibs=2
 + F7C99 NZXDEC(000C6) Type=0.0 Nibs=2
 - F7B1D NZXPAR(00620) Type=0.0 Nibs=5

 LEXPTR = 2F6CF TIXR6S -
 LGT15 = 0D1AE TIXR6S -
 LIMITS = 0AC3E TIXR6S -
 LIN#AU = 05122 TIXR6S -
 LIN#D+ = 05112 TIXR6S -
 LIN#DC = 05115 TIXR6S -
 LINEP = 02620 TIXR6S -
 LINEP* = 02634 TIXR6S -
 LINEP+ = 02626 TIXR6S -
 LINP = 02A07 TIXR6S -
 LISTDC = 05839 TIXR6S -
 LISTEN = F0CF1 NZXGPR -
 LISTIO = F17D3 NZXBAS - F0131 NZXTBL(00129) Type=1.2 Nibs=5 Dist=016A2
 LN1+15 = 0CD44 TIXR6S -
 LN1+XF = 0CD51 TIXR6S -
 LN12 = 0CD7D TIXR6S -
 LN15 = 0CD81 TIXR6S -

LN30	=	0CD9C	TIXR6S	-
LNEP66	=	027EA	TIXR6S	-
LNPEXT	=	02617	TIXR6S	-
LNSKP-	=	089FF	TIXR6S	-
LOCADR	=	0A611	TIXR6S	-
LOCAL	=	F1517	NZXBAS	- F0194 NZXTBL(0018C) Type=1.2 Nibs=5 Dist=01383
LOCALd	=	F7C8E	NZ%DEC	- F150D NZXBAS(00573) Type=1.2 Nibs=5 Dist=06781
LOCALp	=	F75E9	NZ%PAR	- F1512 NZXBAS(00578) Type=1.2 Nibs=5 Dist=06007
LOCFIL	=	1721D	TIXR6S	-
LOCKWD	=	2F7B2	TIXR6S	-
LOOP#d	=	F7D3F	NZ%DEC	-
LOOP#p	=	F773C	NZ%PAR	-
LOOPST	=	2F7AC	TIXR6S	- F0BF7 NZ%GPR(00435) Type=0.0 Nibs=5
				+ F0C55 NZ%GPR(00493) Type=0.0 Nibs=5
				+ F1948 NZ%BAS(009AE) Type=0.0 Nibs=5
				+ F1987 NZ%BAS(009ED) Type=0.0 Nibs=5
				+ F1A56 NZ%BAS(00ABC) Type=0.0 Nibs=5
				+ F2F44 NZ%BIF(0006D) Type=0.0 Nibs=2
				+ F3038 NZ%BIF(00161) Type=0.0 Nibs=4
				+ F30E9 NZ%BIF(00212) Type=0.0 Nibs=5
				+ F3C42 NZ%BUT(0004B) Type=0.0 Nibs=5
				-
LSLEEP	=	006CD	TIXR6S	-
LSTCHR	=	F3F92	NZ%BUT	-
LSTENT	=	F4AC9	NZ%CAS	- F66CE NZ%CAT(0083D) Type=1.0 Nibs=4 Dist=01C05
LSTLEN	=	06C27	TIXR6S	-
LXFND	=	0979D	TIXR6S	-
LXTXTT	=	1EE9F	TIXR6S	-
Loop	=	0009F	NZ%SYM	- F08A4 NZ%GPR(000E2) Type=0.0 Nibs=2
				+ F09AE NZ%GPR(001EC) Type=0.0 Nibs=2
				+ F724F NZ%FXQ(00436) Type=0.0 Nibs=2
				- F1097 NZ%BAS(000FD) Type=0.0 Nibs=1
				+ F196A NZ%BAS(009D0) Type=0.0 Nibs=1
				+ F19A0 NZ%BAS(00A06) Type=0.0 Nibs=1
				+ F310A NZ%BIF(00233) Type=0.0 Nibs=1
				+ F365D NZ%DSP(00026) Type=0.0 Nibs=1
				+ F3991 NZ%DSP(0035A) Type=0.0 Nibs=1
				+ F3B79 NZ%DSP(00542) Type=0.0 Nibs=1
				+ F4A60 NZ%CAS(007CD) Type=0.0 Nibs=1
				+ F6A05 NZ%IOR(00333) Type=0.0 Nibs=1
				-
MAIN05	=	00338	TIXR6S	-
MAIN30	=	0037E	TIXR6S	-
MAINEN	=	2F571	TIXR6S	-
MAINLP	=	002FD	TIXR6S	-
MAINST	=	2F558	TIXR6S	-
MAKE1	=	0DACE	TIXR6S	-
MAKEBF	=	01751	TIXR6S	-
MAXCMD	=	2F976	TIXR6S	-
MBOX^	=	2F7A9	TIXR6S	- F3138 NZ%BIF(00261) Type=0.0 Nibs=5
				+ F31BC NZ%BIF(002E5) Type=0.0 Nibs=5
				+ F3BF9 NZ%BUT(00002) Type=0.0 Nibs=5
				+ F3CD7 NZ%BUT(000E0) Type=0.0 Nibs=5
				- F25BF SC%ENT(0068B) Type=0.1 Nibs=5
				-
MEMBER	=	1B098	TIXR6S	-
MEMCKL	=	012A5	TIXR6S	-
MEMER*	=	0945B	TIXR6S	-
MEMERR	=	0944D	TIXR6S	- F28E4 SC%ENT(009B0) Type=0.1 Nibs=5
MEMERX	=	0944F	TIXR6S	-
MESSG	=	0CC17	TIXR6S	-
MFER42	=	0962C	TIXR6S	-
MFERR	=	09393	TIXR6S	-

MFERR*	=	093F1	TIZR6S	-
MFERRS	=	0939E	TIZR6S	-
MFERsp	=	0940D	TIZR6S	-
MLFG=0	=	13DA1	TIZR6S	- F22D8 SCZENT(003A4) Type=0.1 Nibs=5
MFWRN	=	093BC	TIZR6S	-
MFWRNQ	=	093C5	TIZR6S	-
MFWRQ8	=	093C3	TIZR6S	-
MGOSUB	=	1AF01	TIZR6S	-
MLFFLG	=	2F870	TIZR6S	- F1CB3 NZXBAS(00D19) Type=0.0 Nibs=5
				+ F1FB2 SCZENT(0007E) Type=0.0 Nibs=5
				+ F229A SCZENT(00366) Type=0.0 Nibs=5
MOVE*M	=	01308	TIZR6S	-
MOVED0	=	1B0F4	TIZR6S	-
MOVED1	=	1B101	TIZR6S	-
MOVED2	=	1B104	TIZR6S	-
MOVED3	=	1B109	TIZR6S	-
MOVEDA	=	1B0FA	TIZR6S	-
MOVEDD	=	1B106	TIZR6S	-
MOVEDM	=	1B0EE	TIZR6S	-
MOVEFL	=	F4606	NZXCAS	- F13C5 NZXBAS(0042B) Type=1.1 Nibs=4 Dist=03241
				+ F55F3 NZXHND(004D8) Type=1.1 Nibs=4 Dist=00FED
MOVEU0	=	1B162	TIZR6S	-
MOVEU1	=	1B16F	TIZR6S	-
MOVEU2	=	1B172	TIZR6S	-
MOVEU3	=	1B177	TIZR6S	-
MOVEU4	=	1B174	TIZR6S	-
MOVEUA	=	1B168	TIZR6S	-
MOVEUM	=	1B15C	TIZR6S	-
MP1-12	=	0C436	TIZR6S	-
MP15S	=	0C440	TIZR6S	-
MP2-12	=	0C432	TIZR6S	-
MP2-15	=	0C43A	TIZR6S	-
MPOP1N	=	0BD8D	TIZR6S	-
MPOP2N	=	0BD54	TIZR6S	-
MPY	=	0ECBB	TIZR6S	-
MSN12	=	0D553	TIZR6S	-
MSN15	=	0D557	TIZR6S	-
MSPARe	=	02E5C	TIZR6S	-
MTADDR	=	08195	TIZR6S	-
MTADR+	=	081A1	TIZR6S	-
MTHSTK	=	2F599	TIZR6S	-
MTYL	=	F0D18	NZYGPR	- F165D NZXBAS(006C3) Type=1.0 Nibs=4 Dist=00945
				+ F36D4 NZXDSP(0009D) Type=1.1 Nibs=4 Dist=029BC
				+ F4A7F NZXCAS(007EC) Type=1.0 Nibs=4 Dist=03D67
				+ F5C87 NZXHND(00B6C) Type=1.0 Nibs=4 Dist=04F6F
MTYLC	=	F0D26	NZYGPR	-
MTYLL	=	F0D1F	NZYGPR	-
MULTF	=	0C446	TIZR6S	-
MVMEM+	=	0133C	TIZR6S	-
MaxRec	=	00007	NZYSYM	- F435C NZXCAS(000C9) Type=0.0 Nibs=1
NAMEp	=	F7A2D	NZXPAR	-
NAMEpb	=	F7A29	NZXPAR	-
NEEDSC	=	2F94A	TIZR6S	- F5FEB NZXCAT(0015A) Type=0.0 Nibs=5
NEWFI+	=	F4ADE	NZXCAS	- F55BD NZXHND(004A2) Type=1.1 Nibs=4 Dist=00ADF
				+ F5778 NZXHND(0065D) Type=1.1 Nibs=4 Dist=00C9A
NEWFIL	=	F4AFA	NZXCAS	- F52BA NZXHND(0019F) Type=1.1 Nibs=3 Dist=007C0
NORAME	=	F3EE9	NZXBUT	- F6254 NZXCAT(003C3) Type=1.0 Nibs=4 Dist=0236B
NORDIM	=	0AE2D	TIZR6S	-
NOSCR L	=	14C8A	TIZR6S	-

NRMCON = 161AF TIXR6S	- F2145 SCXENT(00211) Type=0.1 Nibs=5
NTOKEN = 0493B TIXR6S	- F7B42 NZZPAR(00645) Type=0.1 Nibs=5
NTOKNL = 048E6 TIXR6S	-
NULLP = 07999 TIXR6S	-
NUMC++ = 03690 TIXR6S	-
NUMC+0 = 03696 TIXR6S	-
NUMCK = F7AE4 NZZPAR	-
NUMCK+ = F7AE0 NZZPAR	-
NUMSCN = 04D18 TIXR6S	- F212F SCXENT(001FB) Type=0.1 Nibs=5
NXTADR = 147E8 TIXR6S	-
NXTCHR = F3F62 NZXBUT	- F1669 NZXBAS(006CF) Type=1.0 Nibs=4 Dist=028F9
	+ F749B NZZFXQ(00682) Type=1.0 Nibs=4 Dist=03539
NXTDST = F2231 SCXENT	-
NXTELM = 148AC TIXR6S	-
NXTEN+ = F4AB1 NZZCAS	-
NXTENT = F4AB3 NZZCAS	- F124C NZXBAS(002B2) Type=1.1 Nibs=4 Dist=03867
	+ F1280 NZXBAS(002E6) Type=1.1 Nibs=4 Dist=03833
	+ F1428 NZXBAS(0048E) Type=1.1 Nibs=4 Dist=03688
	+ F66C8 NZZCAT(00837) Type=1.0 Nibs=4 Dist=01C15
	- F26A3 SCXENT(0076F) Type=0.1 Nibs=5
NXTEXP = 1C2F7 TIXR6S	-
NXTIRQ = 2F70D TIXR6S	-
NXTLIN = 10031 TIXR6S	-
NXTP = 03455 TIXR6S	-
NXTSTM = 08A48 TIXR6S	- F1782 NZXBAS(007E8) Type=0.1 Nibs=5
NXTVA- = 13E58 TIXR6S	- F224A SCXENT(00316) Type=0.1 Nibs=5
NoCont = 0000E TIXR6S	-
Null = 0007F NZZSYM	- F089B NZZGPR(000D9) Type=0.0 Nibs=2
	+ F0998 NZZGPR(001D6) Type=0.0 Nibs=2
	+ F723A NZZFXQ(00421) Type=0.0 Nibs=2
NunExp = 00003 NZZPAR	-
NuOFFS = 1C02D TIXR6S	-
ORGNXT = 03060 TIXR6S	-
OBCOLL = 01435 TIXR6S	-
OBEDIT = 17687 TIXR6S	-
OFFFLG = 2F442 TIXR6S	-
OFFIO = F192B NZXBAS	- F011F NZXTBL(00117) Type=1.2 Nibs=5 Dist=0180C
OFFIOd = F7CD9 NZZDEC	- F17C9 NZXBAS(0082F) Type=1.2 Nibs=5 Dist=06510
	+ F1921 NZXBAS(00987) Type=1.2 Nibs=5 Dist=06388
	- F1926 NZXBAS(0098C) Type=1.2 Nibs=5 Dist=05D22
OFFIOp = F7648 NZZPAR	-
OKP = 00000 TIXR6S	-
ONDC20 = 05501 TIXR6S	- F7EC1 NZZDEC(002EE) Type=0.1 Nibs=5
ONINTR = 2F68D TIXR6S	- F1939 NZXBAS(0099F) Type=0.0 Nibs=5
	+ F29C6 SCXENT(00A92) Type=0.0 Nibs=5
	+ F2B26 SCXENT(00BF2) Type=0.0 Nibs=5
	+ F2B84 SCXENT(00C50) Type=0.0 Nibs=5
ONINTd = F7EBB NZZDEC	- F29B5 SCXENT(00A81) Type=1.2 Nibs=5 Dist=05506
ONINTp = F7678 NZZPAR	- F29BA SCXENT(00A86) Type=1.2 Nibs=5 Dist=04CBE
ONINTx = F29BF SCXENT	- F014C NZXTBL(00144) Type=1.2 Nibs=5 Dist=02873
ONP40 = 02B7B TIXR6S	- F7697 NZZPAR(0019A) Type=0.1 Nibs=5
ONTIMR = 08008 TIXR6S	- F2B93 SCXENT(00C5F) Type=0.1 Nibs=5
OPENF = 11B06 TIXR6S	-
ORGSB = 0D65B TIXR6S	-
ORSB = 0D63C TIXR6S	-
ORXM = 0D633 TIXR6S	-
OUT1T+ = 02CDF TIXR6S	-
OUT1TK = 02CEB TIXR6S	- F7AC0 NZZPAR(005C3) Type=0.1 Nibs=5
OUT2TC = 02CFD TIXR6S	- F7AC7 NZZPAR(005CA) Type=0.1 Nibs=5
OUT2TK = 02CFF TIXR6S	-
OUT3TC = F7ACC NZZPAR	- F7BDC NZZDEC(00009) Type=1.1 Nibs=3 Dist=00110

OUT3TK = 02D15 TIXR6S	- F7AD1 NZXPAR(005D4) Type=0.1 Nibs=5
OUTBS = 2F58F TIXR6S	-
OUTBY+ = 02CE5 TIXR6S	-
OUTBYT = F7ABB NZXPAR	- F7DCA NZXDEC(001F7) Type=1.0 Nibs=3 Dist=0030F
OUTC15 = 05421 TIXR6S	-
OUTEL1 = 05300 TIXR6S	-
OUTELA = 05303 TIXR6S	- F7C60 NZXDEC(0008D) Type=0.1 Nibs=5
OUTLI1 = 03709 TIXR6S	-
OUTLIT = 036F3 TIXR6S	-
OUTNBC = F7AD6 NZXPAR	- F7C4A NZXDEC(00077) Type=1.1 Nibs=3 Dist=00174
	+ F7D1B NZXDEC(00148) Type=1.1 Nibs=3 Dist=00245
	+ F7E8D NZXDEC(002BA) Type=1.1 Nibs=3 Dist=00387
	+ F7ED5 NZXDEC(00302) Type=1.0 Nibs=3 Dist=003FF
	- F7ADB NZXPAR(005DE) Type=0.1 Nibs=5
	-
OUTNBS = 05426 TIXR6S	- F10D0 NZXBAS(00136) Type=0.0 Nibs=1
OUTNIB = 02D28 TIXR6S	+ F1126 NZXBAS(0018C) Type=0.0 Nibs=1
OUTPt = 00002 NZXSYM	+ F5443 NZXHND(00328) Type=0.0 Nibs=1
	- F013A NZXTBL(00132) Type=1.2 Nibs=5 Dist=00FB2
OUTPUT = F10EC NZXBAS	- F10E2 NZXBAS(00148) Type=1.2 Nibs=5 Dist=06B24
OUTPd = F7C06 NZXDEC	+ F1F4E SCZENT(0001A) Type=1.2 Nibs=5 Dist=05CB8
	- F10E7 NZXBAS(0014D) Type=1.2 Nibs=5 Dist=06427
	-
OUTPp = F750E NZXPAR	-
OUTRES = 0BC84 TIXR6S	-
OUTVAR = 0373E TIXR6S	-
OVFL = 0CA73 TIXR6S	-
OVFNIB = 2F6FB TIXR6S	-
OVP = 00002 TIXR6S	-
Offed = 0000B NZXSYM	- F1955 NZXBAS(009BB) Type=0.0 Nibs=1
	+ F30F6 NZXBIF(0021F) Type=0.0 Nibs=1
	+ F3C51 NZXBUT(0005A) Type=0.0 Nibs=1
	- F79BC NZXPAR(004BF) Type=0.0 Nibs=1
	+ F79C9 NZXPAR(004CC) Type=0.0 Nibs=1
	+ F788E NZXPAR(00691) Type=0.0 Nibs=1
	-
OptDev = 00008 NZXPAR	-
	- F0179 NZXTBL(00171) Type=1.2 Nibs=5 Dist=011CD
P1-10 = 041C1 TIXR6S	- F0182 NZXTBL(0017A) Type=1.2 Nibs=5 Dist=01053
PACK = F1346 NZXBAS	- F11CB NZXBAS(00231) Type=1.2 Nibs=5 Dist=06A14
PACKD = F11D5 NZXBAS	+ F133C NZXBAS(003A2) Type=1.2 Nibs=5 Dist=068A3
PACKd = F7BDF NZXDEC	- F11D0 NZXBAS(00236) Type=1.2 Nibs=5 Dist=067E0
	+ F1341 NZXBAS(003A7) Type=1.2 Nibs=5 Dist=0666F
PACKp = F79B0 NZXPAR	- F34E0 NZXBIF(00609) Type=0.1 Nibs=5
	-
PARERR = 02F08 TIXR6S	- F01AF NZXTBL(001A7) Type=1.2 Nibs=5 Dist=0284F
PART3 = 18097 TIXR6S	- F29F4 SCZENT(00AC0) Type=1.2 Nibs=5 Dist=05484
PASS = F29FE SCZENT	- F29F9 SCZENT(00AC5) Type=1.2 Nibs=5 Dist=0517A
PASSd = F7E78 NZXDEC	- F2A7C SCZENT(00B48) Type=0.0 Nibs=5
PASSp = F7B73 NZXPAR	-
PCADDR = 2F679 TIXR6S	-
PDEV = 09E9E TIXR6S	-
PDIR = F11ED NZXBAS	-
PEDIT = 0FF5F TIXR6S	-
PEDITD = 0FF62 TIXR6S	-
PFINDL = 078DF TIXR6S	-
PFNDZL = 078E2 TIXR6S	-
PI/2 = 0DB77 TIXR6S	-
PI/2D = 0DB7A TIXR6S	-
PI/4 = 0DAA1 TIXR6S	-
PILCNF = F2F91 NZXBIF	- F07A9 NZZDIR(000F4) Type=1.2 Nibs=5 Dist=027E8
	+ F1152 NZXBAS(001B8) Type=1.1 Nibs=4 Dist=01E3F
	+ F19B7 NZXBAS(00A1D) Type=1.1 Nibs=4 Dist=015DA
PILCST = F2ED7 NZXBIF	- F0795 NZZDIR(000E0) Type=1.2 Nibs=5 Dist=02742

PILDC = F7DA8 NZ%DEC	- F06D6 NZ%DIR(00021) Type=1.2 Nibs=5 Dist=076D2
PILMLP = F30E7 NZ%BIF	- F07AE NZ%DIR(000F9) Type=1.2 Nibs=5 Dist=02939
PILMSG = F040A Def ine	- F008C NZ%TBL(00084) Type=1.2 Nibs=4 Dist=0037E
PILPOF = F3032 NZ%BIF	- F07A4 NZ%DIR(000EF) Type=1.2 Nibs=5 Dist=0288E
PILPOL = F06B5 NZ%DIR	- F0090 NZ%TBL(00088) Type=1.2 Nibs=5 Dist=00625
PILSRQ = F3119 NZ%BIF	- F07B3 NZ%DIR(000FE) Type=1.2 Nibs=5 Dist=02966
PILVER = 03142 Def ine	- F5149 NZ%HND(0002E) Type=0.0 Nibs=4
PILWKP = F3019 NZ%BIF	- F079F NZ%DIR(000EA) Type=1.2 Nibs=5 Dist=0287A
PILWNK = F2F68 NZ%BIF	- F079A NZ%DIR(000E5) Type=1.2 Nibs=5 Dist=027CE
PLOTt = 00003 NZ%SYM	- F5448 NZ%HND(0032D) Type=0.0 Nibs=1
PNDALM = 2F761 TI%R6S	-
POLL = 12337 TI%R6S	-
POLLd+ = 1232D TI%R6S	-
POP1N = F6D81 NZ%LOW	- F1789 NZ%BAS(007EF) Type=1.0 Nibs=4 Dist=055F8
	+ F60F4 NZ%CAT(00263) Type=1.1 Nibs=4 Dist=00C8D
	-
POP1N+ = 0BD91 TI%R6S	-
POP1R = 0E8FD TI%R6S	-
POP1S = 0BD38 TI%R6S	- F3539 NZ%BIF(00662) Type=0.1 Nibs=5
	+ F60C5 NZ%CAT(00234) Type=0.1 Nibs=5
	- F1EF9 NZ%BAS(00F5F) Type=0.1 Nibs=5
	-
POP2N = 0BC8C TI%R6S	- F5F8C NZ%CAT(000FB) Type=0.1 Nibs=5
POP2N+ = 0BD58 TI%R6S	+ F601E NZ%CAT(0018D) Type=0.1 Nibs=5
POPBUF = 010EE TI%R6S	- F21AB SC%ENT(00277) Type=0.1 Nibs=5
	+ F2284 SC%ENT(00350) Type=0.1 Nibs=5
	-
POPMTN = 1B3DB TI%R6S	-
	-
POPSTK = 08F55 TI%R6S	-
POPSTR = 1B405 TI%R6S	-
POPUPD = 08F3E TI%R6S	- F74A7 NZ%FXQ(0068E) Type=0.1 Nibs=5
PPOS = 2F956 TI%R6S	-
PRASCI = F107F NZ%BAS	-
PREND = F10B7 NZ%BAS	- F107A NZ%BAS(000E0) Type=1.2 Nibs=5 Dist=0003D
PREP = 0ADAF TI%R6S	-
PRESCN = 04A49 TI%R6S	-
PREXT = F0FD7 NZ%BAS	- F0FD2 NZ%BAS(00038) Type=1.2 Nibs=5 Dist=00005
PRGFMF = 0A146 TI%R6S	- F5B06 NZ%HND(009EB) Type=0.1 Nibs=5
PRGMEN = 2F567 TI%R6S	-
PRGMST = 2F562 TI%R6S	-
PRINT* = 17F37 TI%R6S	- F112F NZ%BAS(00195) Type=0.1 Nibs=5
PRINTt = 00001 TI%R6S	-
PRMCNT = 2F94B TI%R6S	-
PRMPTR = 2F5B7 TI%R6S	-
PRMSGA = F0D4E NZ%GPR	- F4437 NZ%CAS(001A4) Type=1.1 Nibs=4 Dist=036E9
PRNEXe = 02E95 TI%R6S	-
PRNTOO = F116B NZ%BAS	-
PRNTDC = 05450 TI%R6S	-
PRNTIS = F1164 NZ%BAS	- F0167 NZ%TBL(0015F) Type=1.2 Nibs=5 Dist=00FFD
PRNTSd = F7BD3 NZ%DEC	- F1138 NZ%BAS(0019E) Type=1.2 Nibs=5 Dist=06A9B
	+ F115A NZ%BAS(001C0) Type=1.2 Nibs=5 Dist=06A79
	- F113D NZ%BAS(001A3) Type=1.2 Nibs=5 Dist=063C0
	+ F115F NZ%BAS(001C5) Type=1.2 Nibs=5 Dist=0639E
PRNTSp = F74FD NZ%PAR	-
	-
PROCDW = F7215 NZ%FXQ	-
PROCLT = F7263 NZ%FXQ	-
PROCST = F6F50 NZ%FXQ	-
PRPSND = 06B17 TI%R6S	-
PRSCOO = 07B93 TI%R6S	-
PRSSc+ = 1BA84 TI%R6S	-
PRSScn = 1BA88 TI%R6S	-
PRT#DC = 06841 TI%R6S	-
PRTIS = F0FA1 NZ%BAS	- F0717 NZ%DIR(00062) Type=1.2 Nibs=5 Dist=0088A
PRTIS+ = F0FAE NZ%BAS	- F5470 NZ%HND(00355) Type=1.1 Nibs=4 Dist=044C2

PRTISc = F0F9A NZXBAS	-
PSHGSB = 08F13 TIZR6S	-
PSHMCR = 08F0B TIZR6S	- F74E6 NZ\FXQ(006CD) Type=0.1 Nibs=5
PSHSTK = 08C7F TIZR6S	-
PSHSTL = 08C85 TIZR6S	-
PSHUPD = 08F0D TIZR6S	-
PT2BYT = F510B NZ\CAS	- F13A0 NZXBAS(00406) Type=1.1 Nibs=4 Dist=03D6B
	+ F5E78 NZXHND(00D5D) Type=1.1 Nibs=4 Dist=00D6D
PUGFIB = 12198 TIZR6S	- F4E3C NZ\CAS(00BA9) Type=0.1 Nibs=5
PURFIB = F5D39 NZXHND	- F4C08 NZ\CAS(00975) Type=1.1 Nibs=4 Dist=01131
PURGDC = 05745 TIZR6S	-
PURGEF = 17359 TIZR6S	-
PUTALR = F0ED2 NZ\GPR	- F4544 NZ\CAS(002B1) Type=1.1 Nibs=4 Dist=03672
PUTARL = F0E8A NZ\GPR	-
PUTC = F6BB1 NZ\IOR	- F0CFC NZ\GPR(0053A) Type=1.0 Nibs=4 Dist=05EB5
	+ F1651 NZXBAS(006B7) Type=1.0 Nibs=4 Dist=05560
	+ F24E2 SC\ENT(005AE) Type=1.0 Nibs=4 Dist=046CF
	+ F2D30 NZ\UTL(0009A) Type=1.1 Nibs=4 Dist=03E81
	+ F2DA7 NZ\UTL(00111) Type=1.1 Nibs=4 Dist=03E0A
	+ F31FF NZ\BIF(00328) Type=1.1 Nibs=4 Dist=039B2
	+ F4A5A NZ\CAS(007C7) Type=1.0 Nibs=4 Dist=02157
PUTC+ = F6BAD NZ\IOR	- F0A3B NZ\GPR(00279) Type=1.1 Nibs=4 Dist=06172
	+ F307F NZ\BIF(001A8) Type=1.1 Nibs=4 Dist=03B2E
	+ F4E63 NZ\CAS(00BD0) Type=1.0 Nibs=4 Dist=01D4A
	-
PUTC+N = F6B7D NZ\IOR	- F316C NZ\BIF(00295) Type=1.1 Nibs=4 Dist=03A15
PUTCN = F6B81 NZ\IOR	- F0D0E NZ\GPR(0054C) Type=1.0 Nibs=4 Dist=05E35
PUTD = F6B43 NZ\IOR	+ F2D08 NZ\UTL(00142) Type=1.1 Nibs=4 Dist=03D6B
	+ F3BC6 NZ\DSP(0058F) Type=1.0 Nibs=4 Dist=02F7D
	+ F4A73 NZ\CAS(007E0) Type=1.0 Nibs=4 Dist=02D0D
	-
PUTDIR = F5044 NZ\CAS	- F1329 NZXBAS(0038F) Type=1.0 Nibs=4 Dist=03D1D
PUTDR" = F5046 NZ\CAS	- F13AF NZXBAS(00415) Type=1.1 Nibs=4 Dist=03C5A
PUTDR# = F5009 NZ\CAS	+ F5D0C NZXHND(00BF1) Type=1.0 Nibs=4 Dist=00D03
	- F4A79 NZ\CAS(007E6) Type=1.0 Nibs=4 Dist=03B8F
PUTDX = F0E8A NZ\GPR	- F08D9 NZ\GPR(00117) Type=1.1 Nibs=4 Dist=0627C
PUTE = F6B55 NZ\IOR	+ F0CA7 NZ\GPR(004E5) Type=1.1 Nibs=4 Dist=05EAE
	+ F1779 NZXBAS(007DF) Type=1.1 Nibs=4 Dist=053DC
	+ F24F9 SC\ENT(005C5) Type=1.0 Nibs=4 Dist=0465C
	+ F327D NZ\BIF(003A6) Type=1.0 Nibs=4 Dist=038D8
	+ F42A6 NZ\CAS(00013) Type=1.1 Nibs=4 Dist=028AF
	+ F436B NZ\CAS(000D8) Type=1.1 Nibs=4 Dist=027EA
	+ F44AA NZ\CAS(00217) Type=1.1 Nibs=4 Dist=026AB
	+ F5AA2 NZXHND(00987) Type=1.1 Nibs=4 Dist=010B3
	+ F5B92 NZXHND(00A77) Type=1.1 Nibs=4 Dist=00FC3
	-
PUTEN = F6B86 NZ\IOR	-
PUTEX = F6B5D NZ\IOR	-
PUTEsc = F3BC0 NZ\DSP	-
PUTGF = F0C86 NZ\GPR	- F2A4D SC\ENT(00B19) Type=1.1 Nibs=4 Dist=01DC7
PUTGF+ = F0C82 NZ\GPR	-
PUTGF- = F0C7E NZ\GPR	- F1D56 NZXBAS(00DBC) Type=1.1 Nibs=4 Dist=010D8
PUTRES = 18115 TIZR6S	-
PUTX = F6A97 NZ\IOR	- F3816 NZ\DSP(001DF) Type=1.1 Nibs=4 Dist=03281
	+ F3961 NZ\DSP(0032A) Type=1.1 Nibs=4 Dist=03136
	-
PWIDTH = 2F958 TIZR6S	-
PWROFF = 00526 TIZR6S	-
PWrite = 00006 NZ\SYM	- F5C74 NZXHND(00B59) Type=0.0 Nibs=1
PgmRun = 0000D TIZR6S	-
Positn = 00003 NZ\SYM	-
Printn = 00009 NZ\SYM	- F3673 NZ\DSP(0003C) Type=0.0 Nibs=1

		+ F36AB NZXDSP(00074) Type=0.0 Nibs=1
		+ F36C0 NZXDSP(00089) Type=0.0 Nibs=1
		+ F3740 NZXDSP(00109) Type=0.0 Nibs=1
		+ F379A NZXDSP(00163) Type=0.0 Nibs=1
Putd =	F0DOC NZXGPR	- F131F NZXBAS(00385) Type=1.1 Nibs=3 Dist=00613
Pute =	F327B NZXBIF	- F2CC3 NZXUTL(0002D) Type=1.1 Nibs=3 Dist=00588
QUOEXe =	02E8B TIXR6S	-
QUOTCK =	0623D TIXR6S	-
R1REV =	00785 TIXR6S	-
R2REV =	0AA83 TIXR6S	-
R3=D10 =	03526 TIXR6S	-
R3REV =	153AB TIXR6S	-
R4REV =	1DBA8 TIXR6S	-
R<RST2 =	014DB TIXR6S	- F61DC NZXCAT(0034B) Type=0.1 Nibs=5
R<RSTK =	014DD TIXR6S	-
RAMEND =	2F5B2 TIXR6S	-
RAMROM =	0A5F7 TIXR6S	-
RANGE =	FOE93 NZXGPR	-
RANGEA =	FOE83 NZXGPR	- F2E45 NZXUTL(001AF) Type=1.1 Nibs=4 Dist=01FC2
		+ F7D73 NZXDEC(001A0) Type=1.1 Nibs=4 Dist=06EFO
RANGEN =	FOE8D NZXGPR	- F20F9 SCXENT(001C5) Type=1.1 Nibs=4 Dist=0126C
		+ F74CA NZXFXQ(006B1) Type=1.0 Nibs=4 Dist=0663D
RAWBFR =	2F580 TIXR6S	-
RCCD1 =	0D3F5 TIXR6S	-
RCCD2 =	0D41C TIXR6S	-
RCL* =	0E983 TIXR6S	-
RCLW1 =	0E981 TIXR6S	-
RCLW2 =	0E98E TIXR6S	-
RCLW3 =	0E9C4 TIXR6S	-
RCSCR =	0E954 TIXR6S	-
RCV0FS =	1C050 TIXR6S	- F26CC SCXENT(00798) Type=0.1 Nibs=5
RDATTY =	17CC6 TIXR6S	- F2269 SCXENT(00335) Type=0.1 Nibs=5
RDBAS =	173FF TIXR6S	-
RDBYTA =	13A2F TIXR6S	-
RDCHD+ =	076EE TIXR6S	-
RDCHDR =	076F0 TIXR6S	-
RDHDR1 =	076FD TIXR6S	-
RDINFO =	F4254 NZXBUT	- F5C5B NZXHND(00B40) Type=1.0 Nibs=4 Dist=01A07
RDLNAS =	13A1F TIXR6S	-
RDTEXT =	17489 TIXR6S	-
READDC =	F1D99 NZXBAS	- F00F2 NZXTBL(000EA) Type=1.2 Nibs=5 Dist=01CA7
READI3 =	F6736 NZXIOR	- F44FB NZXCAS(00268) Type=1.1 Nibs=4 Dist=0223B
READIN =	F1D46 NZXBAS	- F00E9 NZXTBL(000E1) Type=1.2 Nibs=5 Dist=01C5D
READIT =	F66DE NZXIOR	-
READNB =	17518 TIXR6S	-
READP5 =	0323B TIXR6S	- F7542 NZXPAR(00045) Type=0.1 Nibs=5
READRH =	F4594 NZXCAS	- F52D8 NZXHND(001BD) Type=1.1 Nibs=4 Dist=00D44
		+ F5361 NZXHND(00246) Type=1.1 Nibs=4 Dist=00DCD
READRG =	F689A NZXIOR	- F0B7A NZXGPR(003B8) Type=1.1 Nibs=4 Dist=05D20
		+ F1BC0 NZXBAS(00C26) Type=1.1 Nibs=4 Dist=04CDA
READSU =	F66D2 NZXIOR	- F4A6D NZXCAS(007DA) Type=1.0 Nibs=4 Dist=01C65
		+ F5A8A NZXHND(0096F) Type=1.1 Nibs=4 Dist=00C48
RECADR =	0F4B7 TIXR6S	-
RECALL =	0F281 TIXR6S	-
REDCHR =	F22F7 SCXENT	-
REDUCE =	15977 TIXR6S	-
RELJMP =	05047 TIXR6S	-
REMOTE =	F1570 NZXBAS	- F019D NZXTBL(00195) Type=1.2 Nibs=5 Dist=013D3

REMOTd = F7CC7 NZXDEC	- F1566 NZXBAS(005CC) Type=1.2 Nibs=5 Dist=06761
REMOTp = F761E NZXPAR	- F156B NZXBAS(005D1) Type=1.2 Nibs=5 Dist=060B3
RENSUB = 1A753 TIxR6S	-
REPROM = 18A1E TIxR6S	-
REQST = F2919 SCZENT	- F018B NZXTBL(00183) Type=1.2 Nibs=5 Dist=0278E
REQSTd = F7D29 NZXDEC	- F290F SCZENT(009DB) Type=1.2 Nibs=5 Dist=0541A
REQSTp = F7B5D NZXPAR	- F2914 SCZENT(009E0) Type=1.2 Nibs=5 Dist=05249
RESCAN = 04A4C TIxR6S	-
RESERV = 2F986 TIxR6S	-
RESET = F6DCA NZXLOW	- F015E NZXTBL(00156) Type=1.2 Nibs=5 Dist=06C6C
RESETd = F7D0E NZXDEC	- F6DC0 NZXLOW(0006A) Type=1.2 Nibs=5 Dist=00F4E
RESETp = F7628 NZXPAR	- F6DC5 NZXLOW(0006F) Type=1.2 Nibs=5 Dist=00863
RESPTR = F7B1B NZXPAR	-
RESREG = 2F7C2 TIxR6S	-
RESST+ = F349C NZXBIF	-
RESSTS = F348E NZXBIF	- F2B02 SCZENT(00BCE) Type=1.1 Nibs=4 Dist=0098C
REST* = 03035 TIxR6S	- F766E NZXPAR(00171) Type=0.1 Nibs=5
REST10 = F1985 NZXBAS	- F2AD9 SCZENT(00BA5) Type=1.0 Nibs=4 Dist=01154
REST1A = F337E NZXBIF	- F14D3 NZXBAS(00539) Type=1.1 Nibs=4 Dist=01EAB
REST2C = F3392 NZXBIF	- F14C3 NZXBAS(00529) Type=1.1 Nibs=4 Dist=01ECF
	+ F16FB NZXBAS(00761) Type=1.1 Nibs=4 Dist=01C97
	+ F172A NZXBAS(00790) Type=1.1 Nibs=4 Dist=01C68
	+ F2D0C NZXUTL(00076) Type=1.1 Nibs=3 Dist=00686
	+ F2D7B NZXUTL(000E5) Type=1.1 Nibs=3 Dist=00617
	+ F72EB NZXFXQ(004D2) Type=1.1 Nibs=4 Dist=03F59
	+ F73A9 NZXFXQ(00590) Type=1.1 Nibs=4 Dist=04017
RESTDO = F32F9 NZXBIF	- F117F NZXBAS(001E5) Type=1.1 Nibs=4 Dist=0217A
	+ F2076 SCZENT(00142) Type=1.1 Nibs=4 Dist=01283
	+ F2968 SCZENT(00A34) Type=1.0 Nibs=4 Dist=00991
	+ F2D62 NZXUTL(000CC) Type=1.1 Nibs=3 Dist=00597
RESTD1 = F330C NZXBIF	- F14B8 NZXBAS(0051E) Type=1.1 Nibs=4 Dist=01E54
	+ F28B2 SCZENT(0097E) Type=1.1 Nibs=4 Dist=00A5A
	+ F5F3C NZXCAT(000AB) Type=1.1 Nibs=4 Dist=02C30
	+ F5FA9 NZXCAT(00118) Type=1.1 Nibs=4 Dist=02C9D
	+ F72E2 NZXFXQ(004C9) Type=1.1 Nibs=4 Dist=03FD6
	+ F739D NZXFXQ(00584) Type=1.1 Nibs=4 Dist=04091
RESTIO = F197F NZXBAS	- F0128 NZXTBL(00120) Type=1.2 Nibs=5 Dist=01857
RESTOR = F3EF1 NZXBUT	- F2FB6 NZXBIF(000DF) Type=1.1 Nibs=4 Dist=00F3B
RESTRT = F308D NZXBIF	- F0916 NZXGPR(00154) Type=1.1 Nibs=4 Dist=02777
	+ F0923 NZXGPR(00161) Type=1.1 Nibs=4 Dist=0276A
RESTST = F32B7 NZXBIF	- F4117 NZXBUT(00520) Type=1.0 Nibs=4 Dist=00E60
	+ F74C4 NZXFXQ(006AB) Type=1.0 Nibs=4 Dist=0420D
RESTd = F7CFE NZXDEC	- F1975 NZXBAS(009DB) Type=1.2 Nibs=5 Dist=06389
RESTp = F7BAE NZXPAR	- F197A NZXBAS(009E0) Type=1.2 Nibs=5 Dist=06234
REV\$ = 1B38E TIxR6S	- F61B4 NZXCAT(00323) Type=0.1 Nibs=5
REVPOP = 0BD31 TIxR6S	- F1CC6 NZXBAS(00D2C) Type=0.1 Nibs=5
	+ F3F43 NZXBUT(0034C) Type=0.1 Nibs=5
REWIND = 11365 TIxR6S	-
RFAD++ = 0A6FB TIxR6S	-
RFAD+I = 0A702 TIxR6S	-
RFAD-- = 0A652 TIxR6S	-
RFAD-I = 0A659 TIxR6S	-
RFNBFR = 2F57B TIxR6S	-
RFUPD+ = 0A66E TIxR6S	-
RJUST = 12AE2 TIxR6S	-
RND-12 = 1B01F TIxR6S	-
RND12+ = 0C9D5 TIxR6S	-
RNDAHx = 136CB TIxR6S	-
RNDNRM = 0CAB1 TIxR6S	-
RNSEED = 2F6FE TIxR6S	-

ROMCID = 00BFE	TIZR6S	-
ROMFND = 1102F	TIZR6S	-
ROMSTT = F0000	NZXRST	-
ROMTYP = F4167	NZXBUT	- F7220 NZ%FXQ(00407) Type=1.1 Nibs=4 Dist=030B9
ROWDVR = 2E350	TIZR6S	-
RPLLIN = 013F7	TIZR6S	-
RPLSBH = 1799B	TIZR6S	-
RPTKY = 152BA	TIZR6S	- F5F93 NZ%CAT(00102) Type=0.1 Nibs=5
RSDOD1 = F7AAA	NZ%PAR	-
RST2<R = 014A6	TIZR6S	- F6204 NZ%CAT(00373) Type=0.1 Nibs=5
RSTK<R = 014A8	TIZR6S	-
RSTKBF = 2F820	TIZR6S	-
RSTKBp = 2F81F	TIZR6S	-
RSTST = 0F5C5	TIZR6S	-
RTNCC = F79AE	NZ%PAR	-
RTNCCX = F2F62	NZ%BIF	-
RTNSXM = F078F	NZ%DIR	- F06DB NZ%DIR(00026) Type=1.2 Nibs=5 Dist=000B4
		+ F0708 NZ%DIR(00053) Type=1.2 Nibs=5 Dist=00087
		+ F070D NZ%DIR(00058) Type=1.2 Nibs=5 Dist=00082
		+ F072B NZ%DIR(00076) Type=1.2 Nibs=5 Dist=00064
		+ F0730 NZ%DIR(0007B) Type=1.2 Nibs=5 Dist=0005F
		+ F0735 NZ%DIR(00080) Type=1.2 Nibs=5 Dist=0005A
		+ F073A NZ%DIR(00085) Type=1.2 Nibs=5 Dist=00055
		+ F0758 NZ%DIR(000A3) Type=1.2 Nibs=5 Dist=00037
		-
RUNRT1 = 074E7	TIZR6S	-
RUNRTN = 074EA	TIZR6S	-
Read = 00002	NZ%SYM	- F4A3E NZ%CAS(007AB) Type=0.0 Nibs=1
		+ F6385 NZ%CAT(004F4) Type=0.0 Nibs=1
Read0 = 00000	NZ%SYM	-
Read1 = 00001	NZ%SYM	- F45B0 NZ%CAS(0031D) Type=0.0 Nibs=1
ReadD1 = F0F8A	NZ%GPR	-
ResetC = 00008	TIZR6S	-
ReWind = 00007	NZ%SYM	- F0BAB NZ%GPR(003E9) Type=0.0 Nibs=1
		+ F4586 NZ%CAS(002F3) Type=0.0 Nibs=1
S-R0-0 = 2F871	TIZR6S	-
S-R0-1 = 2F876	TIZR6S	-
S-R0-2 = 2F87B	TIZR6S	-
S-R0-3 = 2F880	TIZR6S	- F21FA SC%ENT(002C6) Type=0.0 Nibs=5
S-R1-0 = 2F881	TIZR6S	-
S-R1-1 = 2F886	TIZR6S	- F2499 SC%ENT(00565) Type=0.0 Nibs=5
S-R1-2 = 2F88B	TIZR6S	-
S-R1-3 = 2F890	TIZR6S	-
SALLOC = 0153B	TIZR6S	-
SAVE1A = F334D	NZ%BIF	- F14A2 NZ%BAS(00508) Type=1.1 Nibs=4 Dist=01EAB
SAVE2C = F3361	NZ%BIF	- F1683 NZ%BAS(006E9) Type=1.0 Nibs=4 Dist=01CDE
		+ F2CEB NZ%UTL(00055) Type=1.1 Nibs=3 Dist=00676
		+ F2DE8 NZ%UTL(00152) Type=1.1 Nibs=3 Dist=00579
		+ F73E0 NZ%FXQ(005C7) Type=1.0 Nibs=4 Dist=0407F
SAVED0 = F32CD	NZ%BIF	- F1170 NZ%BAS(001D6) Type=1.1 Nibs=4 Dist=0215D
		+ F2949 SC%ENT(00A15) Type=1.1 Nibs=4 Dist=00984
		+ F2CA5 NZ%UTL(0000F) Type=1.1 Nibs=3 Dist=00628
SAVED1 = F32E3	NZ%BIF	- F1492 NZ%BAS(004F8) Type=1.1 Nibs=4 Dist=01E51
		+ F26BE SC%ENT(0078A) Type=1.1 Nibs=4 Dist=00C25
		+ F5EAB NZ%CAT(0001A) Type=1.1 Nibs=4 Dist=02BC8
		+ F5F2A NZ%CAT(00099) Type=1.1 Nibs=4 Dist=02C47
SAVEIT = F3E4B	NZ%BUT	- F1663 NZ%BAS(006C9) Type=1.0 Nibs=4 Dist=027E8
		+ F1F84 SC%ENT(00050) Type=1.1 Nibs=4 Dist=01EC7
		+ F1F97 SC%ENT(00063) Type=1.1 Nibs=4 Dist=01EB4
		+ F361A NZ%BIF(00743) Type=1.1 Nibs=4 Dist=00831

SAVESB = 0D66E	TIZR6S	-	
SAVEST = F329C	NZXBIF	-	F4103 NZ%BUT(0050C) Type=1.1 Nibs=4 Dist=00E67
SAVEXM = 0D663	TIZR6S	-	
SAVGSB = 0D64E	TIZR6S	-	
SAVST+ = F3463	NZXBIF	-	
SAVSTK = 2F59E	TIZR6S	-	F4256 NZ%BUT(0065F) Type=0.0 Nibs=5
SAVSTS = F345A	NZXBIF	-	F2ADF SC%ENT(00BAB) Type=1.1 Nibs=4 Dist=0097B
SB15S = 0E19A	TIZR6S	-	
SCAN = 04C40	TIZR6S	-	
SCANRT = 022B9	TIZR6S	-	F3888 NZ%DSP(00251) Type=0.1 Nibs=5
			+ F39E1 NZ%DSP(003AA) Type=0.1 Nibs=5
SCOPCK = 0915B	TIZR6S	-	
SCREX0 = 2F941	TIZR6S	-	
SCREX1 = 2F951	TIZR6S	-	
SCREX2 = 2F961	TIZR6S	-	
SCREX3 = 2F971	TIZR6S	-	
SCRLLR = 0212E	TIZR6S	-	F5F9D NZ%CAT(0010C) Type=0.1 Nibs=5
SCROLLT = 2F946	TIZR6S	-	
SCRPTR = 2F966	TIZR6S	-	
SCRSTO = 2F901	TIZR6S	-	
SCRICH = 2F901	TIZR6S	-	F477F NZ%CAS(004EC) Type=0.0 Nibs=2
			+ F4979 NZ%CAS(006E6) Type=0.0 Nibs=4 Offset= 16
			+ F4A2E NZ%CAS(0079B) Type=0.0 Nibs=5
			+ F4B4D NZ%CAS(008BA) Type=0.0 Nibs=2 Offset= 20
			+ F4BB0 NZ%CAS(0092A) Type=0.0 Nibs=2 Offset= 20
			+ F4BEA NZ%CAS(00957) Type=0.0 Nibs=5 Offset= 28
			+ F4C22 NZ%CAS(0098F) Type=0.0 Nibs=2 Offset= 36
			+ F4C5E NZ%CAS(009CB) Type=0.0 Nibs=2 Offset= 56
			+ F4C6D NZ%CAS(009DA) Type=0.0 Nibs=2 Offset= 20
			+ F4C98 NZ%CAS(00A05) Type=0.0 Nibs=5 Offset= 56
			+ F4CE7 NZ%CAS(00A54) Type=0.0 Nibs=2 Offset= 28
			+ F4D27 NZ%CAS(00A94) Type=0.0 Nibs=2 Offset= 28
			+ F4F32 NZ%CAS(00C9F) Type=0.0 Nibs=5 Offset= 16
			+ F4FF4 NZ%CAS(00D61) Type=0.0 Nibs=5 Offset= 36
			+ F55A7 NZ%HND(0048C) Type=0.0 Nibs=2 Offset= 56
			+ F581D NZ%HND(00702) Type=0.0 Nibs=5 Offset= 56
			+ F5845 NZ%HND(0072A) Type=0.0 Nibs=2 Offset= 32
			+ F5C3A NZ%HND(00B1F) Type=0.0 Nibs=5
			+ F5C95 NZ%HND(00B7A) Type=0.0 Nibs=5 Offset= 20
			+ F6360 NZ%CAT(004CF) Type=0.0 Nibs=5 Offset= 20
			+ F63A1 NZ%CAT(00510) Type=0.0 Nibs=5
			+ F6498 NZ%CAT(00607) Type=0.0 Nibs=5 Offset= 56
			+ F64D5 NZ%CAT(00644) Type=0.0 Nibs=5 Offset= 32
			+ F6589 NZ%CAT(006F8) Type=0.0 Nibs=5 Offset= 40
SE1-10 = 04468	TIZR6S	-	
SECHMS = 13252	TIZR6S	-	
SEEKA = F42C7	NZ%CAS	-	F0B4E NZ%GPR(0038C) Type=1.1 Nibs=4 Dist=03779
			+ F12DD NZ%BAS(00343) Type=1.1 Nibs=4 Dist=02FEA
			+ F5C30 NZ%HND(00B15) Type=1.0 Nibs=4 Dist=01969
SEEKB = F42CE	NZ%CAS	-	
SEEKRD = F636D	NZ%CAT	-	
SEND = F2CA0	NZ%UTL	-	F0155 NZ%TBL(0014D) Type=1.2 Nibs=5 Dist=02B4B
SEND20 = 17DFA	TIZR6S	-	F6640 NZ%CAT(007AF) Type=0.1 Nibs=5
SENDEL = 17DC1	TIZR6S	-	
SENDI+ = F6A1E	NZ%IOR	-	F38CF NZ%DSP(00298) Type=1.1 Nibs=4 Dist=0314F
			+ F3B70 NZ%DSP(00539) Type=1.1 Nibs=4 Dist=02EAE
SENDIT = F6A24	NZ%IOR	-	F38E5 NZ%DSP(002AE) Type=1.1 Nibs=4 Dist=0313F
			+ F3AEC NZ%DSP(004B5) Type=1.1 Nibs=4 Dist=02F38
			+ F4322 NZ%CAS(0008F) Type=1.0 Nibs=4 Dist=02702
SENDWD = 17E15	TIZR6S	-	

SENDd = F7D29 NZXDEC	- F2C96 NZXUTL(00000) Type=1.2 Nibs=5 Dist=05093
SENDp = F76C8 NZXPAR	- F2C9B NZXUTL(00005) Type=1.2 Nibs=5 Dist=04A2D
SETALM = 1290D TIXR6S	-
SETALR = 12917 TIXR6S	-
SETFMT = 0F01F TIXR6S	-
SETLP = F3C12 NZXBUT	- F087F NZXGPR(000BD) Type=1.1 Nibs=4 Dist=03393
	+ F367A NZXDSP(00043) Type=1.1 Nibs=3 Dist=00598
SETSB = 0D641 TIXR6S	-
SETTMO = 13158 TIXR6S	-
SETTSR = 0FD01 NZXSYM	-
SETUP = F3DC8 NZXBUT	- F6E9C NZXFXQ(00083) Type=1.0 Nibs=4 Dist=030D4
SFLAG? = 1364C TIXR6S	- F098B NZXGPR(001C9) Type=0.1 Nibs=5
SFLAGC = 13601 TIXR6S	-
SFLAGS = 135FA TIXR6S	-
SFLAGT = 13608 TIXR6S	-
SHF10 = 0C486 TIXR6S	-
SHFLAC = 0DB46 TIXR6S	-
SHFRAC = 0DB51 TIXR6S	-
SHFRBD = 0DB5F TIXR6S	-
SHRT = 0F96C TIXR6S	-
SIGCHK = 0BD98 TIXR6S	-
SIGTST = 0E636 TIXR6S	-
SIN12 = 0D716 TIXR6S	-
SIN15 = 0D71A TIXR6S	-
SKIP = F7B36 NZXPAR	-
SKIPDC = 057F6 TIXR6S	-
SLEEP = 006C2 TIXR6S	-
SNAPBF = 2F7F0 TIXR6S	- F345E NZXBIF(00587) Type=0.0 Nibs=5
	+ F3492 NZXBIF(005BB) Type=0.0 Nibs=5 Offset= 33
SNAPR* = 01578 TIXR6S	-
SNAPRS = 01571 TIXR6S	- F52F7 NZXHND(001DC) Type=0.1 Nibs=5
SNAPSV = 015A7 TIXR6S	-
SNDWD+ = 17E1F TIXR6S	-
SPACE = 0AD9D TIXR6S	-
SPLITA = 0C6BF TIXR6S	-
SPLITC = 0C940 TIXR6S	-
SPLTAC = 0C934 TIXR6S	-
SPLTAX = 0E62B TIXR6S	-
SPOLL = F1B9D NZXBAS	- F00E0 NZXTBL(000D8) Type=1.2 Nibs=5 Dist=01ABD
SQR15 = 0C534 TIXR6S	-
SQR17 = 0C553 TIXR6S	-
SQR70 = 0C5C3 TIXR6S	-
SQRSBV = 0D629 TIXR6S	-
SRLEAS = 015EC TIXR6S	-
ST!NOd = F7D83 NZXDEC	-
ST!NOp = F782C NZXPAR	-
STAB1 = 0D3D9 TIXR6S	-
STAB2 = 0D400 TIXR6S	-
STANBY = F16AF NZXBAS	- F01C1 NZXTBL(001B9) Type=1.2 Nibs=5 Dist=014EE
STANDd = F7C74 NZXDEC	- F16A5 NZXBAS(0070B) Type=1.2 Nibs=5 Dist=065CF
STANDp = F75CD NZXPAR	- F16AA NZXBAS(00710) Type=1.2 Nibs=5 Dist=05F23
STAND+ = F7C6C NZXDEC	-
STANp+ = F75BC NZXPAR	-
START = F087D NZXGPR	- F1029 NZXBAS(0008F) Type=1.1 Nibs=3 Dist=007AC
	+ F14EA NZXBAS(00550) Type=1.1 Nibs=4 Dist=00C6D
	+ F1D11 NZXBAS(00D77) Type=1.1 Nibs=4 Dist=01494
	+ F22B6 SCXENT(00382) Type=1.1 Nibs=4 Dist=01A39
	+ F2324 SCXENT(003F0) Type=1.1 Nibs=4 Dist=01AA7
	+ F2A1D SCXENT(00AE9) Type=1.1 Nibs=4 Dist=021A0
	+ F3691 NZXDSP(0005A) Type=1.1 Nibs=4 Dist=02E14

	+ F4R85 NZXCAS(007F2)	Type=1.0	Nibs=4	Dist=04208
	+ F542D NZXHND(00312)	Type=1.0	Nibs=4	Dist=048B0
	+ F5F47 NZXCAT(000B6)	Type=1.1	Nibs=4	Dist=056CA
	+ F5FB6 NZXCAT(00125)	Type=1.1	Nibs=4	Dist=05739
	+ F6E93 NZFXQ(0007A)	Type=1.1	Nibs=4	Dist=06616
START+ = F0883 NZGPR	- F2CAC NZUTL(00016)	Type=1.1	Nibs=4	Dist=02429
START- = F0886 NZGPR	- F19AE NZBAS(00A14)	Type=1.1	Nibs=4	Dist=01128
	+ F1A6E NZBAS(00AD4)	Type=1.1	Nibs=4	Dist=011E8
STATAR = 2F7AD TIXR6S	-			
STATRS = 172F3 TIXR6S	-			
STATSV = 1732F TIXR6S	-			
STATUS = F1DEF NZBAS	- F00FB NZTBL(000F3)	Type=1.2	Nibs=5	Dist=01CF4
STCD2 = 0D427 TIXR6S	-			
STKCHR = 18504 TIXR6S	-			
STKCMD = 155ED TIXR6S	-			
STKVCT = 1470C TIXR6S	- F2258 SCZENT(00324)	Type=0.1	Nibs=5	
STMBCL = 090E7 TIXR6S	-			
STMBUF = 090DF TIXR6S	-			
STMTDO = 2F891 TIXR6S	- F15D8 NZBAS(0063E)	Type=0.0	Nibs=2	Offset= 2
	+ F1692 NZBAS(006F8)	Type=0.0	Nibs=5	
	+ F186D NZBAS(008D3)	Type=0.0	Nibs=2	
	+ F26AE SCZENT(0077A)	Type=0.0	Nibs=5	
	+ F282A SCZENT(008F6)	Type=0.0	Nibs=5	
	+ F32D4 NZBIF(003FD)	Type=0.0	Nibs=5	
	+ F3300 NZBIF(00429)	Type=0.0	Nibs=5	
	+ F3328 NZBIF(00451)	Type=0.0	Nibs=5	
	+ F333F NZBIF(00468)	Type=0.0	Nibs=5	
STMTD1 = 2F896 TIXR6S	- F2850 SCZENT(0091C)	Type=0.0	Nibs=5	
	+ F28C4 SCZENT(00990)	Type=0.0	Nibs=5	
	+ F32EA NZBIF(00413)	Type=0.0	Nibs=5	
	+ F3313 NZBIF(0043C)	Type=0.0	Nibs=5	
	+ F73CD NZFXQ(005B4)	Type=0.0	Nibs=5	
STMTRO = 2F871 TIXR6S	- F1118 NZBAS(0017E)	Type=0.0	Nibs=4	Offset= 11
	+ F1689 NZBAS(006EF)	Type=0.0	Nibs=5	
	+ F3354 NZBIF(0047D)	Type=0.0	Nibs=5	
	+ F3385 NZBIF(004AE)	Type=0.0	Nibs=5	
	+ F54A2 NZXHND(00387)	Type=0.0	Nibs=5	Offset= 1
STMTR1 = 2F881 TIXR6S	- F10C4 NZBAS(0012A)	Type=0.0	Nibs=2	Offset= 2
	+ F10F7 NZBAS(0015D)	Type=0.0	Nibs=5	Offset= 2
	+ F336B NZBIF(00494)	Type=0.0	Nibs=5	
	+ F3399 NZBIF(004C2)	Type=0.0	Nibs=5	
	+ F51E8 NZXHND(000CD)	Type=0.0	Nibs=5	Offset= 5
	+ F5453 NZXHND(00338)	Type=0.0	Nibs=5	Offset= 2
	+ F5499 NZXHND(0037E)	Type=0.0	Nibs=5	Offset= 9
	+ F59BE NZXHND(008A3)	Type=0.0	Nibs=5	Offset= 14
	+ F5A3D NZXHND(00922)	Type=0.0	Nibs=5	Offset= 14
	- F218B SCZENT(00257)	Type=0.1	Nibs=5	
STORE = 0F5F8 TIXR6S	-			
STR\$00 = 1815C TIXR6S	-			
STR\$SB = 18149 TIXR6S	-			
STRASN = 0F6B3 TIXR6S	-			
STREQL = 1B1EF TIXR6S	-			
STRGCK = 036BA TIXR6S	-			
STRHDR = 0F09A TIXR6S	-			
STRHED = 14C2E TIXR6S	- F264B SCZENT(00717)	Type=0.1	Nibs=5	
STRNGP = 0379D TIXR6S	-			
STRTST = 1B1C7 TIXR6S	-			
STSAVE = 2F6BE TIXR6S	- F32A3 NZBIF(003CC)	Type=0.0	Nibs=5	
	+ F32BE NZBIF(003E7)	Type=0.0	Nibs=5	
STSCR = 0E92C TIXR6S	-			
STUFF = 1B0B2 TIXR6S	-			

SUBONE	=	0C327	TIZR6S	-	
SVDOD1	=	F7A93	NZXP	-	
SVINF+	=	08457	TIZR6S	-	
SVINFO	=	0845A	TIZR6S	-	
SVTRC	=	0FA35	TIZR6S	-	F22D1 SCXENT(0039D) Type=0.1 Nibs=5
SWAPO1	=	F65FB	NZXCAT	-	F093B NZXGPR(00179) Type=1.1 Nibs=4 Dist=05CC0
					+ F094C NZXGPR(0018A) Type=1.1 Nibs=4 Dist=05CAF
					+ F1185 NZXBAS(001EB) Type=1.1 Nibs=4 Dist=05476
SWAPDO	=	F331F	NZXBIF	-	F2956 SCXENT(00A22) Type=1.1 Nibs=4 Dist=009C9
					+ F2D05 NZXUTL(0006F) Type=1.1 Nibs=3 Dist=0061A
					+ F2D42 NZXUTL(000AC) Type=1.1 Nibs=3 Dist=005DD
					+ F2D77 NZXUTL(000E1) Type=1.1 Nibs=3 Dist=005A8
SWPBYT	=	17A24	TIZR6S	-	
SYNTXe	=	02E2B	TIZR6S	-	
SYSEN	=	2F58A	TIZR6S	-	
SYSFLG	=	2F6D9	TIZR6S	-	
SavLvl	=	00005	TIZR6S	-	
Seek	=	00004	NZXS	-	F42CF NZXCAS(0003C) Type=0.0 Nibs=1
Seeka	=	F5C2E	NZXHND	-	F637E NZXCAT(004ED) Type=1.1 Nibs=3 Dist=00750
SendBf	=	F39DF	NZXDSP	-	
SetAVM	=	1B9FA	TIZR6S	-	
SetBP	=	00003	NZXS	-	F130B NZXBAS(00371) Type=0.0 Nibs=1
					+ F4896 NZXCAS(00603) Type=0.0 Nibs=1
					+ F4E82 NZXCAS(00C1F) Type=0.0 Nibs=1
					+ F502B NZXCAS(00D98) Type=0.0 Nibs=1
SngDev	=	00004	NZXS	-	F3D4A NZXBUT(00153) Type=0.0 Nibs=1
					+ F3E61 NZXBUT(0026A) Type=0.0 Nibs=1
					+ F3EDF NZXBUT(002E8) Type=0.0 Nibs=1
SpChar	=	00002	NZXP	-	
StarOK	=	0000A	NZXP	-	F7623 NZXP(00126) Type=0.0 Nibs=1
					+ F78B4 NZXP(003B7) Type=0.0 Nibs=1
					+ F78CA NZXP(003CD) Type=0.0 Nibs=1
					+ F79B2 NZXP(004B5) Type=0.0 Nibs=1
					+ F79B9 NZXP(004BC) Type=0.0 Nibs=1
					+ F7B8B NZXP(0068E) Type=0.0 Nibs=1
StrOK	=	0000A	NZXP	-	F7739 NZXP(0023C) Type=0.0 Nibs=1
					+ F77DD NZXP(002E0) Type=0.0 Nibs=1
					+ F7811 NZXP(00314) Type=0.0 Nibs=1
					+ F7848 NZXP(0034B) Type=0.0 Nibs=1
					+ F7B63 NZXP(00666) Type=0.0 Nibs=1
TALK	=	F0D44	NZGPR	-	F2A38 SCXENT(00B04) Type=1.1 Nibs=4 Dist=01CF4
TAN12	=	0D72F	TIZR6S	-	
TAN15	=	0D733	TIZR6S	-	
TASTK	=	2F599	TIZR6S	-	
TBLJMC	=	02426	TIZR6S	-	
TBLJMP	=	0242A	TIZR6S	-	
TBMSG\$	=	099AB	TIZR6S	-	
TER/LF	=	F24FD	SCXENT	-	F5BC9 NZXHND(00ARE) Type=1.0 Nibs=4 Dist=036CC
TERCHR	=	2F97D	TIZR6S	-	F22EF SCXENT(003BB) Type=0.0 Nibs=5
					+ F27F8 SCXENT(008C4) Type=0.0 Nibs=5
					+ F2F57 NZXBIF(00080) Type=0.0 Nibs=4
TFHDLR	=	1702F	TIZR6S	-	
TFORN	=	2F59E	TIZR6S	-	
TGSBS	=	2F5A3	TIZR6S	-	
TIMAF	=	2F787	TIZR6S	-	
TIMER1	=	2E3F8	TIZR6S	-	
TIMER2	=	2E2F8	TIZR6S	-	
TIMER3	=	2E1F8	TIZR6S	-	
TIMLAF	=	2F77B	TIZR6S	-	

TIMLST = 2F76F	TIZR6S	-	
TIMOFS = 2F763	TIZR6S	-	
TKSCH+ = 08A6B	TIZR6S	-	
TKSCH7 = 08A99	TIZR6S	-	
TMRAD1 = 2F697	TIZR6S	-	
TMRAD2 = 2F69C	TIZR6S	-	
TMRAD3 = 2F6A1	TIZR6S	-	
TMRIN1 = 2F6A6	TIZR6S	-	
TMRIN2 = 2F6AE	TIZR6S	-	
TMRIN3 = 2F6B6	TIZR6S	-	
TODT = 13229	TIZR6S	-	
TONE = 0EBEB	TIZR6S	-	
TRACDC = 052FC	TIZR6S	-	
TRACEM = 2F7B0	TIZR6S	-	
TRC90 = 0DA11	TIZR6S	-	
TRES2C = F3446	NZXBIF	-	F5476 NZXHND(0035B) Type=1.1 Nibs=4 Dist=02030
			+ F55C6 NZXHND(004AB) Type=1.1 Nibs=4 Dist=02180
			+ F5B54 NZXHND(00A39) Type=1.1 Nibs=4 Dist=0270E
			+ F6211 NZXCAT(00380) Type=1.1 Nibs=4 Dist=02DCB
TRESDO = F33D2	NZXBIF	-	F16A1 NZXBAS(00707) Type=1.0 Nibs=4 Dist=01D31
			+ F1F9D SCXENT(00069) Type=1.1 Nibs=4 Dist=01435
			+ F65F5 NZXCAT(00764) Type=1.1 Nibs=4 Dist=03223
			+ F74BE NZAFXQ(006A5) Type=1.1 Nibs=4 Dist=040EC
			+ F74ED NZAFXQ(006D4) Type=1.1 Nibs=4 Dist=0411B
TRESD1 = F33E5	NZXBIF	-	F0FE6 NZXBAS(0004C) Type=1.0 Nibs=4 Dist=023FF
			+ F214C SCXENT(00218) Type=1.1 Nibs=4 Dist=01299
			-
TRFMBF = 2F8C5	TIZR6S	-	
TRFROM = 0FE59	TIZR6S	-	
TRIGGER = F155B	NZXBAS	-	F01A6 NZXTBL(0019E) Type=1.2 Nibs=5 Dist=013B5
TRIGd = F7CC7	NZDEC	-	F1551 NZXBAS(005B7) Type=1.2 Nibs=5 Dist=06776
TRIGp = F761E	NZPAR	-	F1556 NZXBAS(005BC) Type=1.2 Nibs=5 Dist=060C8
TRKDON = 1CFAC	TIZR6S	-	
TRMNR = 0F1DD	TIZR6S	-	
TRPREG = 2F6F9	TIZR6S	-	
TRSFMu = 16B84	TIZR6S	-	
TRTO+ = 0FE7B	TIZR6S	-	
TSAV2C = F3429	NZXBIF	-	F546A NZXHND(0034F) Type=1.1 Nibs=4 Dist=02041
			+ F55B4 NZXHND(00499) Type=1.1 Nibs=4 Dist=0218B
			+ F5B1D NZXHND(00A02) Type=1.1 Nibs=4 Dist=026F4
			+ F61FE NZXCAT(0036D) Type=1.1 Nibs=4 Dist=02DD5
TSAVDO = F33A6	NZXBIF	-	F169B NZXBAS(00701) Type=1.0 Nibs=4 Dist=01D0B
			+ F639B NZXCAT(0050A) Type=1.1 Nibs=4 Dist=02FF5
			+ F6E85 NZAFXQ(0006C) Type=1.1 Nibs=4 Dist=03ADF
			+ F74A1 NZAFXQ(00688) Type=1.1 Nibs=4 Dist=040FB
			+ F74E0 NZAFXQ(006C7) Type=1.1 Nibs=4 Dist=0413A
TSAVD1 = F33BC	NZXBIF	-	F0FA3 NZXBAS(00009) Type=1.1 Nibs=4 Dist=02419
			+ F19DE NZXBAS(00A44) Type=1.1 Nibs=4 Dist=019DE
			+ F1CDA NZXBAS(00D40) Type=1.1 Nibs=4 Dist=016E2
			+ F2138 SCXENT(00204) Type=1.1 Nibs=4 Dist=01284
			+ F544D NZXHND(00332) Type=1.1 Nibs=4 Dist=02091
			-
TST12A = 0D476	TIZR6S	-	
TST15 = 0D47A	TIZR6S	-	
TSTAT = F4293	NZXCAS	-	F0B2E NZXGPR(0036C) Type=1.1 Nibs=4 Dist=03765
			+ F1657 NZXBAS(006BD) Type=1.0 Nibs=4 Dist=02C3C
			+ F5C7E NZXHND(00B63) Type=1.1 Nibs=4 Dist=019EB
			+ F6376 NZXCAT(004E5) Type=1.1 Nibs=4 Dist=020E3
TSTATA = F429A	NZXCAS	-	F0B69 NZXGPR(003A7) Type=1.1 Nibs=4 Dist=03731
			+ F6391 NZXCAT(00500) Type=1.0 Nibs=4 Dist=020F7
TSWAD1 = F33F8	NZXBIF	-	F1A8F NZXBAS(00AF5) Type=1.1 Nibs=4 Dist=01969
			+ F1AE5 NZXBAS(00B4B) Type=1.1 Nibs=4 Dist=01913

TWO*	=	0DB38	TIZR6S		+ F1AF8	NZXBAS(00B5E)	Type=1.1	Nibs=4	Dist=01900
Timeout	=	007D0	NZXSVM		-				
Trace	=	0000F	TIZR6S		-	F16D5	NZXBAS(0073B)	Type=0.0	Nibs=5
TstEnd	=	1COFF	TIZR6S		-				
UCRANG	=	FOE66	NZXGPR		-	F2681	SCXENT(0074D)	Type=0.1	Nibs=5
					-				
					-	F1AA5	NZXBAS(00B0B)	Type=1.1	Nibs=4
					-	F1ABE	NZXBAS(00B24)	Type=1.1	Nibs=4
					-	F74F9	NZXFQ(006E0)	Type=1.0	Nibs=4
ULYL	=	FOCEA	NZXGPR		-	F103A	NZXBAS(000A0)	Type=1.1	Nibs=3
					-	F12EB	NZXBAS(00351)	Type=1.1	Nibs=3
UNFNIB	=	2F6FA	TIZR6S		-				
UNLPUT	=	F0D00	NZXGPR		-	F15E5	NZXBAS(0064B)	Type=1.1	Nibs=4
					-	F2A2F	SCXENT(00AFB)	Type=1.1	Nibs=4
UNP	=	00001	TIZR6S		-				
UNT	=	F24E6	SCXENT		-	F0867	NZXGPR(000A5)	Type=1.1	Nibs=4
					-	F0ARE	NZXGPR(002EC)	Type=1.1	Nibs=4
UPCPOS	=	13C67	TIZR6S		-				
UPD1EN	=	2F599	TIZR6S		-				
UPD1ST	=	2F55D	TIZR6S		-				
UPD2EN	=	2F6A6	TIZR6S		-				
UPD2ST	=	2F674	TIZR6S		-				
UPDANN	=	13571	TIZR6S		-				
USGch+	=	1BC15	TIZR6S		-				
USGch-	=	1BC0B	TIZR6S		-				
USGrst	=	1BC63	TIZR6S		-	F27A0	SCXENT(0086C)	Type=0.1	Nibs=5
USING	=	1B446	TIZR6S		-	F1FBE	SCXENT(0008A)	Type=0.1	Nibs=5
USINGp	=	03628	TIZR6S		-	F7527	NZXPAR(0002A)	Type=0.1	Nibs=5
USloop	=	1C14B	TIZR6S		-	F2790	SCXENT(0085C)	Type=0.1	Nibs=5
USnm05	=	1BD12	TIZR6S		-				
USst03	=	1BBCE	TIZR6S		-				
USst05	=	1BBD4	TIZR6S		-				
UTLEND	=	F0861	NZXGPR		-	F10DC	NZXBAS(00142)	Type=1.1	Nibs=4
					-	F4590	NZXCAS(002FD)	Type=1.0	Nibs=4
					-	F4E69	NZXCAS(00BD6)	Type=1.0	Nibs=4
					-	F5AD3	NZXHND(009B8)	Type=1.1	Nibs=4
					-	F5F6F	NZXCAT(000DE)	Type=1.1	Nibs=4
					-	F5F83	NZXCAT(000F2)	Type=1.1	Nibs=4
Ucrang	=	F74F7	NZXFQ		-	F776A	NZXPAR(0026D)	Type=1.1	Nibs=3
					-	F7793	NZXPAR(00296)	Type=1.1	Nibs=3
Utlend	=	F4E67	NZXCAS		-	F52EB	NZXHND(001D0)	Type=1.1	Nibs=3
					-				
VAL00	=	1AD8F	TIZR6S		-				
VALCHK	=	1AE61	TIZR6S		-				
VARDC	=	0537C	TIZR6S		-				
VARNB-	=	0E28D	TIZR6S		-				
VARNBR	=	0E289	TIZR6S		-				
VARP	=	0350E	TIZR6S		-				
VECTOR	=	2F43C	TIZR6S		-				
VIEWD1	=	15147	TIZR6S		-				
VRIABL	=	04BC4	TIZR6S		-				
ValSub	=	0000A	TIZR6S		-				
Verify	=	0000B	NZXSVM		-	F0AE3	NZXGPR(00321)	Type=0.0	Nibs=2
VolLb1	=	0005F	NZXSVM		-	F3D8F	NZXBUT(00198)	Type=0.0	Nibs=2
					-	F700E	NZXFQ(001F5)	Type=0.0	Nibs=2
					-	F7311	NZXFQ(004F8)	Type=0.0	Nibs=2
WFTMDT	=	085DD	TIZR6S		-				
WINDLN	=	2F473	TIZR6S		-				

WINDST = 2F471	TIxR6S	-
WIPOUT = 1B0AF	TIxR6S	-
WRBYTC = 13A73	TIxR6S	-
WRDSC+ = 02C26	TIxR6S	-
WRDSCN = 02C2A	TIxR6S	- F7B95 NZxPAR(00698) Type=0.1 Nibs=5
WRITE# = F45D4	NZxCAS	- F5327 NZxHND(0020C) Type=1.1 Nibs=4 Dist=00D53
		+ F534C NZxHND(00231) Type=1.1 Nibs=4 Dist=00D78
WRITIT = F69AF	NZxIOR	- F109A NZxBAS(00100) Type=1.1 Nibs=4 Dist=05915
		+ F37E6 NZxDSP(001AF) Type=1.1 Nibs=4 Dist=031C9
		+ F3A85 NZxDSP(0044E) Type=1.1 Nibs=4 Dist=02F2A
		+ F4A63 NZxCAS(007D0) Type=1.0 Nibs=4 Dist=01F4C
WRITNB = 1752B	TIxR6S	-
WRTASC = F6653	NZxCAT	- F1820 NZxBAS(00886) Type=1.1 Nibs=4 Dist=04E33
		+ F18CA NZxBAS(00930) Type=1.1 Nibs=4 Dist=04D89
WRTFIB = 11CEE	TIxR6S	-
WRTNUM = 139C4	TIxR6S	-
WRTSTR = 1396F	TIxR6S	-
WSTRFX = 138B5	TIxR6S	-
Wallby = 0000A	NZxSYM	- F366E NZxDSP(00037) Type=0.0 Nibs=1
		+ F36A8 NZxDSP(00071) Type=0.0 Nibs=1
		+ F36D1 NZxDSP(0009A) Type=0.0 Nibs=1
		+ F3A1F NZxDSP(003E8) Type=0.0 Nibs=1
		+ F3AA3 NZxDSP(0046C) Type=0.0 Nibs=1
Write = 00002	NZxSYM	- F4A36 NZxCAS(007A3) Type=0.0 Nibs=1
		+ F5C8C NZxHND(00B71) Type=0.0 Nibs=1
Write0 = 00000	NZxSYM	- F5045 NZxCAS(00DB2) Type=0.0 Nibs=1
Write1 = 00001	NZxSYM	- F1326 NZxBAS(0038C) Type=0.0 Nibs=1
XDelay = 00009	TIxR6S	-
XMTADR = 08133	TIxR6S	-
XROMO1 = 00001	TIxR6S	-
XWORDd = F7C5B	NZxDEC	-
XWORDp = F79AE	NZxPAR	-
XWRD1p = F75B1	NZxPAR	-
XXHEAD = 1A44E	TIxR6S	-
XYEX = 0C697	TIxR6S	-
XchgL = 0000A	NZxSYM	-
XchgT = 00004	NZxSYM	- F12E5 NZxBAS(0034B) Type=0.0 Nibs=1
		+ F12FC NZxBAS(00362) Type=0.0 Nibs=1
		+ F45A7 NZxCAS(00314) Type=0.0 Nibs=1
		+ F45C8 NZxCAS(00335) Type=0.0 Nibs=1
Xfr01L = 00009	NZxSYM	-
Xfr01T = 00005	NZxSYM	-
YMDDAY = 13304	TIxR6S	-
YMDHO1 = 130E5	TIxR6S	-
YMDHMS = 130DB	TIxR6S	- F4AAC NZxCAS(00819) Type=0.1 Nibs=5
YTML = F0D30	NZxGPR	- F1BAF NZxBAS(00C15) Type=1.1 Nibs=4 Dist=00E7F
		+ F2396 SCxENT(00462) Type=1.1 Nibs=4 Dist=01666
		+ F4846 NZxCAS(005B3) Type=1.0 Nibs=4 Dist=03B16
		+ F6891 NZxIOR(001BF) Type=1.1 Nibs=4 Dist=05B61
YTMLL = F0D37	NZxGPR	- F68A7 NZxIOR(001D5) Type=1.1 Nibs=4 Dist=05B70
YX2-12 = 0D274	TIxR6S	-
YX2-15 = 0D27A	TIxR6S	-
ZERBUF = 18B20	TIxR6S	-
a! = 00021	TIxR6S	-
a" = 00022	TIxR6S	-
a\$ = 00024	TIxR6S	-

a'	=	00027	TIZR6S	-
a.	=	0002E	TIZR6S	-
a0	=	00030	TIZR6S	-
a1	=	00031	TIZR6S	-
a2	=	00032	TIZR6S	-
a3	=	00033	TIZR6S	-
a4	=	00034	TIZR6S	-
a5	=	00035	TIZR6S	-
a6	=	00036	TIZR6S	-
a7	=	00037	TIZR6S	-
a8	=	00038	TIZR6S	-
a9	=	00039	TIZR6S	-
aVE=D1	=	F21BB	SCZENT	- F60FD NZ%CAT(0026C) Type=1.1 Nibs=4 Dist=03F42 + F61AA NZ%CAT(00319) Type=1.1 Nibs=4 Dist=03FEF
bALICH	=	00BFB	TIZR6S	-
bASSGN	=	00804	TIZR6S	-
bCARD	=	00807	TIZR6S	-
bCHARS	=	00BFB	TIZR6S	-
bECOMD	=	00809	TIZR6S	-
bFIB	=	00803	TIZR6S	- F4BF9 NZ%CAS(00966) Type=0.0 Nibs=3 + F5D2D NZ%HND(00C12) Type=0.0 Nibs=3
bFILE	=	00805	TIZR6S	-
bIEKKY	=	00802	TIZR6S	-
bLEX	=	00BFC	TIZR6S	-
bPILAI	=	00810	TIZR6S	- F0941 NZ%GPR(0017F) Type=0.0 Nibs=3 + F17D5 NZ%BAS(0083B) Type=0.0 Nibs=3 + F1A23 NZ%BAS(00A89) Type=0.0 Nibs=3 + F1B2C NZ%BAS(00B92) Type=0.0 Nibs=3 + F2FD9 NZ%BIF(00102) Type=0.0 Nibs=3 + F4126 NZ%BUT(0052F) Type=0.0 Nibs=3 + F2EE0 NZ%BIF(00009) Type=0.0 Nibs=3 + F2F93 NZ%BIF(000BC) Type=0.0 Nibs=3
bPILSV	=	0080F	TIZR6S	-
bROMTB	=	00BFE	TIZR6S	-
bSCRTC	=	00E00	TIZR6S	-
bSERR	=	F1A30	NZ%BAS	- F34C7 NZ%BIF(005F0) Type=1.0 Nibs=4 Dist=01A97
bSTART	=	00808	TIZR6S	-
bSTAT	=	00806	TIZR6S	-
bSTAT	=	00801	TIZR6S	-
bSTMXQ	=	00811	TIZR6S	- F2C34 SCZENT(00D00) Type=0.0 Nibs=3 + F2FD0 NZ%BIF(000F9) Type=0.0 Nibs=3
cATCH+	=	F7B14	NZ%PAR	- F1AD4 NZ%BAS(00B3A) Type=1.1 Nibs=4 Dist=06040
cC->C	=	00068	TIZR6S	-
cR->C	=	00069	TIZR6S	-
cRCL	=	00067	TIZR6S	-
dCARD	=	00007	TIZR6S	-
dIRAM	=	00001	TIZR6S	-
dMAIN	=	00000	TIZR6S	-
dPCRD	=	00007	TIZR6S	-
dPORT	=	00001	TIZR6S	-
e#of#	=	000F7	TIZR6S	-
e0^0	=	00006	TIZR6S	-
e0^NEG	=	00005	TIZR6S	-
e1^INF	=	00011	TIZR6S	-
e2MROM	=	0001A	TIZR6S	-
eABORT	=	00034	NZ%ERR	- F0BEB NZ%GPR(00429) Type=0.0 Nibs=1 + F1604 NZ%BAS(0066A) Type=0.0 Nibs=1

		+ F240C SCZENT(004D8) Type=0.0 Nibs=1
		+ F243A SCZENT(00506) Type=0.0 Nibs=1
		+ F317B NZ%BIF(002A4) Type=0.0 Nibs=1
		+ F34F6 NZ%BIF(0061F) Type=0.0 Nibs=1
		+ F350F NZ%BIF(00638) Type=0.0 Nibs=1
		+ F3513 NZ%BIF(0063C) Type=0.0 Nibs=1
		+ F6710 NZ%IOR(0003E) Type=0.0 Nibs=1
		+ F67BF NZ%IOR(000ED) Type=0.0 Nibs=1
		+ F6947 NZ%IOR(00275) Type=0.0 Nibs=1
		+ F6B2A NZ%IOR(00458) Type=0.0 Nibs=1
		-
eRF =	0001B TIXR6S	
eALGN =	000F0 TIXR6S	
eBADMD =	00029 NZ%ERR	- F08AD NZ%GPR(000EB) Type=0.0 Nibs=1
		+ F0C75 NZ%GPR(004B3) Type=0.0 Nibs=1
		+ F2908 SCZENT(009D4) Type=0.0 Nibs=1
		-
eBLANK =	00018 NZ%ERR	-
eCALGN =	00060 TIXR6S	-
eCHNL# =	00029 TIXR6S	-
eCHSUM =	0001A NZ%ERR	-
eDATTY =	0001F TIXR6S	- F061F NZ%ERR(00215) Type=0.0 Nibs=2
eDEVIC =	00041 NZ%ERR	- F0515 NZ%ERR(0010B) Type=0.0 Nibs=2
		+ F05E6 NZ%ERR(001DC) Type=0.0 Nibs=2
		+ F060E NZ%ERR(00204) Type=0.0 Nibs=2
eDIRFL =	0001F NZ%ERR	- F4DA4 NZ%CAS(00B11) Type=0.0 Nibs=1
eDSPEC =	00035 NZ%ERR	- F1193 NZ%BAS(001F9) Type=0.0 Nibs=1
		+ F1B13 NZ%BAS(00B79) Type=0.0 Nibs=1
		+ F1D1E NZ%BAS(00D84) Type=0.0 Nibs=1
		+ F1F71 SCZENT(0003D) Type=0.0 Nibs=1
		+ F47B0 NZ%CAS(0051D) Type=0.0 Nibs=1
		+ F60D5 NZ%CAT(00244) Type=0.0 Nibs=1
		+ F6E7E NZ%FXQ(00065) Type=0.0 Nibs=1
		+ F6F4D NZ%FXQ(00134) Type=0.0 Nibs=1
		+ F7204 NZ%FXQ(003EB) Type=0.0 Nibs=1
		+ F73B5 NZ%FXQ(0059C) Type=0.0 Nibs=1
		+ F7428 NZ%FXQ(0060F) Type=0.0 Nibs=1
eDTYPE =	0002F NZ%ERR	- F1508 NZ%BAS(0056E) Type=0.0 Nibs=1
		+ F35B0 NZ%BIF(006D9) Type=0.0 Nibs=1
		+ F4309 NZ%CAS(00076) Type=0.0 Nibs=1
eDVCNF =	00040 TIXR6S	- F050D NZ%ERR(00103) Type=0.0 Nibs=2
eEFILE =	0001E NZ%ERR	- F4BB5 NZ%CAS(00922) Type=0.0 Nibs=1
		+ F5D9A NZ%HND(00C7F) Type=0.0 Nibs=1
		-
eEOFIL =	00036 TIXR6S	- F4DAD NZ%CAS(00B1A) Type=0.0 Nibs=1
eEOTAP =	00011 NZ%ERR	- F0438 NZ%ERR(0002E) Type=0.0 Nibs=2
eEXCHR =	0004E TIXR6S	-
eEXPO =	00003 TIXR6S	-
eEXPCT =	000E7 TIXR6S	-
eF2BIG =	0004A TIXR6S	-
eFACCS =	0003C TIXR6S	-
eFEXST =	0003B TIXR6S	- F04E2 NZ%ERR(000D8) Type=0.0 Nibs=2
eFILE =	000EA TIXR6S	- F04DA NZ%ERR(000D0) Type=0.0 Nibs=2
eFLOST =	00024 NZ%ERR	- F055F NZ%ERR(00155) Type=0.0 Nibs=2
		+ F0567 NZ%ERR(0015D) Type=0.0 Nibs=2
		+ F058E NZ%ERR(00184) Type=0.0 Nibs=2
		-
eFNNTF =	00021 TIXR6S	-
eFOPEN =	0003E TIXR6S	-
eFPROT =	0003D TIXR6S	- F0460 NZ%ERR(00056) Type=0.0 Nibs=2
eFRAME =	00040 NZ%ERR	- F054C NZ%ERR(00142) Type=0.0 Nibs=2
		+ F0586 NZ%ERR(0017C) Type=0.0 Nibs=2
		-
eFRTOI =	0002A NZ%ERR	-
eFRTOI =	0002B NZ%ERR	-

eFSPEC = 0003A TIXR6S	-
eFTYPE = 0003F TIXR6S	- F57F3 NZXHND(006D8) Type=0.0 Nibs=4
eFnFND = 00039 TIXR6S	- F04A1 NZZERR(00097) Type=0.0 Nibs=2
	+ F5634 NZXHND(00519) Type=0.0 Nibs=4
eFwoNX = 0002A TIXR6S	-
eHPIL = 00000 NZZERR	-
eIF*ZR = 00010 TIXR6S	-
eIF-IF = 0000F TIXR6S	-
eIF/IF = 0000E TIXR6S	-
eILCNT = 0004F TIXR6S	-
eILEXP = 00050 TIXR6S	- F0450 NZZERR(00046) Type=0.0 Nibs=2
eILEXp = 00006 NZZERR	- F7A81 NZZPAR(00584) Type=0.0 Nibs=1
	+ F7B0A NZZPAR(0060D) Type=0.0 Nibs=1
eILKEY = 00055 TIXR6S	-
eILLEG = 000E6 TIXR6S	-
eILPAR = 00051 TIXR6S	- F0448 NZZERR(0003E) Type=0.0 Nibs=2
eILPAr = 00005 NZZERR	- F76BD NZZPAR(001C0) Type=0.0 Nibs=1
	+ F78C7 NZZPAR(003CA) Type=0.0 Nibs=1
eILTFM = 00037 TIXR6S	-
eILVAR = 00053 TIXR6S	-
eIMGOV = 0002F TIXR6S	-
eINF = 000F3 TIXR6S	-
eINF^O = 00012 TIXR6S	-
eINPUT = 000F4 TIXR6S	-
eINVAL = 00012 NZZERR	- F048A NZZERR(00080) Type=0.0 Nibs=2
	+ F04A9 NZZERR(0009F) Type=0.0 Nibs=2
	+ F04B1 NZZERR(000A7) Type=0.0 Nibs=2
	+ F04B9 NZZERR(000AF) Type=0.0 Nibs=2
	+ F04C1 NZZERR(000B7) Type=0.0 Nibs=2
eINVIM = 0002D TIXR6S	-
eINVLD = 000EC TIXR6S	- F047F NZZERR(00075) Type=0.0 Nibs=2
	+ F0596 NZZERR(0018C) Type=0.0 Nibs=2
	+ F060B NZZERR(00201) Type=0.0 Nibs=2
eINVST = 000ED TIXR6S	-
eINVUS = 0002E TIXR6S	-
eINX = 00015 TIXR6S	-
eION = 00043 NZZERR	- F0430 NZZERR(00026) Type=0.0 Nibs=2
	+ F065A NZZERR(00250) Type=0.0 Nibs=2
	- F0627 NZZERR(0021D) Type=0.0 Nibs=2
eIVARG = 0000B TIXR6S	-
eIVSAR = 00033 TIXR6S	-
eIVSOP = 00035 TIXR6S	-
eIVSTA = 00034 TIXR6S	-
eIVTAB = 00030 TIXR6S	-
eL2LNG = 00041 TIXR6S	-
eLNO = 0000C TIXR6S	-
eLOBAT = 00016 TIXR6S	-
eLOG- = 0000D TIXR6S	-
eLPERR = 00026 NZZERR	-
eLTIMO = 00023 NZZERR	- F05A7 NZZERR(0019D) Type=0.0 Nibs=2
	+ F05AF NZZERR(001A5) Type=0.0 Nibs=2
eMEDIA = 00042 NZZERR	- F0477 NZZERR(0006D) Type=0.0 Nibs=2
	+ F0482 NZZERR(00078) Type=0.0 Nibs=2
	+ F0499 NZZERR(0008F) Type=0.0 Nibs=2
	- F0643 NZZERR(00239) Type=0.0 Nibs=2
	- F05B7 NZZERR(001AD) Type=0.0 Nibs=2
eMEM = 00018 TIXR6S	-
eMMCOR = 00017 TIXR6S	-
eMPI = 00019 TIXR6S	-
eMSPAR = 00052 TIXR6S	- F0440 NZZERR(00036) Type=0.0 Nibs=2
eMSPAr = 00004 NZZERR	- F759B NZZPAR(0009E) Type=0.0 Nibs=1
	+ F7910 NZZPAR(00413) Type=0.0 Nibs=1
eNEG^X = 00009 TIXR6S	-

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eNEWTA = 00017 NZZERR      - F0B40 NZ%GPR(0037E) Type=0.0 Nibs=1
                             + F4338 NZ%CAS(000A5) Type=0.0 Nibs=1
                             + F4B1C NZ%CAS(00889) Type=0.0 Nibs=1
eNFILE = 00016 NZZERR      - F4833 NZ%CAS(005A0) Type=0.0 Nibs=1
                             + F57D2 NZ%HND(006B7) Type=0.0 Nibs=1
                             + F5D8B NZ%HND(00C70) Type=0.0 Nibs=1
eNFOUN = 000E8 TIXR6S      -
eNMBOX = 00039 NZZERR      - F1DF8 NZ%BAS(00E5E) Type=0.0 Nibs=1
                             + F3CC0 NZ%BUT(000C9) Type=0.0 Nibs=1
eNNUMR = 00036 NZZERR      - F1DE7 NZ%BAS(00E4D) Type=0.0 Nibs=1
                             + F1F04 NZ%BAS(00F6A) Type=0.0 Nibs=1
                             + F2EA3 NZ%UTL(0020D) Type=0.0 Nibs=1
                             + F3FE6 NZ%BUT(003EF) Type=0.0 Nibs=1
                             + F4039 NZ%BUT(00442) Type=0.0 Nibs=1
                             + F6DB9 NZ%LOW(00063) Type=0.0 Nibs=1
eNOASN = 00001 NZZERR      - F17C2 NZ%BAS(00828) Type=0.0 Nibs=1
eNODAT = 00020 TIXR6S      -
eNOFND = 00020 NZZERR      - F0AB9 NZ%GPR(002F7) Type=0.0 Nibs=1
                             + F1D2A NZ%BAS(00D90) Type=0.0 Nibs=1
eNOLIF = 00013 NZZERR      - F4930 NZ%CAS(0069D) Type=0.0 Nibs=1
eNORAM = 0003B NZZERR      - F35E3 NZ%BIF(0070C) Type=0.0 Nibs=1
                             + F3EER NZ%BUT(002F3) Type=0.0 Nibs=1
                             + F4633 NZ%CAS(003A0) Type=0.0 Nibs=1
                             + F613F NZ%CAT(002AE) Type=0.0 Nibs=1
                             + F6F49 NZ%FXQ(00130) Type=0.0 Nibs=1
eNORDY = 00022 NZZERR      - F0CE4 NZ%GPR(00522) Type=0.0 Nibs=1
                             + F2A5D SC%ENT(00B29) Type=0.0 Nibs=1
eNOTAP = 00014 NZZERR      -
eNOTIN = 00043 TIXR6S      -
eNSVAR = 00033 TIXR6S      -
eNUMIN = 00026 TIXR6S      -
eNVSTA = 00033 TIXR6S      -
eNXioF = 0002B TIXR6S      -
eOFFED = 0003C NZZERR      - F3C4E NZ%BUT(00057) Type=0.0 Nibs=1
eOVFL* = 000F5 TIXR6S      -
eOVFLW = 00002 TIXR6S      -
eOVRUN = 00025 NZZERR      -
ePALGN = 0005E TIXR6S      -
ePARSE = 00000 NZZSYM      - F17C4 NZ%BAS(0082A) Type=0.0 Nibs=1
                             + F34D3 NZ%BIF(005FC) Type=0.0 Nibs=1
                             + F34E7 NZ%BIF(00610) Type=0.0 Nibs=1
ePIL   = 00002 NZZSYM      - F08AF NZ%GPR(000ED) Type=0.0 Nibs=1
                             + F0ABB NZ%GPR(002F9) Type=0.0 Nibs=1
                             + F0ADE NZ%GPR(0031C) Type=0.0 Nibs=1
                             + F0C77 NZ%GPR(004B5) Type=0.0 Nibs=1
                             + F0CDB NZ%GPR(00519) Type=0.0 Nibs=1
                             + F1D21 NZ%BAS(00D87) Type=0.0 Nibs=1
                             + F1D3E NZ%BAS(00DA4) Type=0.0 Nibs=1
                             + F2460 SC%ENT(0052C) Type=0.0 Nibs=1
                             + F290A SC%ENT(009D6) Type=0.0 Nibs=1
                             + F2A5F SC%ENT(00B2B) Type=0.0 Nibs=1
                             + F34F1 NZ%BIF(0061A) Type=0.0 Nibs=1
                             + F3519 NZ%BIF(00642) Type=0.0 Nibs=1
                             + F35A7 NZ%BIF(006D0) Type=0.0 Nibs=1
                             + F430B NZ%CAS(00078) Type=0.0 Nibs=1
                             + F53DC NZ%HND(002C1) Type=0.0 Nibs=1
                             + F670B NZ%IOR(00039) Type=0.0 Nibs=1
                             + F685A NZ%IOR(00188) Type=0.0 Nibs=1
ePLLC  = 0005A TIXR6S      -
ePLLC# = 00059 TIXR6S      -

```

Offset= 1

		+ F4BE3 NZXCAS(00950) Type=0.0 Nibs=1
		+ F4DA6 NZXCAS(00B13) Type=0.0 Nibs=1
		+ F57D4 NZXHND(006B9) Type=0.0 Nibs=1
		+ F57DF NZXHND(006C4) Type=0.0 Nibs=1
		+ F5D82 NZXHND(00C67) Type=0.0 Nibs=1
		+ F5D9C NZXHND(00C81) Type=0.0 Nibs=1
eTERM	= 00020 NZ%ERR	-
eTESTF	= 0002D NZ%ERR	-
eTFFLD	= 00038 TI%R6S	-
eTFM	= 000F1 TI%R6S	-
eTFWRN	= 00058 TI%R6S	-
eTNINF	= 00004 TI%R6S	-
eTOO	= 000EF TI%R6S	-
eTOOFI	= 00028 TI%R6S	-
eTOOMI	= 00027 TI%R6S	-
eTRKDN	= 00061 TI%R6S	-
eTRKOF	= 000E5 TI%R6S	-
eTSIZE	= 0001C NZ%ERR	- F4926 NZXCAS(00693) Type=0.0 Nibs=1
		+ F57DD NZXHND(006C2) Type=0.0 Nibs=1
eTUFAS	= 00047 TI%R6S	-
eTUSLO	= 00048 TI%R6S	-
eUALGN	= 0005F TI%R6S	-
eUNEXP	= 00027 NZ%ERR	- F0ADC NZ%GPR(0031A) Type=0.0 Nibs=1
		+ F0CD5 NZ%GPR(00513) Type=0.0 Nibs=1
		+ F1D3C NZ%BAS(00DA2) Type=0.0 Nibs=1
		+ F245A SC%ENT(00526) Type=0.0 Nibs=1
		+ F6709 NZ%IOR(00037) Type=0.0 Nibs=1
eUNFLW	= 00001 TI%R6S	-
eUNKCD	= 00045 TI%R6S	-
eUNORC	= 00014 TI%R6S	-
eVALGN	= 0005C TI%R6S	-
eVARTY	= 00032 TI%R6S	-
eVFYER	= 00044 TI%R6S	-
eWALGN	= 0005B TI%R6S	-
eWRGNM	= 00049 TI%R6S	-
eXCESS	= 00003 NZ%ERR	-
eXFNNF	= 00022 TI%R6S	-
eXPEXC	= F4107 NZ%BUT	- F178F NZ%BAS(007F5) Type=1.1 Nibs=4 Dist=02978
		+ F2244 SC%ENT(00310) Type=1.1 Nibs=4 Dist=01EC3
		+ F2E7E NZ%UTL(001E8) Type=1.1 Nibs=4 Dist=01289
eXWORD	= 00023 TI%R6S	-
eXXXXX	= 00028 NZ%ERR	-
eZRDIV	= 00008 TI%R6S	-
eZRO/O	= 00007 TI%R6S	-
efPROT	= 00010 NZ%ERR	- F4BE1 NZXCAS(0094E) Type=0.0 Nibs=1
enu11	= 00000 TI%R6S	-
ew/o	= 000EB TI%R6S	-
FAOS	= 000DF TI%R6S	-
FASCII	= 00001 TI%R6S	-
FBASIC	= 0E214 TI%R6S	- F56BC NZXHND(005A1) Type=0.0 Nibs=4
FBIN	= 0E204 TI%R6S	-
FDATA	= 0E0F0 TI%R6S	-
FEOF	= 000FF TI%R6S	-
FEDR	= 000EF TI%R6S	-
FEDS	= 0006F TI%R6S	-
FKEY	= 0E20C TI%R6S	- F58F3 NZXHND(007D8) Type=0.0 Nibs=5
FLEX	= 0E208 TI%R6S	- F0018 NZ%TBL(00010) Type=0.0 Nibs=4
		+ F5BFB NZXHND(00AE0) Type=0.0 Nibs=4
FLIF1	= 00001 TI%R6S	-

FLTDH = F1F2D NZXBAS	- F3FEB NZ%BUT(003F4) Type=1.1 Nibs=4 Dist=020BE
	+ F4020 NZ%BUT(00429) Type=1.1 Nibs=4 Dist=020F3
	+ F6103 NZ%CAT(00272) Type=1.1 Nibs=4 Dist=041D6
FMOS = 0007F TIXR6S	-
FPROT = F4BDD NZXCAS	- F5CE4 NZ%HND(00BC9) Type=1.1 Nibs=4 Dist=01107
FSDATA = 0E0D0 TIXR6S	-
FSOS = 000CF TIXR6S	-
FTEXT = 00001 TIXR6S	-
FTPF# = F5CB0 NZXHND	- F4BCD NZXCAS(0093A) Type=1.1 Nibs=4 Dist=010E3
	+ F63F6 NZ%CAT(00565) Type=1.1 Nibs=3 Dist=00746
fIAC = FFFC7 TIXR6S	-
fIALRM = FFFC4 TIXR6S	-
fIBASE = FFFF0 TIXR6S	-
fIBAT = FFFC3 TIXR6S	-
fIBEEP = FFFF E TIXR6S	-
fIBPLD = FFFE7 TIXR6S	-
fICALC = FFFC0 TIXR6S	-
fICLOC = FFFD3 TIXR6S	-
fICMDS = FFFD1 TIXR6S	-
fICTON = FFFF D TIXR6S	-
fICTRL = FFFD0 TIXR6S	-
fIDG0 = FFFF E F TIXR6S	-
fIDG1 = FFFEE TIXR6S	-
fIDG2 = FFFED TIXR6S	-
fIDG3 = FFFEC TIXR6S	-
fIDORM = FFFD5 TIXR6S	- F319B NZ%BIF(002C4) Type=0.0 Nibs=2
fIDVZ = FFFF9 TIXR6S	-
fIEOT = FFFE9 TIXR6S	- F2309 SC%ENT(003D5) Type=0.0 Nibs=2
fIEXAC = FFFD2 TIXR6S	-
fIEXTD = FFFEA TIXR6S	- F092C NZ%GPR(0016A) Type=0.0 Nibs=2
fIFXEN = FFFF3 TIXR6S	-
fIIMFR = FFFF5 TIXR6S	-
fIIMX = FFFF C TIXR6S	-
fIIVL = FFFF8 TIXR6S	-
fILC = FFFF1 TIXR6S	-
fIMKOF = FFFCE TIXR6S	-
fINEGR = FFFF4 TIXR6S	-
fINOFN = FFFD6 TIXR6S	-
fINOPR = FFFE6 TIXR6S	-
fINZ4 = FFFE8 TIXR6S	- F090B NZ%GPR(00149) Type=0.0 Nibs=2
fIOVF = FFFF A TIXR6S	-
fIPDWN = FFFEB TIXR6S	- F304D NZ%BIF(00176) Type=0.0 Nibs=2
fIPRGM = FFFC2 TIXR6S	-
fIPWDN = FFFCF TIXR6S	-
fIQIET = FFFFF TIXR6S	-
fIRAD = FFFF6 TIXR6S	-
fIRPTD = FFFC5 TIXR6S	-
fIRTN = FFFD4 TIXR6S	-
fIScen = FFFF2 TIXR6S	-
fISUSP = FFFC1 TIXR6S	-
fITNOF = FFFCD TIXR6S	-
fIUNF = FFFF B TIXR6S	-
fIUSER = FFFF7 TIXR6S	-
fIUSRX = FFFC6 TIXR6S	-
fIVIEW = FFFCC TIXR6S	-
getdev = F28F9 SC%ENT	- F2CB4 NZ%UTL(0001E) Type=1.1 Nibs=3 Dist=0038B
hCAT = F5E91 NZ%CAT	- F06EA NZ%DIR(00035) Type=1.2 Nibs=5 Dist=057A7
hCAT\$ = F60BF NZ%CAT	- F06EF NZ%DIR(0003A) Type=1.2 Nibs=5 Dist=059D0

hCOPYx = F54B8 NZ%HND	- F06F4 NZ%DIR(0003F) Type=1.2 Nibs=5 Dist=04DC4
hCPY5s = F5C15 NZ%HND	- F23A3 SC%ENT(0046F) Type=1.1 Nibs=4 Dist=03872
	+ F2BE7 SC%ENT(00CB3) Type=1.1 Nibs=4 Dist=0302E
	+ F46B7 NZ%CAS(00424) Type=1.1 Nibs=4 Dist=0155E
	+ F47C0 NZ%CAS(0052D) Type=1.1 Nibs=4 Dist=01455
hCREAT = F51B3 NZ%HND	- F06F9 NZ%DIR(00044) Type=1.2 Nibs=5 Dist=04ABA
hDIDST = F35FD NZ%BIF	- F06FE NZ%DIR(00049) Type=1.2 Nibs=5 Dist=02EFF
hENTER = F1F34 SC%ENT	- F0726 NZ%DIR(00071) Type=1.2 Nibs=5 Dist=0180E
hEXCPT = F2B0A SC%ENT	- F07B8 NZ%DIR(00103) Type=1.2 Nibs=5 Dist=02352
hFINDF = F5153 NZ%HND	- F073F NZ%DIR(0008A) Type=1.2 Nibs=5 Dist=04A14
hFPROT = F5E03 NZ%HND	- F0703 NZ%DIR(0004E) Type=1.2 Nibs=5 Dist=05700
hKYDF = F2B98 SC%ENT	- F0753 NZ%DIR(0009E) Type=1.2 Nibs=5 Dist=02445
hPRCTL = F5438 NZ%HND	- F0712 NZ%DIR(0005D) Type=1.2 Nibs=5 Dist=04D26
hPURGE = F5CBD NZ%HND	- F071C NZ%DIR(00067) Type=1.2 Nibs=5 Dist=055A1
hRDCBF = F52C4 NZ%HND	- F0744 NZ%DIR(0008F) Type=1.2 Nibs=5 Dist=04B80
hRDNBF = F532F NZ%HND	- F0749 NZ%DIR(00094) Type=1.2 Nibs=5 Dist=04BE6
hRENAM = F5D6E NZ%HND	- F0721 NZ%DIR(0006C) Type=1.2 Nibs=5 Dist=0564D
hVER\$ = F511B NZ%HND	- F06CC NZ%DIR(00017) Type=1.2 Nibs=5 Dist=04A4F
hWRCBF = F5313 NZ%HND	- F074E NZ%DIR(00099) Type=1.2 Nibs=5 Dist=04BC5
hZERPG = F2ADD SC%ENT	- F07BD NZ%DIR(00108) Type=1.2 Nibs=5 Dist=02320
hs3BYT = 00007 NZ%SYM	-
hsAWKE = 00002 NZ%SYM	-
hsERRO = 00004 NZ%SYM	-
hsLPRQ = 00005 NZ%SYM	- F1E53 NZ%BAS(00EB9) Type=0.0 Nibs=1
hsMANL = 00006 NZ%SYM	-
hsMGAV = 00000 NZ%SYM	-
hsNRD = 00001 NZ%SYM	-
hsRQSR = 00003 NZ%SYM	- F2BBF SC%ENT(00C8B) Type=0.0 Nibs=1
	+ F3156 NZ%BIF(0027F) Type=0.0 Nibs=1
i/OFND = F410E NZ%BUT	- F0946 NZ%GPR(00184) Type=1.1 Nibs=4 Dist=037C8
	+ F17DA NZ%BAS(00840) Type=1.1 Nibs=4 Dist=02934
	+ F4BFE NZ%CAS(0096B) Type=1.1 Nibs=4 Dist=00AF0
	+ F53D1 NZ%HND(002B6) Type=1.1 Nibs=4 Dist=012C3
	+ F5D32 NZ%HND(00C17) Type=1.1 Nibs=4 Dist=01C24
k#-CHR = 00068 TI%R6S	-
k#-LIN = 0006B TI%R6S	-
k#1 = 00027 TI%R6S	-
k#2 = 00028 TI%R6S	-
k#3 = 00029 TI%R6S	-
k#ATTN = 0002B TI%R6S	-
k#BKSP = 00067 TI%R6S	-
k#BOT = 000A3 TI%R6S	- F5FD6 NZ%CAT(00145) Type=0.0 Nibs=2
k#CALC = 0006F TI%R6S	-
k#CONT = 00070 TI%R6S	-
k#CTRL = 0009E TI%R6S	-
k#DOWN = 00033 TI%R6S	- F5FCC NZ%CAT(0013B) Type=0.0 Nibs=2
k#EOL = 00026 TI%R6S	-
k#FLFT = 0009F TI%R6S	-
k#FRT = 000A0 TI%R6S	-
k#GON = 0009B TI%R6S	-
k#I/R = 00069 TI%R6S	-
k#LAST = 000A4 TI%R6S	-
k#LC = 0006A TI%R6S	-
k#LERR = 000A1 TI%R6S	-
k#LFT = 0002F TI%R6S	-
k#OFF = 00063 TI%R6S	-
k#RT = 00030 TI%R6S	-
k#RUN = 0002E TI%R6S	-

k#SST	=	00066	TIXR6S	-					
k#TOP	=	000A2	TIXR6S	-	F5FD8	NZ%CAT(0014A)	Type=0.0 Nibs=2		
k#UP	=	00032	TIXR6S	-	F5FD1	NZ%CAT(00140)	Type=0.0 Nibs=2		
k#USER	=	0006D	TIXR6S	-					
k#USEX	=	000A5	TIXR6S	-					
k#VIEW	=	0006E	TIXR6S	-					
kc-CHR	=	00000	TIXR6S	-					
kc-LIN	=	00004	TIXR6S	-					
kcATTN	=	0000E	TIXR6S	-					
kcBKSP	=	00007	TIXR6S	-					
kcBOT	=	00015	TIXR6S	-					
kcCALC	=	00017	TIXR6S	-					
kcCONT	=	00010	TIXR6S	-					
kcCTRL	=	0000A	TIXR6S	-					
kcDOWN	=	00013	TIXR6S	-					
kcEOL	=	0000D	TIXR6S	-					
kcFLFT	=	00005	TIXR6S	-					
kcFRT	=	00006	TIXR6S	-					
kcGON	=	00016	TIXR6S	-					
kcI/R	=	00002	TIXR6S	-					
kcLAST	=	00019	TIXR6S	-					
kcLC	=	00001	TIXR6S	-					
kcLERR	=	0001A	TIXR6S	-					
kcLFT	=	00008	TIXR6S	-					
kcOFF	=	00018	TIXR6S	-					
kcRT	=	00009	TIXR6S	-					
kcRUN	=	0000F	TIXR6S	-					
kcSST	=	00011	TIXR6S	-					
kcTOP	=	00014	TIXR6S	-					
kcUP	=	00012	TIXR6S	-					
kcUSER	=	00003	TIXR6S	-					
kcUSEX	=	0000C	TIXR6S	-					
kcVIEW	=	0000B	TIXR6S	-					
JACCSb	=	00001	TIXR6S	-					
JAp	=	00010	TIXR6S	-					
JBPOSp	=	00005	TIXR6S	-					
JCOPYb	=	00001	TIXR6S	-					
JCPOsb	=	00006	TIXR6S	-					
JDOp	=	00005	TIXR6S	-					
JD1p	=	00005	TIXR6S	-					
JDATEh	=	00006	TIXR6S	-					
JDBEGb	=	0000B	TIXR6S	-					
JDEVC	=	00005	TIXR6S	-	F426D	NZ%BUT(00676)	Type=0.0 Nibs=1 Offset=	3	
					+	F4278	NZ%BUT(00681)	Type=0.0 Nibs=1 Offset=	3
JDEVCb	=	00001	TIXR6S	-					
JLENb	=	00006	TIXR6S	-					
JOp	=	00010	TIXR6S	-					
JEOL	=	00002	TIXR6S	-					
JFBEGb	=	00006	TIXR6S	-					
JFBF#b	=	00003	TIXR6S	-					
JFIB	=	0003F	TIXR6S	-					
JFIL#b	=	00002	TIXR6S	-					
JFILSV	=	00032	TIXR6S	-					
JFLAGh	=	00002	TIXR6S	-					
JLENh	=	00005	TIXR6S	-	F5665	NZ%HND(0054A)	Type=0.0 Nibs=1		
					+	F56A1	NZ%HND(00586)	Type=0.0 Nibs=1	
					+	F574B	NZ%HND(00630)	Type=0.0 Nibs=1 Offset=	-1
					+	F5758	NZ%HND(0063D)	Type=0.0 Nibs=1 Offset=	-1
					+	F575B	NZ%HND(00640)	Type=0.0 Nibs=1 Offset=	8

		+ F58B4 NZ%HND(00799)	Type=0.0	Nibs=2	
		+ F59E3 NZ%HND(008C8)	Type=0.0	Nibs=1	
		+ F64AA NZ%CAT(00619)	Type=0.0	Nibs=2	
IFNAM+	= 00004	TIZR6S	-		
IFNAM8	= 00010	TIZR6S	-		
IFNAMh	= 00010	TIZR6S	-		
IFSIzb	= 00006	TIZR6S	-		
IFTYPb	= 00004	TIZR6S	-		
IFTYPb	= 00004	TIZR6S	-		
IFTYPb	= 00004	TIZR6S	-		
ILXADR	= 00005	TIZR6S	-		
ILXENT	= 0000B	TIZR6S	-		
ILXFAD	= 00005	TIZR6S	-		
ILXID	= 00002	TIZR6S	-		
ILXTKR	= 00004	TIZR6S	-		
IMSGp	= 00004	TIZR6S	-		
IPOL#p	= 00005	TIZR6S	-		
IPOLLp	= 00005	TIZR6S	-		
IPOLSV	= 0003E	TIZR6S	-	F4264 NZ%BUT(0066D)	Type=0.0 Nibs=2
IPOLra	= 00006	TIZR6S	-		
IPROTb	= 00001	TIZR6S	-		
IREChb	= 00004	TIZR6S	-		
IRECLb	= 00004	TIZR6S	-		
IRLENb	= 00005	TIZR6S	-		
IRTN1p	= 00005	TIZR6S	-		
IRTN2p	= 00005	TIZR6S	-		
IRTN3p	= 00005	TIZR6S	-		
ISHLNb	= 00002	TIZR6S	-		
ISPDtB	= 0004E	TIZR6S	-		
ISPDn	= 00001	TIZR6S	-		
ISPDn2	= 00001	TIZR6S	-		
ITEXTp	= 00004	TIZR6S	-		
ITIMEh	= 00004	TIZR6S	-		
mADDRl	= 05000	NZ%SYM	-	F0CF3 NZ%GPR(00531)	Type=0.0 Nibs=4
mADDRM	= 02000	NZ%SYM	-	F0D28 NZ%GPR(00566)	Type=0.0 Nibs=4 Offset= 4
				+ F0D39 NZ%GPR(00577)	Type=0.0 Nibs=4 Offset= 2
				- F0D46 NZ%GPR(00584)	Type=0.0 Nibs=4
mADDRT	= 04000	NZ%SYM	-		
mAUTO	= 00009	NZ%SYM	-		
mAUTOR	= 00070	NZ%SYM	-	F0934 NZ%GPR(00172)	Type=0.0 Nibs=2 Offset= 1
				+ F0952 NZ%GPR(00190)	Type=0.0 Nibs=2
mAUTOE	= 00007	NZ%SYM	-		
mAUTOS	= 00071	NZ%SYM	-		
mCLRBF	= 000F8	NZ%SYM	-		
mCLRCA	= F0000	NZ%SYM	-	F2AAA SC%ENT(00B76)	Type=0.0 Nibs=6
mCMD2	= 00014	NZ%SYM	-		
mCMD3	= 00140	NZ%SYM	-	F6BC2 NZ%IOR(004F0)	Type=0.0 Nibs=3 Offset= 10
				+ F6BD1 NZ%IOR(004FF)	Type=0.0 Nibs=3 Offset= 12
				- F1648 NZ%BAS(006AE)	Type=0.0 Nibs=4
mCMDf	= 01400	NZ%SYM	-		
mCSRQ	= 00004	NZ%SYM	-		
mDATA2	= 00010	NZ%SYM	-		
mDATAf	= 01000	NZ%SYM	-		
mEAR	= 01418	NZ%SYM	-		
mENDM	= 00003	NZ%SYM	-	F4E5F NZ%CAS(00BCC)	Type=0.0 Nibs=2
mENDf	= 01200	NZ%SYM	-	F4EE1 NZ%CAS(00C4E)	Type=0.0 Nibs=4
				+ F50DB NZ%CAS(00E48)	Type=0.0 Nibs=4
				- F682A NZ%IOR(00158)	Type=0.0 Nibs=2
mERSTS	= 00006	NZ%SYM	-		
mETE	= 01541	NZ%SYM	-		
mETO	= 01540	NZ%SYM	-		
mFIND1	= 00006	NZ%SYM	-	F09CD NZ%GPR(0020B)	Type=0.0 Nibs=1
mFIND0	= 06000	NZ%SYM	-	F0B11 NZ%GPR(0034F)	Type=0.0 Nibs=4 Offset= 16

HFRAME = 01000 NZXSYM	-		
HGETCA = 0000C NZXSYM	-	F0A9A NZXGPR(002D8)	Type=0.0 Nibs=2
HIDYf = 01600 NZXSYM	-		
HIFC = 01490 NZXSYM	-		
HINCCA = 0000D NZXSYM	-	F0AC2 NZXGPR(00300)	Type=0.0 Nibs=2
HIMADDR = 0000E NZXSYM	-		
HIMANUL = 00008 NZXSYM	-		
HINOP = 00000 NZXSYM	-		
HIPDLOP = 00030 NZXSYM	-	F307B NZXBIF(001A4)	Type=0.0 Nibs=2
HIPULOP = 000FE NZXSYM	-	F08BD NZXGPR(000FB)	Type=0.0 Nibs=2
HIRDADR = 00001 NZXSYM	-		
HIRDYf = 01500 NZXSYM	-		
HIREADC = 000FC NZXSYM	-	F1DA2 NZXBAS(00E08)	Type=0.0 Nibs=2
HIREADI = 000FB NZXSYM	-	F1D4F NZXBAS(00DB5)	Type=0.0 Nibs=2
HIRSTCA = 0000B NZXSYM	-	F0A37 NZXGPR(00275)	Type=0.0 Nibs=2
HIRdMem = 00000 NZXSYM	-		
HISAI = 00000 NZXSYM	-	F0C9F NZXGPR(004D0)	Type=0.0 Nibs=6 Offset= 2
HISCOPE = 00801 NZXSYM	-		
HISDA = 00000 NZXSYM	-	F0B72 NZXGPR(003B0)	Type=0.0 Nibs=6 Offset= 8
	+	F4363 NZXCAS(000D0)	Type=0.0 Nibs=6 Offset= 2
	+	F449F NZXCAS(0020C)	Type=0.0 Nibs=6 Offset= 12
	+	F45BA NZXCAS(00327)	Type=0.0 Nibs=6 Offset= 256
	+	F4769 NZXCAS(004D6)	Type=0.0 Nibs=6 Offset= 32
	+	F48BE NZXCAS(0062B)	Type=0.0 Nibs=6 Offset= 32
	+	F48EC NZXCAS(00659)	Type=0.0 Nibs=6 Offset= 24
	+	F496A NZXCAS(006D7)	Type=0.0 Nibs=6 Offset= 12
	+	F4B3E NZXCAS(008AB)	Type=0.0 Nibs=6 Offset= 32
HISDA@5 = 00008 NZXSYM	-	F5C19 NZXHND(00AFE)	Type=0.0 Nibs=1
HISDI = 00000 NZXSYM	-	F68AD NZXIOR(001DB)	Type=0.0 Nibs=6 Offset= 8
HISETAi = 30321 NZXSYM	-	F3217 NZXBIF(00340)	Type=0.0 Nibs=6
HISETA1 = 30120 NZXSYM	-	F3208 NZXBIF(00331)	Type=0.0 Nibs=6
HISETCA = 00F01 NZXSYM	-	F2AC9 SCXENT(00B95)	Type=0.0 Nibs=4
HISETDI = 30011 NZXSYM	-	F324B NZXBIF(00374)	Type=0.0 Nibs=6
HISETDR = 30000 NZXSYM	-		
HISETD1 = 30610 NZXSYM	-	F3226 NZXBIF(0034F)	Type=0.0 Nibs=6
HISETFC = 00000 NZXSYM	-	F2CBC NZXUTL(00026)	Type=0.0 Nibs=6 Offset=1048575
HISETIC = 0F600 NZXSYM	-	F1762 NZXBAS(007C8)	Type=0.0 Nibs=4
HISETIM = 0FA00 NZXSYM	-	F29E5 SCXENT(00AB1)	Type=0.0 Nibs=4
	+	F2AF2 SCXENT(00BBE)	Type=0.0 Nibs=4
	+	F2B7A SCXENT(00C46)	Type=0.0 Nibs=4
HISETIT = 0F700 NZXSYM	-	F31F9 NZXBIF(00322)	Type=0.0 Nibs=4 Offset= 50
HISETST = 30041 NZXSYM	-	F2935 SCXENT(00A01)	Type=0.0 Nibs=2
HISETS1 = 30140 NZXSYM	-	F2923 SCXENT(009EF)	Type=0.0 Nibs=6
HISETTC = 0F500 NZXSYM	-	F251B SCXENT(005E7)	Type=0.0 Nibs=4
HISETTM = 0F400 NZXSYM	-	F237C SCXENT(00448)	Type=0.0 Nibs=4 Offset= 12
	+	F24D2 SCXENT(0059E)	Type=0.0 Nibs=4
	+	F24DC SCXENT(005A8)	Type=0.0 Nibs=4 Offset= 8
	+	F250E SCXENT(005DA)	Type=0.0 Nibs=4 Offset= 1
HISETTO = 00000 NZXSYM	-		
HISFC@5 = 0000E NZXSYM	-	F24F6 SCXENT(005C2)	Type=0.0 Nibs=1
	+	F5C25 NZXHND(00B0A)	Type=0.0 Nibs=1
HISPDIS = 0FF00 NZXSYM	-		
HISPEN = 0FF01 NZXSYM	-		
HISPT0 = 0F900 NZXSYM	-		
HISSRQ = 00005 NZXSYM	-		
HISST = 00000 NZXSYM	-	F1BB8 NZXBAS(00C1E)	Type=0.0 Nibs=6 Offset= 8
	+	F429E NZXCAS(0000B)	Type=0.0 Nibs=6 Offset= 1
HISSTATS = 00002 NZXSYM	-	F6820 NZXIOR(0014E)	Type=0.0 Nibs=2
HISSTO@5 = 0000D NZXSYM	-	F1774 NZXBAS(007DA)	Type=0.0 Nibs=1
HISSTS@4 = 000F3 NZXSYM	-	F293B SCXENT(00A07)	Type=0.0 Nibs=2

mSTSTC = 00201 NZ%SYM	- F3166 NZ%BIF(0028F) Type=0.0 Nibs=4	
mTAKEC = 00F03 NZ%SYM	-	
mTAKEI = F0390 NZ%SYM	- F08D1 NZ%GPR(0010F) Type=0.0 Nibs=6	
mTAKEO = F0310 NZ%SYM	-	
mTCT = 00000 NZ%SYM	- F2A41 SC%ENT(00B0D) Type=0.0 Nibs=6	
mTEST = 000F2 NZ%SYM	-	
mUNADM = 02010 NZ%SYM	-	
mUNL = 0143F NZ%SYM	- F0D04 NZ%GPR(00542) Type=0.0 Nibs=4	
mUNT = 0145F NZ%SYM	- F24EA SC%ENT(005B6) Type=0.0 Nibs=4	
mUPDSC = 00A00 NZ%SYM	-	
mWrMem = 10000 NZ%SYM	-	
maddrL = 00002 NZ%SYM	-	
maddrT = 00004 NZ%SYM	-	
nXTSTM = F1780 NZ%BAS	- F0851 NZ%GPR(0008F) Type=1.0 Nibs=4 Dist=00F2F	
	+ F1F8A SC%ENT(00056) Type=1.0 Nibs=4 Dist=0080A	
	+ F6E0F NZ%LOW(000B9) Type=1.0 Nibs=4 Dist=0568F	
o41sod = 00005 TIXR6S	- F573C NZ%HND(00621) Type=0.0 Nibs=1	
oACCSb = 0000B TIXR6S	- F5308 NZ%HND(001ED) Type=0.0 Nibs=1 Offset=	-1
	+ F53BD NZ%HND(002A2) Type=0.0 Nibs=1 Offset=	-1
oAp = 0003E TIXR6S	-	
oBNsod = 00011 TIXR6S	-	
oBPOSp = 00005 TIXR6S	-	
oBSsod = 00011 TIXR6S	-	
oCOPYb = 0000A TIXR6S	-	
oCPOsb = 00028 TIXR6S	-	
oD0p = 00019 TIXR6S	-	
oD1p = 0001E TIXR6S	-	
oDATEh = 0001A TIXR6S	-	
oDAsod = 0000D TIXR6S	- F59DC NZ%HND(008C1) Type=0.0 Nibs=1 Offset=	-5
	+ F5A6B NZ%HND(00950) Type=0.0 Nibs=1 Offset=	-5
oDBEGb = 00015 TIXR6S	-	
oDEVCb = 0000C TIXR6S	- F539A NZ%HND(0027F) Type=0.0 Nibs=1 Offset=	-1
oDLENb = 0002E TIXR6S	-	
oDp = 0002E TIXR6S	-	
oFBEGb = 0000D TIXR6S	- F5D45 NZ%HND(00C2A) Type=0.0 Nibs=1 Offset=	-1
oFBF#b = 00002 TIXR6S	-	
oFIL#b = 00000 TIXR6S	-	
oFLAGh = 00014 TIXR6S	- F5640 NZ%HND(00525) Type=0.0 Nibs=1 Offset=	-1
	+ F59AE NZ%HND(00893) Type=0.0 Nibs=2	
	- F56EE NZ%HND(005D3) Type=0.0 Nibs=2 Offset=	17
oFLENh = 00020 TIXR6S	-	
oFLSTr = 00031 TIXR6S	-	
oFNAMh = 00000 TIXR6S	-	
oFSIZb = 00039 TIXR6S	-	
oFT-FL = 00010 TIXR6S	-	
oFTYPb = 00005 TIXR6S	-	
oFTYPb = 00010 TIXR6S	- F563D NZ%HND(00522) Type=0.0 Nibs=1 Offset=	-1
	+ F5BEC NZ%HND(00AD1) Type=0.0 Nibs=2	
	- F5A35 NZ%HND(0091A) Type=0.0 Nibs=2	
oIMPLh = 00025 TIXR6S	- F31D3 NZ%BIF(002FC) Type=0.0 Nibs=1 Offset=	-1
oINHS = 00008 NZ%IOR	+ F31D9 NZ%BIF(00302) Type=0.0 Nibs=1 Offset=	-1
oINST = 00009 NZ%IOR	-	
oKysod = 00005 TIXR6S	-	
oLXsod = 00005 TIXR6S	-	
oMAINT = 0005D TIXR6S	-	
oMSGPT = 00009 TIXR6S	-	
oOUTHS = 00007 NZ%IOR	- F31E0 NZ%BIF(00309) Type=0.0 Nibs=1 Offset=	-1
	+ F31E7 NZ%BIF(00310) Type=0.0 Nibs=1 Offset=	-1
oOUTST = 00006 NZ%IOR	-	

oPOL#p	=	0000A	TIZR6S	-
oPROTb	=	00009	TIZR6S	-
oRECHb	=	00020	TIZR6S	-
oRECLb	=	00024	TIZR6S	-
oRENB	=	00034	TIZR6S	-
oRTN1p	=	0000A	TIZR6S	-
oRTN2p	=	0000F	TIZR6S	-
oRTN3p	=	00014	TIZR6S	-
oSHLNB	=	00013	TIZR6S	-
oSPDTB	=	00111	TIZR6S	-
oSPDn2	=	0000E	TIZR6S	-
oSUBLn	=	00025	TIZR6S	-
oTIMEh	=	00016	TIZR6S	-
oTXsod	=	00005	TIZR6S	-
oUT1TK	=	F7ABE	NZ%PAR	- F7D68 NZ%DEC(00195) Type=1.1 Nibs=3 Dist=002AA + F7E32 NZ%DEC(0025F) Type=1.1 Nibs=3 Dist=00374 - F7CFB NZ%DEC(00128) Type=1.0 Nibs=3 Dist=00236
oUT2TC	=	F7AC5	NZ%PAR	-
oUT3TK	=	F7ACF	NZ%PAR	-
oUTNBS	=	F7AD9	NZ%PAR	-
p3DATA	=	0000F	NZ%SYM	- F07CD NZ%GPR(0000B) Type=0.0 Nibs=1
pACK	=	00000	NZ%SYM	- F0815 NZ%GPR(00053) Type=0.0 Nibs=1 + F2A56 SC%ENT(00B22) Type=0.0 Nibs=1
pADDR	=	00004	NZ%SYM	- F07EF NZ%GPR(0002D) Type=0.0 Nibs=1 + F096A NZ%GPR(001A8) Type=0.0 Nibs=1 + F09D7 NZ%GPR(00215) Type=0.0 Nibs=1 + F0AA5 NZ%GPR(002E3) Type=0.0 Nibs=1 + F0ACD NZ%GPR(0030B) Type=0.0 Nibs=1 + F0B29 NZ%GPR(00367) Type=0.0 Nibs=1
pBSCen	=	000F5	TIZR6S	-
pBSCex	=	000F6	TIZR6S	-
pCALRS	=	00036	TIZR6S	-
pCALSV	=	00037	TIZR6S	-
pCAT	=	00006	TIZR6S	-
pCAT\$	=	00007	TIZR6S	-
pCLDST	=	000FF	TIZR6S	-
pCMD	=	0000C	NZ%SYM	-
pCMPLX	=	00038	TIZR6S	-
pCONFG	=	000FB	TIZR6S	-
pCOPYx	=	00008	TIZR6S	-
pCRDAB	=	00033	TIZR6S	-
pCREAT	=	00009	TIZR6S	-
pCRT=8	=	00023	TIZR6S	-
pCURSR	=	00029	TIZR6S	-
pDATA	=	0000B	NZ%SYM	- F07E6 NZ%GPR(00024) Type=0.0 Nibs=1 + F0CB4 NZ%GPR(004F2) Type=0.0 Nibs=1 + F686C NZ%IOR(0019A) Type=0.0 Nibs=1
pDATLN	=	0002A	TIZR6S	-
pDEVCp	=	00001	TIZR6S	-
pDIAGL	=	00003	NZ%SYM	- F1D5F NZ%BAS(00DC5) Type=0.0 Nibs=1
pDIAGR	=	00002	NZ%SYM	-
pDIDST	=	0000A	TIZR6S	-
pDSWKY	=	000FD	TIZR6S	-
pDSWNK	=	000FE	TIZR6S	-
pEDIT	=	0002B	TIZR6S	-
pENTER	=	00012	TIZR6S	-
pEOFIL	=	00025	TIZR6S	-
pEOT	=	00006	NZ%SYM	- F0827 NZ%GPR(00065) Type=0.0 Nibs=1 + F0ECC NZ%GPR(0050A) Type=0.0 Nibs=1 + F2417 SC%ENT(004E3) Type=0.0 Nibs=1

pERROR = 000F2	TIZR6S		+ F44EF NZ%CAS(0025C)	Type=0.0	Nibs=1
pETE = 00009	NZ%SYM		+ F5BB9 NZ%HND(00A9E)	Type=0.0	Nibs=1
pExcpt = 000F8	TIZR6S		+ F6723 NZ%IOR(00051)	Type=0.0	Nibs=1
pFASCH = 0002C	TIZR6S		+ F6889 NZ%IOR(001B7)	Type=0.0	Nibs=1
pFILDC = 00002	TIZR6S		+ F695B NZ%IOR(00289)	Type=0.0	Nibs=1
pFILXQ = 00003	TIZR6S		-		
pFINDF = 00017	TIZR6S		- F081E NZ%GPR(0005C)	Type=0.0	Nibs=1
pFNIN = 0003D	TIZR6S		-		
pFNOUT = 0003E	TIZR6S		-		
pFPROT = 0000B	TIZR6S		-		
pFSPCp = 00004	TIZR6S		-		
pFSPCx = 00005	TIZR6S		-		
pFTYPE = 0002D	TIZR6S		-		
pHALTD = 00007	NZ%SYM		- F0830 NZ%GPR(0006E)	Type=0.0	Nibs=1
pIDY = 0000E	NZ%SYM		-		
pIFC = 00005	NZ%SYM		- F0839 NZ%GPR(00077)	Type=0.0	Nibs=1
pIMCHR = 0001E	TIZR6S		-		
pIMXCH = 0001F	TIZR6S		-		
pIMXQT = 0001D	TIZR6S		-		
pIMbck = 00020	TIZR6S		-		
pIMcpi = 00021	TIZR6S		-		
pIMcpw = 00022	TIZR6S		-		
pKYDF = 0001B	TIZR6S		-		
pLIST = 0000C	TIZR6S		-		
pLIST2 = 0002E	TIZR6S		-		
pMEM = 000F1	TIZR6S		-		
pMERGE = 0000D	TIZR6S		-		
pMNL P = 000FA	TIZR6S		-		
pMRGE2 = 0002F	TIZR6S		-		
pPARSE = 000F4	TIZR6S		-		
pPRGPR = 00032	TIZR6S		-		
pPRINH = 00026	TIZR6S		-		
pPRTCL = 0000E	TIZR6S		-		
pPRTIS = 0000F	TIZR6S		-		
pPURGE = 00010	TIZR6S		-		
pPWROF = 000FC	TIZR6S		-		
pRCRD = 00034	TIZR6S		-		
pRDCBF = 00018	TIZR6S		-		
pRDNBF = 00019	TIZR6S		-		
pRDY = 0000D	NZ%SYM		-		
pREAD# = 00027	TIZR6S		-		
pREN = 00039	TIZR6S		-		
pRNAME = 00011	TIZR6S		-		
pRTNtp = 0003A	TIZR6S		-		
pRUNft = 00030	TIZR6S		-		
pRUNnB = 00031	TIZR6S		-		
pSRECH = 00028	TIZR6S		-		
pSREQ = 000F9	TIZR6S		-		
pSTATE = 00001	NZ%SYM		- F08C8 NZ%GPR(00106)	Type=0.0	Nibs=1
			+ F0AD5 NZ%GPR(00313)	Type=0.0	Nibs=1
			+ F0CD1 NZ%GPR(0050F)	Type=0.0	Nibs=1
			+ F244F SC%ENT(0051B)	Type=0.0	Nibs=1
			+ F671B NZ%IOR(00049)	Type=0.0	Nibs=1
			+ F6842 NZ%IOR(00170)	Type=0.0	Nibs=1
			+ F6956 NZ%IOR(00284)	Type=0.0	Nibs=1

pTERM = 00008 NZ%SYM - F0842 NZ%GPR(00080) Type=0.0 Nibs=1
 + F2425 SC%ENT(004F1) Type=0.0 Nibs=1
 + F5BB4 NZ%HND(00A99) Type=0.0 Nibs=1
 + F6728 NZ%IOR(00056) Type=0.0 Nibs=1

 pTEST = 000F0 TI%R6S -
 pTIMR# = 0003B TI%R6S -
 pTRANS = 000EF TI%R6S -
 pTRFMx = 0003C TI%R6S -
 pUTYPE = 0000A NZ%SYM - F0848 NZ%GPR(00086) Type=0.0 Nibs=1
 pVER\$ = 00000 TI%R6S -
 pWARN = 000F3 TI%R6S -
 pWCRD = 00035 TI%R6S -
 pWCRD8 = 00024 TI%R6S -
 pWRCBF = 0001A TI%R6S -
 pWTKY = 0001C TI%R6S -
 pZERPG = 000F7 TI%R6S -

 rEV\$ = F61B2 NZ%CAT - F200B SC%ENT(000D7) Type=1.1 Nibs=4 Dist=041A7
 + F20C7 SC%ENT(00193) Type=1.1 Nibs=4 Dist=040EB

 s3BYTE = 00003 NZ%SYM -
 sARITH = 00007 TI%R6S -
 sBYEx = 00000 TI%R6S -
 sC/P = 00001 TI%R6S -
 sCARD = 00002 TI%R6S - F54C5 NZ%HND(003AA) Type=0.0 Nibs=1
 sCARDC = 00008 TI%R6S -
 sCHAIN = 0000B TI%R6S -
 sCONT = 0000A TI%R6S -
 sCONTK = 00009 TI%R6S -
 sCONTR = 00000 NZ%SYM - F0C4C NZ%GPR(0048A) Type=0.0 Nibs=1
 + F3074 NZ%BIF(0019D) Type=0.0 Nibs=1

 sCURBT = 00003 TI%R6S -
 sCURUD = 00004 TI%R6S -
 sCURUP = 00002 TI%R6S -
 sCntg = 00002 TI%R6S -
 sCplxP = 00007 TI%R6S -
 sDATA0 = 00009 NZ%SYM -
 sDATAV = 00008 NZ%SYM - F2BCE SC%ENT(00C9A) Type=0.0 Nibs=1
 + F3191 NZ%BIF(002BA) Type=0.0 Nibs=1

 sDEST = 00003 TI%R6S - F4273 NZ%BUT(0067C) Type=0.0 Nibs=1
 + F5A04 NZ%HND(008E9) Type=0.0 Nibs=1
 + F5C58 NZ%HND(00B3D) Type=0.0 Nibs=1
 + F5DA7 NZ%HND(00C8C) Type=0.0 Nibs=1
 + F5DEB NZ%HND(00CDO) Type=0.0 Nibs=1

 sDIAsr = 00001 NZ%SYM - F2F77 NZ%BIF(000A0) Type=0.0 Nibs=1
 + F3128 NZ%BIF(00251) Type=0.0 Nibs=1

 sDevOK = 00008 NZ%SYM - F35E8 NZ%BIF(00711) Type=0.0 Nibs=1
 + F6E8B NZ%FXQ(00072) Type=0.0 Nibs=1
 + F6EC2 NZ%FXQ(000A9) Type=0.0 Nibs=1

 sENDx = 00001 TI%R6S -
 sEOF = 00007 TI%R6S -
 sERROR = 00000 NZ%SYM - F6792 NZ%IOR(000C0) Type=0.0 Nibs=1
 + F6AFC NZ%IOR(0042A) Type=0.0 Nibs=1

 sEXTDV = 00000 TI%R6S - F54BA NZ%HND(0039F) Type=0.0 Nibs=1
 sEXTGS = 00005 TI%R6S - F2B90 SC%ENT(00C5C) Type=0.0 Nibs=1
 sFLAG? = F0989 NZ%GPR - F230D SC%ENT(003D9) Type=1.1 Nibs=4 Dist=01984
 + F3051 NZ%BIF(0017A) Type=1.1 Nibs=4 Dist=026C8
 + F319F NZ%BIF(002C8) Type=1.1 Nibs=4 Dist=02816

 sFOUND = 0000A TI%R6S -
 sFirst = 00000 NZ%SYM - F742D NZ%FXQ(00614) Type=0.0 Nibs=1

	+ F744D NZ%FXQ(00634)	Type=0.0	Nibs=1
	+ F7459 NZ%FXQ(00640)	Type=0.0	Nibs=1
	+ F747D NZ%FXQ(00664)	Type=0.0	Nibs=1
sGOSUB = 00003	TI%R6S	-	
sI/OBF = 0000A	TI%R6S	-	
sINFRD = 0000A	TI%R6S	-	
sINTR = 00004	NZ%SYM	- F2B1B SC%ENT(00BE7)	Type=0.0 Nibs=1
		+ F3186 NZ%BIF(002AF)	Type=0.0 Nibs=1
sINX = 00005	TI%R6S	-	
sIRAM = 00002	TI%R6S	-	
sIX = 00007	TI%R6S	-	
sInit = 00003	TI%R6S	-	
sKEYS = 00005	TI%R6S	-	
sLISTR = 00001	NZ%SYM	-	
sLOCKD = 0000B	NZ%SYM	-	
sLoop? = 00005	NZ%SYM	- F4736 NZ%CAS(004A3)	Type=0.0 Nibs=1
		+ F473D NZ%CAS(004AA)	Type=0.0 Nibs=1
		+ F475D NZ%CAS(004CA)	Type=0.0 Nibs=1
		+ F47B5 NZ%CAS(00522)	Type=0.0 Nibs=1
		+ F47C9 NZ%CAS(00536)	Type=0.0 Nibs=1
		+ F5A12 NZ%HND(008F7)	Type=0.0 Nibs=1
		+ F5AB8 NZ%HND(0099D)	Type=0.0 Nibs=1
		+ F5B77 NZ%HND(00A5C)	Type=0.0 Nibs=1
sMAINC = 00005	TI%R6S	-	
sMANUL = 00002	NZ%SYM	- F0C2C NZ%GPR(0046A)	Type=0.0 Nibs=1
sMULT = 00008	TI%R6S	-	
sNAPRS = F52F5	NZ%HND	- F360B NZ%BIF(00734)	Type=1.1 Nibs=4 Dist=01CER
sNEGRD = 0000B	TI%R6S	-	
sNoChn = 00002	TI%R6S	-	
sONERR = 00004	TI%R6S	-	
sONTMR = 00006	TI%R6S	-	
sOVERW = 00008	NZ%SYM	- F4BB8 NZ%CAS(00925)	Type=0.0 Nibs=1
		+ F52B8 NZ%HND(0019D)	Type=0.0 Nibs=1
		+ F55BA NZ%HND(0049F)	Type=0.0 Nibs=1
		+ F5775 NZ%HND(0065A)	Type=0.0 Nibs=1
sPCRD = 00008	TI%R6S	-	
sPOLLE = 00006	NZ%SYM	-	
sPRGCF = 0000B	TI%R6S	-	
sPRIVT = 0000B	NZ%SYM	- F5E2A NZ%HND(00D0F)	Type=0.0 Nibs=1
sRAD = 00009	TI%R6S	-	
sRDX = 0000B	TI%R6S	-	
sREADI = 00004	TI%R6S	-	
sRENAM = 00006	TI%R6S	-	
sRENUM = 00008	TI%R6S	-	
sRESTR = 0000A	TI%R6S	-	
sRETRN = 00000	TI%R6S	-	
sRFILF = 00008	TI%R6S	-	
sRMOTE = 0000A	NZ%SYM	- F3196 NZ%BIF(002BF)	Type=0.0 Nibs=1
sRUNBn = 00004	TI%R6S	-	
sRUNDC = 00007	TI%R6S	-	
sReadd = 00004	NZ%SYM	- F0885 NZ%GPR(000C3)	Type=0.0 Nibs=1
		+ F08B8 NZ%GPR(000F6)	Type=0.0 Nibs=1
		+ F08FA NZ%GPR(00138)	Type=0.0 Nibs=1
		+ F0929 NZ%GPR(00167)	Type=0.0 Nibs=1
		+ F19A9 NZ%BAS(00A0F)	Type=0.0 Nibs=1
		+ F1A6B NZ%BAS(00AD1)	Type=0.0 Nibs=1
sSCNTR = 00003	NZ%SYM	-	
sSIGN = 00009	TI%R6S	-	
sSRQIN = 00001	NZ%SYM	-	
sSST = 00002	TI%R6S	-	

sSTdc = 00001	TIZR6S	-
sSTAND = 00007	NZ%SYM	-
sSTAT = 00006	TIZR6S	-
sSTK = 00007	NZ%SYM	-
		- F19D5 NZ%BAS(00A3B) Type=0.0 Nibs=1
		+ F1C8B NZ%BAS(00CF1) Type=0.0 Nibs=1
		+ F352E NZ%BIF(00657) Type=0.0 Nibs=1
		+ F3F1B NZ%BUT(00324) Type=0.0 Nibs=1
		+ F3F4A NZ%BUT(00353) Type=0.0 Nibs=1
		+ F3F64 NZ%BUT(0036D) Type=0.0 Nibs=1
		+ F3F94 NZ%BUT(0039D) Type=0.0 Nibs=1
		+ F3FC4 NZ%BUT(003CD) Type=0.0 Nibs=1
		+ F4007 NZ%BUT(00410) Type=0.0 Nibs=1
		+ F4044 NZ%BUT(0044D) Type=0.0 Nibs=1
		+ F6E24 NZ%FXQ(0000B) Type=0.0 Nibs=1
		+ F6EC5 NZ%FXQ(000AC) Type=0.0 Nibs=1
		+ F73EC NZ%FXQ(005D3) Type=0.0 Nibs=1
		-
sSTOP = 00005	TIZR6S	-
sSpec1 = 00006	TIZR6S	-
sTALKA = 00002	NZ%SYM	- F50D1 NZ%CAS(00E3E) Type=0.0 Nibs=1
sUNCNF = 00005	NZ%SYM	- F0901 NZ%GPR(0013F) Type=0.0 Nibs=1
sUNDEF = 00001	TIZR6S	- F5508 NZ%HND(003ED) Type=0.0 Nibs=1
sUNSEC = 0000A	NZ%SYM	- F5E3B NZ%HND(00D20) Type=0.0 Nibs=1
sXCPT = 00004	TIZR6S	-
sXQT = 00000	TIZR6S	-
sXWORD = 00009	TIZR6S	-
		-
t! = 000FC	TIZR6S	-
t% = 00085	TIZR6S	- F7318 NZ%FXQ(004FF) Type=0.0 Nibs=2
		+ F78DD NZ%PAR(003E0) Type=0.0 Nibs=2
		+ F7DE3 NZ%DEC(00210) Type=0.0 Nibs=2
		-
t& = 00089	TIZR6S	-
t* = 00083	TIZR6S	- F7336 NZ%FXQ(0051D) Type=0.0 Nibs=2
		+ F76AD NZ%PAR(001B0) Type=0.0 Nibs=2
		+ F78BF NZ%PAR(003C2) Type=0.0 Nibs=2
		+ F7DB8 NZ%DEC(001E5) Type=0.0 Nibs=2
		-
t+ = 00087	TIZR6S	-
t- = 00082	TIZR6S	-
t/ = 00084	TIZR6S	-
t@ = 000F4	TIZR6S	- F7561 NZ%PAR(00064) Type=0.0 Nibs=2
tABS = 000A2	TIZR6S	-
tACOS = 0009A	TIZR6S	-
tADD = 000D5	TIZR6S	-
tADIGO = 00060	TIZR6S	-
tADIG1 = 00061	TIZR6S	-
tADIG2 = 00062	TIZR6S	-
tADIG3 = 00063	TIZR6S	-
tADIG4 = 00064	TIZR6S	-
tADIG5 = 00065	TIZR6S	-
tADIG6 = 00066	TIZR6S	-
tADIG7 = 00067	TIZR6S	-
tADIG8 = 00068	TIZR6S	-
tADIG9 = 00069	TIZR6S	-
tALL = 000F8	TIZR6S	-
tAND = 0008B	TIZR6S	-
tANGLE = 601B3	TIZR6S	-
tARRAY = 0007D	TIZR6S	-
tASIN = 00099	TIZR6S	-
tATAN = 0009B	TIZR6S	-
tAUTO = 000EE	TIZR6S	-
tBASE = 000E9	TIZR6S	-

tBEEP	=	000E8	TIZR6S	-	
tBIG	=	00010	TIZR6S	-	
tCALL	=	000F9	TIZR6S	-	
tCARD	=	000D0	TIZR6S	-	
tCAT	=	000EC	TIZR6S	-	
tCEIL	=	00072	TIZR6S	-	
tCFLAG	=	000FA	TIZR6S	-	
tCHR\$	=	000A4	TIZR6S	-	
tCLOCK	=	501EF	TIZR6S	-	
tCMLX	=	0007A	TIZR6S	-	
tCNTRL	=	00023	NZXTBL	-	F7B7B NZ%PAR(0067E) Type=0.0 Nibs=2
tCOLON	=	000E2	TIZR6S	-	F2D56 NZ%UTL(000C0) Type=0.0 Nibs=2
				-	+ F3F23 NZ%BUT(0032C) Type=0.0 Nibs=2
				-	+ F726E NZ%FXQ(00455) Type=0.0 Nibs=2
				-	+ F72AA NZ%FXQ(00491) Type=0.0 Nibs=2
				-	+ F7892 NZ%PAR(00395) Type=0.0 Nibs=2
				-	+ F78C6 NZ%PAR(006C9) Type=0.0 Nibs=2
				-	+ F7EE8 NZ%DEC(00315) Type=0.0 Nibs=2
				-	- F146B NZ%BAS(004D1) Type=0.0 Nibs=2
				-	+ F1598 NZ%BAS(005FE) Type=0.0 Nibs=2
				-	+ F1710 NZ%BAS(00776) Type=0.0 Nibs=2
				-	+ F2A03 SC%ENT(00ACF) Type=0.0 Nibs=2
				-	+ F2CF6 NZ%UTL(00060) Type=0.0 Nibs=2
				-	+ F2D4D NZ%UTL(000B7) Type=0.0 Nibs=2
				-	+ F6DD2 NZ%LOW(0007C) Type=0.0 Nibs=2
				-	+ F7614 NZ%PAR(00117) Type=0.0 Nibs=2
				-	+ F7832 NZ%PAR(00335) Type=0.0 Nibs=2
				-	+ F79D8 NZ%PAR(004DB) Type=0.0 Nibs=2
				-	+ F7D85 NZ%DEC(001B2) Type=0.0 Nibs=2
				-	+ F7EDD NZ%DEC(0030A) Type=0.0 Nibs=2
tCOMMA	=	000F1	TIZR6S	-	
tCOPY	=	000B5	TIZR6S	-	
tCOS	=	00097	TIZR6S	-	
tCVAL	=	000E1	TIZR6S	-	
tDATA	=	000C6	TIZR6S	-	
tDATE	=	00077	TIZR6S	-	
tDATE\$	=	00078	TIZR6S	-	
tDEF	=	000B9	TIZR6S	-	
tDEG	=	0006F	TIZR6S	-	
tDEGRE	=	000D3	TIZR6S	-	
tDELAY	=	000D6	TIZR6S	-	
tDELET	=	000B7	TIZR6S	-	
tDIM	=	000CC	TIZR6S	-	
tDISP	=	000C5	TIZR6S	-	
tDIV	=	00086	TIZR6S	-	
tDMYAR	=	0007E	TIZR6S	-	
tDSTRY	=	000BE	TIZR6S	-	
tDVZ	=	000B1	TIZR6S	-	
tEDIT	=	000B8	TIZR6S	-	
tELSE	=	000F5	TIZR6S	-	
tEND	=	000DA	TIZR6S	-	
tENDDF	=	000BA	TIZR6S	-	
tENDSB	=	000C2	TIZR6S	-	
tENTER	=	4FFEF	TIZR6S	-	F2570 SC%ENT(0063C) Type=0.0 Nibs=6
tEOL	=	000F0	TIZR6S	-	F2B6C SC%ENT(00C38) Type=0.0 Nibs=2
tEPS	=	00071	TIZR6S	-	
tERRL	=	00075	TIZR6S	-	
tERRN	=	00076	TIZR6S	-	
tERROR	=	000E3	TIZR6S	-	
tEXOR	=	0008C	TIZR6S	-	
tEXP	=	00094	TIZR6S	-	

tEXTIF	=	000F4	TIXR6S	-
tEXTND	=	601EF	TIXR6S	-
tFACT	=	000A8	TIXR6S	-
tFETCH	=	000C8	TIXR6S	-
tFFN	=	000B4	TIXR6S	-
tFLOW	=	901EF	TIXR6S	-
tFLT1	=	0001D	TIXR6S	-
tFLT10	=	00014	TIXR6S	-
tFLT11	=	00013	TIXR6S	-
tFLT12	=	00012	TIXR6S	-
tFLT2	=	0001C	TIXR6S	-
tFLT3	=	0001B	TIXR6S	-
tFLT4	=	0001A	TIXR6S	-
tFLT5	=	00019	TIXR6S	-
tFLT6	=	00018	TIXR6S	-
tFLT7	=	00017	TIXR6S	-
tFLT8	=	00016	TIXR6S	-
tFLT9	=	00015	TIXR6S	-
tFN	=	0007C	TIXR6S	-
tFOR	=	000C3	TIXR6S	-
tFP	=	0006B	TIXR6S	-
tGOSUB	=	000DC	TIXR6S	-
tGOTO	=	000DD	TIXR6S	-
tIF	=	000DF	TIXR6S	-
tIMAGE	=	000FF	TIXR6S	-
tIN	=	000F2	TIXR6S	-
tINF	=	00070	TIXR6S	-
tINPUT	=	000C9	TIXR6S	-
tINT	=	0009C	TIXR6S	-
tINT10	=	00004	TIXR6S	-
tINT11	=	00003	TIXR6S	-
tINT12	=	00002	TIXR6S	-
tINT2	=	0000C	TIXR6S	-
tINT3	=	0000B	TIXR6S	-
tINT4	=	0000A	TIXR6S	-
tINT5	=	00009	TIXR6S	-
tINT6	=	00008	TIXR6S	-
tINT7	=	00007	TIXR6S	-
tINT8	=	00006	TIXR6S	-
tINT9	=	00005	TIXR6S	-
tINTEG	=	000CA	TIXR6S	-
tINT0	=	E01EF	TIXR6S	-
tINTR	=	015FF	TIXR6S	-
tINTRR	=	00026	NZX TBL	- F7650 NZXPAR(00153) Type=0.0 Nibs=2
				+ F7680 NZXPAR(00183) Type=0.0 Nibs=2
				+ F7B4F NZXPAR(00652) Type=0.0 Nibs=2
tINX	=	000B2	TIXR6S	-
tIO	=	00024	NZX TBL	- F7663 NZXPAR(00166) Type=0.0 Nibs=2
tIP	=	0006A	TIXR6S	-
tIS	=	000E7	TIXR6S	- F7503 NZXPAR(00006) Type=0.0 Nibs=2
tISUB\$	=	000A7	TIXR6S	-
tIVL	=	000AE	TIXR6S	-
tKEY	=	000E5	TIXR6S	-
tKEY\$	=	00073	TIXR6S	-
tKEYS	=	000CF	TIXR6S	-
tLBLRF	=	0000E	TIXR6S	-
tLBLST	=	000F6	TIXR6S	-
tLEN	=	000A9	TIXR6S	-
tLET	=	000C0	TIXR6S	-
tLINE#	=	0000F	TIXR6S	-

tLINPT	=	000BF	TIXR6S	-
tLIST	=	000BB	TIXR6S	-
tLITRL	=	000C4	TIXR6S	- F355E NZXBIF(00687) Type=0.0 Nibs=2
				+ F3F2F NZXBUT(00338) Type=0.0 Nibs=2
				+ F7281 NZFXQ(00468) Type=0.0 Nibs=2
				+ F7866 NZXPAR(00369) Type=0.0 Nibs=2
				+ F797F NZXPAR(00482) Type=0.0 Nibs=2
				+ F7E19 NZXDEC(00246) Type=0.0 Nibs=2
tLN	=	00091	TIXR6S	-
tLOCKO	=	00025	NZXTBL	- F1524 NZXBAS(0058A) Type=0.0 Nibs=2
				+ F75F6 NZXPAR(000F9) Type=0.0 Nibs=2
				+ F7C9B NZXDEC(000C8) Type=0.0 Nibs=2
tLOG	=	00090	TIXR6S	-
tLOG10	=	00093	TIXR6S	-
tLPRP	=	000AA	TIXR6S	-
tLR	=	000B6	TIXR6S	-
tMAIN	=	000D2	TIXR6S	-
tMATH	=	601EF	TIXR6S	-
tMAX	=	000AD	TIXR6S	-
tMAXRL	=	0006C	TIXR6S	-
tMEAN	=	0009D	TIXR6S	-
tMIN	=	000AC	TIXR6S	-
tMOD	=	00074	TIXR6S	-
tNAME	=	000BD	TIXR6S	-
tNEAR	=	C01EF	TIXR6S	-
tNEG	=	D01EF	TIXR6S	-
tNEXT	=	000C4	TIXR6S	-
tNOT	=	00081	TIXR6S	-
tNUM	=	000A3	TIXR6S	-
tOFF	=	000E1	TIXR6S	- F16BD NZXBAS(00723) Type=0.0 Nibs=2
				+ F75DA NZXPAR(000DD) Type=0.0 Nibs=2
				+ F7BA3 NZXPAR(006A6) Type=0.0 Nibs=2
				+ F7C83 NZXDEC(000B0) Type=0.0 Nibs=2
tON	=	000E0	TIXR6S	- F16C6 NZXBAS(0072C) Type=0.0 Nibs=2
				+ F2A8F SCXENT(00B5B) Type=0.0 Nibs=2
				+ F75D5 NZXPAR(000D8) Type=0.0 Nibs=2
				+ F7B9E NZXPAR(006A1) Type=0.0 Nibs=2
				+ F7C7A NZXDEC(000A7) Type=0.0 Nibs=2
tOPT'N	=	000ED	TIXR6S	-
tOR	=	0008D	TIXR6S	-
tOVF	=	000AF	TIXR6S	-
tPAUSE	=	000D7	TIXR6S	-
tPCRD	=	E01EF	TIXR6S	-
tPI	=	00079	TIXR6S	-
tPORT	=	000D1	TIXR6S	-
tPOS	=	201B3	TIXR6S	-
tPREDV	=	0009F	TIXR6S	-
tPRINT	=	000CD	TIXR6S	-
tPRMEN	=	000F8	TIXR6S	-
tPRMST	=	000F3	TIXR6S	-
tPURGE	=	000EB	TIXR6S	-
tRAD	=	0006E	TIXR6S	-
tRDIAN	=	000D4	TIXR6S	-
tREAD	=	000C7	TIXR6S	-
tREAL	=	000BC	TIXR6S	-
tRELOP	=	0008A	TIXR6S	-
tREM	=	000E6	TIXR6S	-
tRES	=	0007F	TIXR6S	-
tRESTR	=	000DE	TIXR6S	-
tRETRN	=	000DB	TIXR6S	-

tRFILE	=	000DE	TIZR6S	-
tRMD	=	0006D	TIZR6S	-
tRND	=	000A0	TIZR6S	-
tROUND	=	C01EF	TIZR6S	-
tRUN	=	000FE	TIZR6S	-
tSDEV	=	0009E	TIZR6S	-
tSEMIC	=	000F2	TIZR6S	-
				- F2DF6 NZXUTL(00160) Type=0.0 Nibs=2
				+ F72FF NZXFQ(004E6) Type=0.0 Nibs=2
				+ F735D NZXFQ(00544) Type=0.0 Nibs=2
				+ F7534 NZXPAR(00037) Type=0.0 Nibs=2
				+ F7556 NZXPAR(00059) Type=0.0 Nibs=2
				+ F7744 NZXPAR(00247) Type=0.0 Nibs=2
				+ F7753 NZXPAR(00256) Type=0.0 Nibs=2
				+ F7894 NZXPAR(00397) Type=0.0 Nibs=2
				+ F7927 NZXPAR(0042A) Type=0.0 Nibs=2
				+ F7D41 NZXDEC(0016E) Type=0.0 Nibs=2
				+ F7E44 NZXDEC(00271) Type=0.0 Nibs=2
				+ F7E5D NZXDEC(0028A) Type=0.0 Nibs=2
tSFLAG	=	000FB	TIZR6S	-
tSGN	=	000A1	TIZR6S	-
tSHORT	=	000CB	TIZR6S	-
tSIN	=	00096	TIZR6S	-
tSMALL	=	00011	TIZR6S	-
tSQR	=	00092	TIZR6S	-
tSTAT	=	000CE	TIZR6S	-
tSTEP	=	000F6	TIZR6S	-
tSTOP	=	000D9	TIZR6S	-
tSTR\$	=	000A6	TIZR6S	-
tSUB	=	000C1	TIZR6S	-
tSVAR	=	0002D	TIZR6S	-
tTAB	=	000F7	TIZR6S	-
tTAN	=	00098	TIZR6S	-
tTHEN	=	000F4	TIZR6S	-
tTIME	=	0007B	TIZR6S	-
tTIME\$	=	00095	TIZR6S	-
tTIMER	=	000E4	TIZR6S	-
tTO	=	000F3	TIZR6S	-
tTRACE	=	000EA	TIZR6S	-
tUNF	=	000B0	TIZR6S	-
tUPRC\$	=	000AB	TIZR6S	-
tUSER	=	000E2	TIZR6S	-
tUSING	=	000FD	TIZR6S	-
				- F1FA9 SCXENT(00075) Type=0.0 Nibs=2
				+ F754D NZXPAR(00050) Type=0.0 Nibs=2
tVAL	=	000A5	TIZR6S	-
tVARS	=	B01EF	TIZR6S	-
tWAIT	=	000D8	TIZR6S	-
tXFN	=	000B3	TIZR6S	-
tXWORD	=	000EF	TIZR6S	-
				- F1520 NZXBAS(00586) Type=0.0 Nibs=2
				+ F1930 NZXBAS(00996) Type=0.0 Nibs=2
				+ F75F2 NZXPAR(000F5) Type=0.0 Nibs=2
				+ F764C NZXPAR(0014F) Type=0.0 Nibs=2
				+ F765F NZXPAR(00162) Type=0.0 Nibs=2
				+ F767C NZXPAR(0017F) Type=0.0 Nibs=2
				+ F7B4B NZXPAR(0064E) Type=0.0 Nibs=2
				+ F7B77 NZXPAR(0067A) Type=0.0 Nibs=2
				+ F7C97 NZXDEC(000C4) Type=0.0 Nibs=2
				+ F7CDB NZXDEC(00108) Type=0.0 Nibs=2
tZ	=	0005A	TIZR6S	-
tZERO	=	C01EF	TIZR6S	-
t^	=	00080	TIZR6S	-

uRLit	=	000F7	TIZR6S	-
uCPLXC	=	000EE	TIZR6S	- F2627 SCZENT(006F3) Type=0.0 Nibs=2
uDELIM	=	000F4	TIZR6S	- F260E SCZENT(006DA) Type=0.0 Nibs=2
uHKB^	=	000F6	TIZR6S	- F259E SCZENT(0066A) Type=0.0 Nibs=2
				+ F266B SCZENT(00737) Type=0.0 Nibs=2
uIMXCH	=	000D4	TIZR6S	-
uIMbck	=	000DC	TIZR6S	-
uIMend	=	000F0	TIZR6S	- F2609 SCZENT(006D5) Type=0.0 Nibs=2
uIMsta	=	000DE	TIZR6S	-
uJMPdl	=	000DB	TIZR6S	-
uJMPst	=	000DA	TIZR6S	-
uJMP{ }	=	000D9	TIZR6S	-
uLOOPB	=	000D2	TIZR6S	- F25E1 SCZENT(006AD) Type=0.0 Nibs=2
uLOOPP	=	000EF	TIZR6S	- F25FF SCZENT(006CB) Type=0.0 Nibs=2
uLOOPS	=	000D3	TIZR6S	- F25FA SCZENT(006C6) Type=0.0 Nibs=2
uMODES	=	0BDB1	TIZR6S	-
uMULT	=	000D1	TIZR6S	- F25DC SCZENT(006A8) Type=0.0 Nibs=2
uNUMEn	=	000FC	TIZR6S	-
uNUMEs	=	000FD	TIZR6S	-
uNUMFn	=	000FA	TIZR6S	-
uNUMFs	=	000FB	TIZR6S	-
uNUMNn	=	000F8	TIZR6S	-
uNUMNs	=	000F9	TIZR6S	-
uOPNM-	=	000DF	TIZR6S	-
uOPNNM	=	000D8	TIZR6S	-
uOPNWM	=	000E0	TIZR6S	-
uRES12	=	0C994	TIZR6S	-
uRES01	=	0E1EE	TIZR6S	-
uRESNX	=	0C9BD	TIZR6S	-
uRESTP	=	000F1	TIZR6S	- F2604 SCZENT(006D0) Type=0.0 Nibs=2
uRESXT	=	0C9C1	TIZR6S	-
uRND>P	=	0C9CF	TIZR6S	-
uSTRPT	=	000D0	TIZR6S	- F25D7 SCZENT(006A3) Type=0.0 Nibs=2
uTEST	=	0D435	TIZR6S	-
vDEVID	=	75048	NZ%SYM	- F3235 NZ%BIF(0035E) Type=0.0 Nibs=8
xANGLE	=	00006	TIZR6S	-
xCLOCK	=	00015	TIZR6S	-
xEXTND	=	00026	TIZR6S	-
xFLOW	=	00029	TIZR6S	-
xINTO	=	0002E	TIZR6S	-
xMATH	=	00036	TIZR6S	-
xNEAR	=	0003C	TIZR6S	-
xNEG	=	0003D	TIZR6S	-
xPCRD	=	0003E	TIZR6S	-
xPOS	=	00042	TIZR6S	-
xROUND	=	0004C	TIZR6S	-
xVARS	=	0005B	TIZR6S	-
xZERO	=	0001C	TIZR6S	-
xroff	* F0095	NZ%TBL(0008D)	-	-

Saturn Hex Code Listing

F0000 - 00000000 840594C4 25F4D402 802E0000 21421048 6DF70FF1 06200000 0000F004
 F0040 - 502702B0 C12C12C1 2EC0C12C 121F0C12 C12A1193 1C121713 D1B02C12 C12C12C1
 F0080 - 2C12C120 4610E730 52600F00 ECD10FE1 061E10FD 20CED10F C303DD10 FB4031E1
 F00C0 - 0F27061B 10F290B6 A10F3805 6B10FED1 DBA10F28 1D5C10F1 717AC10F CF14FC10

 F0100 - FEC02531 0D450874 10D0007B 810DA11C 0810D2C1 75810D1F 02A610DA 212BF00D
 F0140 - 1C051E10 D3213782 0C3D1B4B 20D5B1C6 C60D061D FF00D1A0 2DF00DA4 1DC110D9
 F0180 - 3135010D 4A1E8720 DCF03831 0D5913D3 10DB025B 310D551F 4820D2B0 72820DBE
 F01C0 - 1EE410D1 609A820D AE000000 09010000 00FD0000 000B1435 359474E4 F0B249AE

 F0200 - 414E4441 0B2494E4 34D40520 B2494E45 4F42530B 2494E494 F4254052 49445509
 F0240 - 34C45414 25E0D34F 4E44525F 4C432D44 54651444 442560B4 45465149 44480B44
 F0280 - 54659444 4270D449 43505C41 49591B54 E41424C4 5412954E 44554254 1D94E494
 F02C0 - 459414C4 D0794E44 52562394 F4427C49 43545219 C4F43414 C4D1DC4F 434B4F45

 F0300 - 545525F4 6464013F 4E451BF4 55450555 4531D051 434B4449 425B1705 1434B4A1
 F0340 - 70514353 502D0525 94E44554 2581D255 41444444 434B0F25 54144494 E44525A0
 F0380 - B2554D4F 44554E1D 25541555 543545C1 92554355 44571D25 543545F4 25541173
 F03C0 - 554E4446 193505F4 C4C490D3 54514E44 4249522B 35451445 5535C0D4 52594747

 F0400 - 45425F11 FF103401 00484059 4C402C51 10514353 59474E4D 34C8030E E4C8040E
 F0440 - 25C8050E 15C8060E 05C8070E B4C8001E D3C71116 54E64602 F46602D2 4CB021EC
 F0480 - ED24C803 1D21CF04 12E4F602 D24C8061 E93C8071 D21C8081 D21C8091 D21C80A1
 F04C0 - D21C91C1 73596A75 602F6660 2EAE80E 1EB3C32F 1BD44962 7563647F 62797026

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F5D00	-	311B816A	D28CDF2F	7F7FD215	D373EF48	9730F419	84832308	8E8D3E11	A2614B96
F5D40	-	87217C17	715B6912	E017E17F	17A5FD1C	7AF215D5	20641A72	1A500707	070FE5A1
F5D80	-	881A180F	08862080	F0521470	30E21691	F6BF9843	70401201	018EFORE	44E76EE7
F5DC0	-	6208E36C	E151717F	11015937	62F41C76	4E4AB699	9853DB10	9746EAFB	129D7036
F5E00	-	D807D795	007F5E40	F709E460	66D978CE	0B80F00B	86BE0851	860416CA	E86A8084
F5E40	-	05508500	B80F00B8	0CF13517	E15349CA	8B1C4173	A4E59F15	F57D1E8E	F82F718E
F5E80	-	4C071AD8	21500692	E7FE8500	978627CC	D4D7DB13	58E434D7	E737ED47	B47D069E
F5EC0	-	07E50B1C	3020202E	414D4540	20202023	50245950	55402020	2C454E40	20202024
F5F00	-	41445540	20202024	594D4540	2D0A0FF6	79DDB135	8E5B3D07	1358FE0C	108ECC3D
F5F40	-	137D78E2	39A43D8E	819E7162	42F8AE60	66808EE9	A05318EE	E8A7E147	B864E05A

F5F80	-	78EAD8A4	438FEE01	08FAB251	4908FE21	20968CE8	EF53D137	D7D88E3C	8AD44951
F5FC0	-	1B10A8F3	E32033F5	023A603A	D602AB90	0096841D	01FA49F2	15908AA4	18E57FA1
F6000	-	4379A0CA	141791C2	08210380	C1068FEE	0100780D	165FE772	244E8AED	3674F777
F6040	-	26FEF7F0	24CC8AE6	F11B94E6	17D56756	65B011BA	4E10B73B	244A6FEE	11A7B26D
F6080	-	ACCC47E	7E167C36	764BE670	26CC5FE7	1167906A	C25CBD72	0D231050	3210D007
F60C0	-	DF58F83D	B08EBFBF	5018953E	898ED69D	B8AB5D8E	502E4CC1	7F8E98C0	17F8EAB0
F6100	-	C8E62EB5	33CC4361	018E457E	7D9040C8	AAE4111C	C4521017	52149A8A	EBE5432B
F6140	-	4C900000	00000001	FOR8F2DB	14576321	FOR8F214	7704F560	D220AF0D	A7345BF0
F6180	-	BF0A0C1C	F137068E	EFDA0713	38B62A13	31351517	8ED00C79	5E8DE83B	1400AFB7
F61C0	-	7E4F281E	CE7CE4D9	760A10A1	0B8FB041	08E01AD7	37172A08	0CEAC255	0B468E72
F6200	-	2D8F6A41	08E8E9D8	E132D80D	E94E008A	AF211B70	84728410	B7A7ED58	E04DA143
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F62C0	-	E8AAA470	E310A25D	A90E217C	E34B0D67	9E35F0D6	70E37D70	40011A72	D3784040
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F6340	-	AC212BDA	7E88AC21	0A8148E3	35E4001F	519F215F	32303D0F	6ABA8E91	FD4007DA
F6380	-	8400228E	D3804008	C90FD772	38E700D1	B109F215	6716F155	717F1461	6315D317
F63C0	-	38E79BA1	331312B1	5DB17B0C	56F13117	5AF27312	8E60DE79	02AFA77B	8A2AC3D0
F6400	-	6F2C65A0	B4723B98	8EEC9A24	7732D117	15B3A4D1	C3AC9A46	BCA80DF3	70235055
F6440	-	414D173D	91371741	5B913715	9917B8AD	F1167729	124AF28E	28CEAE27	0816590D
F6480	-	9E613A4F	21564161	14EAF51B	939F294E	4215A520	315025A1	2B19550A	F2B7681E
F64C0	-	6050A465	50480A46	5C01B129	F24A8A46	59174118	E50CE7A0	1BF281E5	9115E316
F6500	-	3AF015A3	8E419AAF	6AFA8EAC	8A2F90D9	00D58F20	80CFAC5A	C3203500	B4D42F30
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F6600	-	71360120	8EE86F15	2710072E	F8F43581	77DF1108	EF66F150	7133D231	82DED78F
F6640	-	AFD718FF	D1518DE9	22090DF0	1710D55F	201C194B	511371DD	21371C11	4D17180C
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F66C0	-	8C4C8A8C	BE3E8CBF	3E25A9A7	A744008A	8267E504	62890941	32182132	4C015D51
F6700	-	755BD203	07220289	4008E7B0	A89121AF	68963B89	8EA59D80	D46221CC	14D1715F
F6740	-	90203167	0B15E00B	86062160	15E68161	88A46560	220380D2	88820200	18508518
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F6800	-	18803840	637F0B16	815E0188	0B012031	20690020	31607D43	400799F4	008E28F9
F6840	-	8810F80D	4BB28806	0F60380F	02202758	F4008E85	F988B208	0FF5006E	8E786F40
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F68C0	-	00AF0AC3	797E487A	EA814814	BF6F6B47	0D5CE308	9C7DD203	1D02D90F	50AE22F9
F6900	-	6AA09665	0A908148	140D0D58	E2D90B32	2FAC2978	6190C700	D58F80FF	81EB46AC
F6940	-	72003894	0080FF8E	C7E9891B	08966066	ADACB80D	F8903881	08100D52	F1FBA8F2
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F6A40	-	F9BF6BF6	7B4057D0	2037CAF4	1D54A165	132A6C4E	2AE973D0	400A6C4E	1D9F6F67
F6A80	-	0C040086	CAD747F4	3D57C038	0FF26318	116680DF	87CD10B1	5E00B871	01870B01
F6AC0	-	8615C703	850851BF	2BF2BF2B	F2BF2136	1B244F21	56413416	115E0181	0B870200
F6B00	-	BBF6BF6B	F6BF6BF6	80FA5708	71C0890E	00C49018	6240280F	A861B086	0C2617F6
F6B40	-	65080FF2	23500004	16F4F263	10120166	87C310B1	5E00B870	606C4F84	0615FF2F

F6B80	-	2F2BF226	31012016	687C210B	15E00B87	0505EC84	1642FF2F	2F2BF26E	9F80F021
F6BC0	-	32A416BE	F80F0213	2C416CDF	AF570000	71360613	220346A0	00CA1321	56780D0B
F6C00	-	F6890279	11111641	36809136	5ED80FFD	1CD18315	E323A065	B0AE6AE1	473A0653
F6C40	-	2D520320	EF0EF1FE	0EF20EF9	320EFD55	01A065A0	20A86A81	BED210D1	36071360
F6C80	-	10008744	14451400	28554E44	40068594	4495F340	555E4C40	244BC494	354554E4
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F6D80	-	30520A81	A0D15379	80400304	B04B0496	C7117115	3717F100	15370502	268C507C
F6DC0	-	E4F00368	00AC214A	311F9621	18E422D4	538EEABB	8E25EC46	2AF22730	815C8752
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F6E40	-	331A3962	4131E296	23187072	727670F0	67007B91	4007A26D	74113102	96280250
F6E80	-	2D38ED15	C8588ABE	E8E6E994	008CC2FC	8E370D40	077358EC	60A11C2B	A9E10420
F6EC0	-	84886790	8506E6F8	E8A0A143	D23141D5	8E0A0A13	7E98B6A5	14513511	8155717F
F6F00	-	11C8E030	A15D3725	3400D779	6F400068	E160A153	717F1001	438E7EF9	10417313
F6F40	-	71450703	2B022502	754547F7	C954977C	65726245	E78A2460	6F90109A	F910A781
F6F80	-	54A32031	82966B27	5F04007F	F441B319	29668AD9	CE490219	0AC02802	7215D211
F6FC0	-	2AF8111F	2F2AE621	0D5D331A	296670D2	5F231529	66D07890	4F1608F7	3D47AF06
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F7040	-	56028021	12AF8111	816310E0	E6AB6681	2F2F24C0	C6C60E3A	03F2AB60	3715411A
F7080	-	AF511903	AF17A044	05723440	1F1A8895	9AE28023	1E2966E2	75E34B27	D0440205
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F7140	-	34728348	3F1A8892	9AE72434	937A634E	205A0455	0B650445	A74234B1	7C435FE7
F7180	-	B4392DB0	F158F7D3	3D0AE48E	BCB9AE53	1F19E16C	8118119E	9BB9696B	D2AEDF5A
F71C0	-	350E3D03	AF17AC24	E2712343	2AE88158	1596D317	EA242176	D256E4CD	0370D297
F7200	-	D6025029	6DEE8158	1554F8E0	0FC5008E	34FC533A	F237E455	C4C47220	31F75003
F7240	-	7C4F4F40	57D0031F	956031F3	0297520D	20172324	D020312E	962606E3	114A1613
F7280	-	14C96260	6470783F	4007E7F4	505E5722	174F1453	312E9668	27F1276E	18E35DC4
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F7300	-	F966217E	BE400D23	1F552431	58966717	1B178718	E5ECC400	6C6F3138	96660D20
F7340	-	379817B8	172518EC	FCC40014	A06312F9	66200741	51617350	70617721	8E49CC40
F7380	-	031309E1	90D9CE56	0280210A	1378EB6F	B1371098	E5EFB12A	669C2502	10AAF912
F73C0	-	A0313706	1371F698	F215D307	135AF98C	18FBAF21	08867708	A8332F30	87E20AF4
F7400	-	1004F02F	3027F10D	40333020	2DA1188A	A4003D02	502850AC	A8E72B9A	F5AC6785
F7440	-	04337FA0	5E087032	74704C18	40AE8815	815A4E94	E4DAA054	17950AA0	A2C86050
F7480	-	AF1942E0	811811B4	651FB240	18C7CAC8	E10FB8FE	3F8007DF	06DB068E	ACA98E01
F74C0	-	FB8C3FDB	8C3C998C	2FAC07DA	07DE068E	2CEB8FB0	F808E1EE	B8CE0CC8	CD6997F3
F7500	-	6317E966	366CA47E	9471308D	4A5307F8	472208F8	26304501	71312F71	85858849
F7540	-	8DB32307	5F531DF9	62D0312F	96240073	14F74556	3B527605	17756AF6	3594A554
F7580	-	97644175	7BC25808	C74FB831	80246121	7C958E13	905D07D0	572B44D0	626577A4
F75C0	-	53E6AF02	764F07B6	17EB50E7	D31E2D30	0763566D	F7355AF6	35FEFF52	976F17EC
F7600	-	47E847E5	4205CA78	94311F64	A47DF485	884A6893	7EF47C95	AF637840	594C4976
F7640	-	A21775BB	7745FEFF	62420007	0C47435F	EFF42E00	00208D53	03018503	7715FEFF
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F7700	-	724869A2	70C4AF63	554F4C49	76611757	1A4AEE25	7DA37AF3	75305798	4A037353
F7740	-	20312F71	73791342	1312F966	90706356	0754364C	37A8D400	7054AEE1	33101133

F7780 - AC281481 4B461711 4B716D5C E80DF0D8 108100D5 7FA46A4E 80DFA961 08D08E61
 F77C0 - 4F4E5110 ACA80DF1 19809135 AF684A84 98489695 08582F36 534D4449 72513874

 F7800 - 41445149 76808598 5A8C680D F7CB26C0 31811191 35027362 311F7382 7422870E
 F7840 - 08737086 A4003795 275D2027 92246065 4120314C 7F422F30 A74B1453 10431A39
 F7880 - 62D231E2 96602171 332E2F7B 222F3067 A8147094 CF662F01 7184A7B0 37382313
 F78C0 - 89667125 86AC0207 8E164D06 6C031589 66A576D1 7B617B71 46E31829 662274C2

 F7900 - 73517361 4EC31922 49663C20 742231A3 96651312 F7E81762 17631486 6B607BD1
 F7940 - 7F417F01 7F114A28 315057C7 0C114B72 B155B1C1 14B17131 029623A7 F212031A
 F7980 - C76312F3 087F904F 0948A076 A1685F21 0D007371 82111403 84A66008 5A8488FE
 F79C0 - 7A205B18 78606DCB 77412031 1F7DD003 77317C90 4606F217 73131E29 622231A3

 F7A00 - 96650171 79AE4B08 312162BB 667B7D6E 6BEF84A0 37DF020A C07BD050 087100A4
 F7A40 - CA4E4007 3701717F B04EE031 3710B135 8D9DF307 CEF873B0 11B13559 08704003
 F7A80 - 26027B00 74DF873B 10313713 58E79491 3613410A 0111A134 8E794913 501AEE8D
 F7AC0 - BEC208DD FC20AFA8 D51D20AF A8D62450 773011B1 3713510B 7C6F873B 011B1355

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 F7B80 - 00671A18 584A8586 D2E8DA2C 2075FF0E 2101ED00 0067DF79 AA8FE7A2 0460702F
 F7BC0 - 6A5F312E 62FE8D8B F3035943 5027DEE1 4B700357 17BB177E 25011717 ED153E7F

 F7C00 - 6268507C D2572779 173C2171 9669078B 15BE79A1 14B8D054 507B326A DF379A85
 F7C40 - 54022718 1798E8F9 57507082 4C014B8D 30350171 7D617102 63EF77C0 310E962B
 F7C80 - 0311E966 4E671215 B5AF635F EFF52976 728498F9 91507822 171962D0 1C172117
 F7CC0 - EA1679F7 D0259017 1698F690 F31FE966 C01757D0 15607400 6A6F3394 F46ACD7B

 F7D00 - C066A173 C064DE37 840594C4 2778BD6D 8F70A114 B72107D2 05BF7B40 54F6F1F3
 F7D40 - 12F96600 722133B3 0274AF17 114B0374 81480027 35D17114 B8EC0195 FE7350AE
 F7D80 - E03311F9 66007ED0 77415A07 E3060FF7 E20AEE03 31A37910 17114B31 38966421
 F7DC0 - 8117131A 261FC732 F310263F F31C26BE F3158966 F2315277 DF78707C E0506318

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 F7E40 - B1312F96 6E018131 E2DA59D7 610312F9 62400331 A37B5F17 18D22950 3F34F4E4
 F7E80 - 4525F4C4 022F764C 74405901 7160CD60 4D8F2915 014F80D1 0C2045E6 64D77008
 F7EC0 - D1055039 94E44525 0229610C 14B311F9 62000131 2E962000 10000000 00000000

 F7F00 - 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
 F7F40 - 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
 F7F80 - 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
 F7FC0 - 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00001300

/SLDAD: End of Saturn Loader Execution

```
1      *
2      *      N  N  ZZZZ  &      RRRR  SSS  TTTT
3      *      N  N      Z  & &  R  R  S  S  T
4      *      NN N      Z  & &  R  R  S      T
5      *      N N N      Z  &      RRRR  SSS  T
6      *      N NN  Z      & & &  R R      S  T
7      *      N  N  Z      & &  R  R  S  S  T
8      *      N  N  ZZZZ  && &  R  R  SSS  T
9      *
10     *
11     TITLE Rom start (header) <830927.1416>
12 F0000 ABS #F0000 TIXHP6 address (fixed)
13 F0000 =ROMSTT
14 F0000 BSS #8-((*)-(ROMSTT)) 8 nibble rom ID
15 F0008 END
```

=ROMSTT Abs 983040 #F0000 - 13 14

Input Parameters

Source file name is NZ&RST::MS

Listing file name is NZ/RST:TI:ML::-1

Object file name is NZXRST:TI:MS::-1

Initial flag settings are 111111
 0123456789012345

Errors

None

Saturn Assembler News


```
1          TITLE Lexical Analyzer Tables--ID=FF
2          * This file was generated on Tue Jan 24, 1984 12:00 pm
3          * File Header
4 00000 8405      NIBASC \HPILROM \      File Name
           94C4
           25F4
           D402
5 00010 0000      CON(4) =FLEX      File Type
6 00014 00        NIBHEX 00        Flags
7 00016 0021      NIBHEX 0021      Time
8 0001A 4210      NIBHEX 421048     Date
           48
9 00020 0000      REL(5) =ChainE    File Length
           0
10         *
11 00025 FF        NIBHEX FF        Id
12 00027 10        CON(2) 1        Lowest Token
13 00029 62        CON(2) 38       Highest Token
14 0002B 0000      NIBHEX 00000     End of lex table chain
           0
15         *
16         * Speed Table
17 00030 0          NIBHEX 0          Speed table exists
18 00031 000        CON(3) 0          A
19 00034 F00        CON(3) 15         B
20 00037 450        CON(3) 84         C
21 0003A 270        CON(3) 114        D
22 0003D 2B0        CON(3) 178        E
23 00040 C12        CON(3) (TxTbEn)-(TxTbSt) F
24 00043 C12        CON(3) (TxTbEn)-(TxTbSt) G
25 00046 C12        CON(3) (TxTbEn)-(TxTbSt) H
26 00049 EC0        CON(3) 206        I
27 0004C C12        CON(3) (TxTbEn)-(TxTbSt) J
28 0004F C12        CON(3) (TxTbEn)-(TxTbSt) K
29 00052 1F0        CON(3) 241        L
30 00055 C12        CON(3) (TxTbEn)-(TxTbSt) M
31 00058 C12        CON(3) (TxTbEn)-(TxTbSt) N
32 0005B A11        CON(3) 282        O
33 0005E 931        CON(3) 313        P
34 00061 C12        CON(3) (TxTbEn)-(TxTbSt) Q
35 00064 171        CON(3) 369        R
36 00067 3D1        CON(3) 467        S
37 0006A B02        CON(3) 523        T
38 0006D C12        CON(3) (TxTbEn)-(TxTbSt) U
39 00070 C12        CON(3) (TxTbEn)-(TxTbSt) V
40 00073 C12        CON(3) (TxTbEn)-(TxTbSt) W
41 00076 C12        CON(3) (TxTbEn)-(TxTbSt) X
42 00079 C12        CON(3) (TxTbEn)-(TxTbSt) Y
43 0007C C12        CON(3) (TxTbEn)-(TxTbSt) Z
44 0007F 0          NIBHEX 0          Speed table exists
45 00080 4610       CON(4) (TxTbSt)+1-(*) Offset to text table
46 00084 0000       REL(4) =PILMSG      Offset to message table
47 00088 0000       REL(5) =PILPOL      Offset to poll handler
           0
```

		STITLE Main Table	
48			
49	* Main Table		
50	0008D	=xromFF	
51		*	
52	0008D F00	CON(3) 15	01 BINAND (<int.exp> , <int.exp>
53	00090 0000	REL(5) =BINAND	
	0		
54	00095 F	NIBHEX F	
55		*	
56	00096 E10	CON(3) 30	02 BINCMP (<int.exp>)
57	00099 0000	REL(5) =BINCMP	
	0		
58	0009E F	NIBHEX F	
59		*	
60	0009F D20	CON(3) 45	03 BINEOR (<int.exp> , <int.exp>
61	000A2 0000	REL(5) =BINEOR	
	0		
62	000A7 F	NIBHEX F	
63		*	
64	000A8 C30	CON(3) 60	04 BINIOR (<int.exp> , <int.exp>
65	000AB 0000	REL(5) =BINIOR	
	0		
66	000B0 F	NIBHEX F	
67		*	
68	000B1 B40	CON(3) 75	05 BIT (<int.exp> , <bit positio
69	000B4 0000	REL(5) =BIT	
	0		
70	000B9 F	NIBHEX F	
71		*	
72	000BA 270	CON(3) 114	06 A=DEVADDR(<device spec>)(Retur
73	000BD 0000	REL(5) =FIND	
	0		
74	000C2 F	NIBHEX F	
75		*	
76	000C3 290	CON(3) 146	07 A\$=DEVID\$(<device spec>)
77	000C6 0000	REL(5) =DEVID	
	0		
78	000CB F	NIBHEX F	
79		*	
80	000CC 380	CON(3) 131	08 A=DEVAID(<device spec>)
81	000CF 0000	REL(5) =DEVYYP	
	0		
82	000D4 F	NIBHEX F	
83		*	
84	000D5 ED1	CON(3) 478	09 SPOLL (<device spec>)
85	000D8 0000	REL(5) =SPOLL	
	0		
86	000DD F	NIBHEX F	
87		*	
88	000DE 281	CON(3) 386	0A READINTR {read interrupt cause
89	000E1 0000	REL(5) =READIN	
	0		
90	000E6 F	NIBHEX F	
91		*	
92	000E7 171	CON(3) 369	0B READDDC {read last D.D. comman

93	000EA 0000	REL(5) =READDC	
	0		
94	000EF F	NIBHEX F	
95	*		
96	000F0 CF1	CON(3) 508	OC STATUS [(<loop #>)]
97	000F3 0000	REL(5) =STATUS	
	0		
98	000F8 F	NIBHEX F	
99	*		
100	000F9 EC0	CON(3) 206	OD INITIALIZE [<volume>]<dev spec
101	000FC 0000	REL(5) =INITXQ	
	0		
102	00101 D	NIBHEX D	
103	*		
104	00102 450	CON(3) 84	OE CLEAR LOOP[;<loop>] <device
105	00105 0000	REL(5) =CLEAR	
	0		
106	0010A D	NIBHEX D	
107	*		
108	0010B 000	CON(3) 0	OF ASSIGN IO
109	0010E 0000	REL(5) =ASGNIO	
	0		
110	00113 D	NIBHEX D	
111	*		
112	00114 A11	CON(3) 282	10 OFF IO
113	00117 0000	REL(5) =OFFIO	
	0		
114	0011C D	NIBHEX D	
115	*		
116	0011D 2C1	CON(3) 450	11 RESTORE IO
117	00120 0000	REL(5) =RESTIO	
	0		
118	00125 D	NIBHEX D	
119	*		
120	00126 1F0	CON(3) 241	12 LIST IO
121	00129 0000	REL(5) =LISTIO	
	0		
122	0012E D	NIBHEX D	
123	*		
124	0012F A21	CON(3) 298	13 OUTPUT <dev spec> [USING] <lis
125	00132 0000	REL(5) =OUTPUT	
	0		
126	00137 D	NIBHEX D	
127	*		
128	00138 1C0	CON(3) 193	14 ENTER <dev spec> [USING] <list
129	0013B 0000	REL(5) =ENTER	
	0		
130	00140 D	NIBHEX D	
131	*		
132	00141 321	CON(3) 291	15 ON INTR GOSUB/GOTO <line #> <l
133	00144 0000	REL(5) =ONINTx	
	0		
134	00149 C	NIBHEX C	
135	*		
136	0014A 3D1	CON(3) 467	16 SEND [;<loop>] {<Frame>}+

137	0014D	0000	REL(5) =SEND		
		0			
138	00152	D	NIBHEX D		
139				*	
140	00153	5B1	CON(3) 437	17	RESET HPIL
141	00156	0000	REL(5) =RESET		
		0			
142	0015B	D	NIBHEX D		
143				*	
144	0015C	061	CON(3) 352	18	PRINTER IS code
145	0015F	0000	REL(5) =PRNTIS		
		0			
146	00164	D	NIBHEX D		
147				*	
148	00165	1A0	CON(3) 161	19	DISPLAY IS code
149	00168	0000	REL(5) =DISPIS		
		0			
150	0016D	D	NIBHEX D		
151				*	
152	0016E	A41	CON(3) 330	1A	PACK <Device specifier> code
153	00171	0000	REL(5) =PACK		
		0			
154	00176	D	NIBHEX D		
155				*	
156	00177	931	CON(3) 313	1B	PACKDIR <Device specifier> cod
157	0017A	0000	REL(5) =PACKD		
		0			
158	0017F	D	NIBHEX D		
159				*	
160	00180	4A1	CON(3) 420	1C	REQUEST [<loop #>;]<num str ex
161	00183	0000	REL(5) =REQST		
		0			
162	00188	D	NIBHEX D		
163				*	
164	00189	CF0	CON(3) 252	1D	LOCAL [<dev.spec loop #>],[<de
165	0018C	0000	REL(5) =LOCAL		
		0			
166	00191	D	NIBHEX D		
167				*	
168	00192	591	CON(3) 405	1E	REMOTE [<dev.spec>..] [LOOP
169	00195	0000	REL(5) =REMOTE		
		0			
170	0019A	D	NIBHEX D		
171				*	
172	0019B	B02	CON(3) 523	1F	TRIGGER [<dev.spec>..] [LOO
173	0019E	0000	REL(5) =TRIGER		
		0			
174	001A3	D	NIBHEX D		
175				*	
176	001A4	551	CON(3) 341	20	PASS CONTROL <dev. spec> L00
177	001A7	0000	REL(5) =PASS		
		0			
178	001AC	D	NIBHEX D		
179				*	
180	001AD	2B0	CON(3) 178	21	ENABLE INTR <interrupt mask by

181	001B0	0000		REL(5) =ENABLE	
		0			
182	001B5	D		NIBHEX D	
183			*		
184	001B6	BE1		CON(3) 491	22
185	001B9	0000		REL(5) =STANBY	STANDBY [ON OFF] or value
		0			
186	001BE	D		NIBHEX D	
187			*		
188			=tCNTRL	EQU #23	
189	001BF	160		CON(3) 97	23
190	001C2	0000		REL(5) =CONTRL	CONTROL ON/OFF
		0			
191	001C7	D		NIBHEX D	
192			*		
193			=tIO	EQU #24	
194	001C8	AE0		CON(3) 234	24
195	001CB	0000		NIBHEX 00000	(See OFF, ASSIGN, and RESTORE)
		0			
196	001D0	0		NIBHEX 0	
197			*		
198			=tLOCK0	EQU #25	
199	001D1	901		CON(3) 265	25
200	001D4	0000		NIBHEX 00000	(See LOCAL)
		0			
201	001D9	0		NIBHEX 0	
202			*		
203			=tINTRR	EQU #26	
204	001DA	FD0		CON(3) 223	26
205	001DD	0000		NIBHEX 00000	(See ON/OFF)
		0			
206	001E2	0		NIBHEX 0	

		STITLE Text Table	
207			
208	* Text Table		
209	001E3 TxTbSt		Text table start
210	*		
211	001E3 B	NIBHEX B	ASSIGN IO
212	001E4 1435 3594 74E4	NIBASC \ASSIGN\	
213	001F0 F0	NIBHEX FO	
214	*		
215	001F2 B	NIBHEX B	BINAND (<int.exp> ,
216	001F3 2494 E414 E444	NIBASC \BINAND\	
217	001FF 10	NIBHEX 10	
218	*		
219	00201 B	NIBHEX B	BINCM (<int.exp>)
220	00202 2494 E434 D405	NIBASC \BINCM\	
221	0020E 20	NIBHEX 20	
222	*		
223	00210 B	NIBHEX B	BINEOR (<int.exp> ,
224	00211 2494 E454 F425	NIBASC \BINEOR\	
225	0021D 30	NIBHEX 30	
226	*		
227	0021F B	NIBHEX B	BINIOR (<int.exp> ,
228	00220 2494 E494 F425	NIBASC \BINIOR\	
229	0022C 40	NIBHEX 40	
230	*		
231	0022E 5	NIBHEX 5	BIT (<int.exp> , <b
232	0022F 2494 45	NIBASC \BIT\	
233	00235 50	NIBHEX 50	
234	*		
235	00237 9	NIBHEX 9	CLEAR LOOP[;<loop>]
236	00238 34C4 5414 25	NIBASC \CLEAR\	
237	00242 E0	NIBHEX E0	
238	*		
239	00244 D	NIBHEX D	CONTROL ON OFF
240	00245 34F4 E445 25F4 C4	NIBASC \CONTROL\	
241	00253 32	NIBHEX 32	
242	*		
243	00255 D	NIBHEX D	A=DEVADDR(<device sp
244	00256 4454 6514	NIBASC \DEVADDR\	

	4444		
	25		
245	00264	60	NIBHEX 60
246		*	
247	00266	B	NIBHEX B
248	00267	4454	NIBASC \DEVAID\
		6514	
		9444	
249	00273	80	NIBHEX 80
250		*	
251	00275	B	NIBHEX B
252	00276	4454	NIBASC \DEVID\$\
		6594	
		4442	
253	00282	70	NIBHEX 70
254		*	
255	00284	D	NIBHEX D
256	00285	4494	NIBASC \DISPLAY\
		3505	
		C414	
		95	
257	00293	91	NIBHEX 91
258		*	
259	00295	B	NIBHEX B
260	00296	54E4	NIBASC \ENABLE\
		1424	
		C454	
261	002A2	12	NIBHEX 12
262		*	
263	002A4	9	NIBHEX 9
264	002A5	54E4	NIBASC \ENTER\
		4554	
		25	
265	002AF	41	NIBHEX 41
266		*	
267	002B1	D	NIBHEX D
268	002B2	94E4	NIBASC \INITIAL\
		9445	
		9414	
		C4	
269	002C0	D0	NIBHEX D0
270		*	
271	002C2	7	NIBHEX 7
272	002C3	94E4	NIBASC \INTR\
		4525	
273	002CB	62	NIBHEX 62
274		*	
275	002CD	3	NIBHEX 3
276	002CE	94F4	NIBASC \IO\
277	002D2	42	NIBHEX 42
278		*	
279	002D4	7	NIBHEX 7
280	002D5	C494	NIBASC \LIST\
		3545	
281	002DD	21	NIBHEX 21

282	*		
283	002DF	9	NIBHEX 9 LOCAL [<dev.spec loo
284	002E0	C4F4	NIBASC \LOCAL\
		3414	
		C4	
285	002EA	D1	NIBHEX D1
286	*		
287	002EC	D	NIBHEX D (See LOCAL)
288	002ED	C4F4	NIBASC \LOCKOUT\
		34B4	
		F455	
		45	
289	002FB	52	NIBHEX 52
290	*		
291	002FD	5	NIBHEX 5 OFF IO
292	002FE	F464	NIBASC \OFF\
		64	
293	00304	01	NIBHEX 01
294	*		
295	00306	3	NIBHEX 3 ON INTR GOSUB/GOTO <
296	00307	F4E4	NIBASC \ON\
297	0030B	51	NIBHEX 51
298	*		
299	0030D	B	NIBHEX B OUTPUT <dev spec> [U
300	0030E	F455	NIBASC \OUTPUT\
		4505	
		5545	
301	0031A	31	NIBHEX 31
302	*		
303	0031C	D	NIBHEX D PACKDIR <Device spec
304	0031D	0514	NIBASC \PACKDIR\
		34B4	
		4494	
		25	
305	0032B	B1	NIBHEX B1
306	*		
307	0032D	7	NIBHEX 7 PACK <Device specifi
308	0032E	0514	NIBASC \PACK\
		34B4	
309	00336	A1	NIBHEX A1
310	*		
311	00338	7	NIBHEX 7 PASS CONTROL <dev. s
312	00339	0514	NIBASC \PASS\
		3535	
313	00341	02	NIBHEX 02
314	*		
315	00343	D	NIBHEX D PRINTER IS code
316	00344	0525	NIBASC \PRINTER\
		94E4	
		4554	
		25	
317	00352	81	NIBHEX 81
318	*		
319	00354	D	NIBHEX D READDCC {read last D
320	00355	2554	NIBASC \READDCC\

	1444			
	4444			
	34			
321	00363	BO	NIBHEX BO	
322		*		
323	00365	F	NIBHEX F	READINTR {read inter
324	00366	2554	NIBASC \READINTR\	
	1444			
	94E4			
	4525			
325	00376	AO	NIBHEX AO	
326		*		
327	00378	B	NIBHEX B	REMOTE [<dev.spec>..
328	00379	2554	NIBASC \REMOTE\	
	D4F4			
	4554			
329	00385	E1	NIBHEX E1	
330		*		
331	00387	D	NIBHEX D	REQUEST [<loop #>]<
332	00388	2554	NIBASC \REQUEST\	
	1555			
	5435			
	45			
333	00396	C1	NIBHEX C1	
334		*		
335	00398	9	NIBHEX 9	RESET HPIL
336	00399	2554	NIBASC \RESET\	
	3554			
	45			
337	003A3	71	NIBHEX 71	
338		*		
339	003A5	D	NIBHEX D	RESTORE IO
340	003A6	2554	NIBASC \RESTORE\	
	3545			
	F425			
	54			
341	003B4	11	NIBHEX 11	
342		*		
343	003B6	7	NIBHEX 7	SEND [<loop>] [<Fra
344	003B7	3554	NIBASC \SEND\	
	E444			
345	003BF	61	NIBHEX 61	
346		*		
347	003C1	9	NIBHEX 9	SPOLL (<device spec
348	003C2	3505	NIBASC \SPOLL\	
	F4C4			
	C4			
349	003CC	90	NIBHEX 90	
350		*		
351	003CE	D	NIBHEX D	STANDBY [ON OFF] o
352	003CF	3545	NIBASC \STANDBY\	
	14E4			
	4424			
	95			
353	003DD	22	NIBHEX 22	

```
354          *  
355 003DF B      NIBHEX B      STATUS [( <loop #> )  
356 003E0 3545  NIBASC \STATUS\  
          1445  
          5535  
357 003EC C0    NIBHEX C0  
358          *  
359 003EE D      NIBHEX D      TRIGGER [<dev.spec>.  
360 003EF 4525  NIBASC \TRIGGER\  
          9474  
          7454  
          25  
361 003FD F1    NIBHEX F1  
362 003FF 1FF  TxTbEn NIBHEX 1FF  Text termination  
363 00402      END
```

ASGNIO	Ext	-	109							
BINAND	Ext	-	53							
BINCMP	Ext	-	57							
BINEOR	Ext	-	61							
BINIOR	Ext	-	65							
BIT	Ext	-	69							
CLEAR	Ext	-	105							
CONTRL	Ext	-	190							
ChainE	Ext	-	9							
DEVID	Ext	-	77							
DEVTYP	Ext	-	81							
DISPIS	Ext	-	149							
ENABLE	Ext	-	181							
ENTER	Ext	-	129							
FIND	Ext	-	73							
INITXQ	Ext	-	101							
LISTIO	Ext	-	121							
LOCAL	Ext	-	165							
OFFIO	Ext	-	113							
ONINTx	Ext	-	133							
OUTPUT	Ext	-	125							
PACK	Ext	-	153							
PACKD	Ext	-	157							
PASS	Ext	-	177							
PILMSG	Ext	-	46							
PILPOL	Ext	-	47							
PRNTIS	Ext	-	145							
READDC	Ext	-	93							
READIN	Ext	-	89							
REMOTE	Ext	-	169							
REQST	Ext	-	161							
RESET	Ext	-	141							
RESTIO	Ext	-	117							
SEND	Ext	-	137							
SROLL	Ext	-	85							
STANBY	Ext	-	185							
STATUS	Ext	-	97							
TRIGER	Ext	-	173							
TxBtEn	Rel	1023 #003FF	- 362	23	24	25	27	28	30	31
			34	38	39	40	41	42	43	
TxBtSt	Rel	483 #001E3	- 209	23	24	25	27	28	30	31
			34	38	39	40	41	42	43	45
FLEX	Ext	-	5							
=tCNTRL	Abs	35 #00023	- 188							
=tINTRR	Abs	38 #00026	- 203							
=tIO	Abs	36 #00024	- 193							
=tLOCKO	Abs	37 #00025	- 198							
=xronFF	Rel	141 #0008D	- 50							

Input Parameters

Source file name is NZ&TBL::MS

Listing file name is NZ/TBL:TI:ML

Object file name is NZ%TBL:TI:MS

Initial flag settings are 111111
 0123456789012345

Errors

None

Saturn Assembler News

```

1      *
2      *      N  N  ZZZZZ  &      EEEEE  RRRR  RRRR
3      *      N  N      Z  & &    E      R  R  R  R
4      *      NN N      Z  & &    E      R  R  R  R
5      *      N N N      Z  &      EEEEE  RRRR  RRRR
6      *      N  NN  Z      & & &  E      R  R  R  R
7      *      N  N  Z      & &    E      R  R  R  R
8      *      N  N  ZZZZZ  && &  EEEEE  R  R  R  R
9      *
10     *
11     * Date of last update <830929.1738>
12     *
13     * HPIL uses error numbers in the range 0-63 (0-3F Hex)
14     * (Error numbers between 64 and (end) are building blocks)
15     *
16 00000 10      CON(2)  1      Min message #
17 00002 34      CON(2)  67      Max message #
18     *
19     =eHPIL EQU  00      (TITLE for my errors)
20 00004 01      CON(2)  16
21 00006 00      CON(2)  00      Message number 00
22 00008 4       CON(1)  4
23 00009 8405    NIBASC \HPIL \
      94C4
      02
24 00013 C       CON(1)  12
25     *
26     * Errors 1-15 are parse errors
27     *
28     *
29     =eNDASN EQU  01      ASSIGN IO Needed
30 00014 51      CON(2)  21
31 00016 10      CON(2)  01      Message number 01
32 00018 5       CON(1)  5
33 00019 1435    NIBASC \ASSIGN\
      3594
      74E4
34 00025 D       CON(1)  13
35 00026 34      CON(2)  =eION
36 00028 C       CON(1)  12
37     *
38     =eXCESS EQU  03      Excess chars
39 00029 80      CON(2)  8
40 0002B 30      CON(2)  03      Message number 03
41 0002D E       CON(1)  14
42 0002E 00      CON(2)  =eEXCHR
43 00030 C       CON(1)  12
44     *
45     =eMSPAr EQU  04      Missing parameter(s)
46 00031 80      CON(2)  8
47 00033 40      CON(2)  04      Message number 04
48 00035 E       CON(1)  14
49 00036 00      CON(2)  =eMSPAR
50 00038 C       CON(1)  12
51     *

```

```
52      =eILPAR EQU    05      Illegal parameter(s)
53 00039 80      CON(2)  8
54 0003B 50      CON(2) 05      Message number 05
55 0003D E       CON(1) 14
56 0003E 00      CON(2) =eILPAR
57 00040 C       CON(1) 12
58      *
59      =eILEXp EQU    06      Illegal expression
60 00041 80      CON(2)  8
61 00043 60      CON(2) 06      Message number 06
62 00045 E       CON(1) 14
63 00046 00      CON(2) =eILEXP
64 00048 C       CON(1) 12
65      *
66      =eSYNTx EQU    07      Syntax Error
67 00049 80      CON(2)  8
68 0004B 70      CON(2) 07      Message number 07
69 0004D E       CON(1) 14
70 0004E 00      CON(2) =eSYNTAX
71 00050 C       CON(1) 12
72      *
73      * Errors 8-15 are reserved
74      *
75      * Errors 16-31 are tape errors
76      *
77      *
78      =efPROT EQU    16      File Protect
79 00051 80      CON(2)  8
80 00053 01      CON(2) 16      Message number 16
81 00055 E       CON(1) 14
82 00056 00      CON(2) =efPROT
83 00058 C       CON(1) 12
84      *
85      =eEOTAP EQU    17      End of medium
86 00059 71      CON(2) 23
87 0005B 11      CON(2) 17      Message number 17
88 0005D 6       CON(1)  6
89 0005E 54E6    NIBASC \End Of \
      4602
      F466
      02
90 0006C D       CON(1) 13
91 0006D 24      CON(2) =eMEDIA
92 0006F C       CON(1) 12
93      =eINVAL EQU    18      Invalid medium
94      *
95      =eSTALL EQU    18      Tape stall-Invalid medium
96 00070 B0      CON(2) 11
97 00072 21      CON(2) 18      Message number 18
98 00074 E       CON(1) 14
99 00075 00      CON(2) =eINVLd
100 00077 D      CON(1) 13
101 00078 24     CON(2) =eMEDIA
102 0007A C      CON(1) 12
103      *
```

104	=eNOLIF EQU	19	Not LIF-Invalid medium
105 0007B 80	CON(2)	8	
106 0007D 31	CON(2)	19	Message number 19
107 0007F D	CON(1)	13	
108 00080 21	CON(2)	=eINVAL	
109 00082 C	CON(1)	12	
110	*		
111	=eNOTAP EQU	20	No medium
112 00083 F0	CON(2)	15	
113 00085 41	CON(2)	20	Message number 20
114 00087 2	CON(1)	2	
115 00088 E4F6	NIBASC	\No \	
02			
116 0008E D	CON(1)	13	
117 0008F 24	CON(2)	=eMEDIA	
118 00091 C	CON(1)	12	
119	*		
120	=eNFILE EQU	22	File not found
121 00092 80	CON(2)	8	
122 00094 61	CON(2)	22	Message number 22
123 00096 E	CON(1)	14	
124 00097 00	CON(2)	=eFnFND	
125 00099 C	CON(1)	12	
126	*		
127	=eNEWTA EQU	23	New medium-Invalid medium
128 0009A 80	CON(2)	8	
129 0009C 71	CON(2)	23	Message number 23
130 0009E D	CON(1)	13	
131 0009F 21	CON(2)	=eINVAL	
132 000A1 C	CON(1)	12	
133	*		
134	=eBLANK EQU	24	No data -Invalid medium
135 000A2 80	CON(2)	8	
136 000A4 81	CON(2)	24	Message number 24
137 000A6 D	CON(1)	13	
138 000A7 21	CON(2)	=eINVAL	
139 000A9 C	CON(1)	12	
140	*		
141	=eRECRD EQU	25	Record #-Invalid medium
142 000AA 80	CON(2)	8	
143 000AC 91	CON(2)	25	Message number 25
144 000AE D	CON(1)	13	
145 000AF 21	CON(2)	=eINVAL	
146 000B1 C	CON(1)	12	
147	*		
148	=eCHSUM EQU	26	Checksum-Invalid medium
149 000B2 80	CON(2)	8	
150 000B4 A1	CON(2)	26	Message number 26
151 000B6 D	CON(1)	13	
152 000B7 21	CON(2)	=eINVAL	
153 000B9 C	CON(1)	12	
154	*		
155	=eTSIZE EQU	28	Size of file
156 000BA 91	CON(2)	25	
157 000BC C1	CON(2)	28	Message number 28

```

158 000BE 7          CON(1)  7
159 000BF 3596      NIBASC  \Size of \
          A756
          02F6
          6602
160 000CF E          CON(1)  14
161 000D0 00        CON(2)  =eFILE
162 000D2 C          CON(1)  12
163                *
164                =eEFILE EQU   30          File exists
165 000D3 80        CON(2)   8
166 000D5 E1        CON(2)  30          Message number 30
167 000D7 E          CON(1)  14
168 000D8 00        CON(2)  =eFEXST
169 000DA C          CON(1)  12
170                *
171                =eDIRFL EQU   31          Directory full
172 000DB 32        CON(2)  35
173 000DD F1        CON(2)  31          Message number 31
174 000DF B          CON(1)  11
175 000E0 D          CON(1)  13
176 000E1 4496      NIBASC  \Director\
          2756
          3647
          F627
177 000F1 9702      NIBASC  \y Full\
          6457
          C6C6
178 000FD C          CON(1)  12
179                *
180                * Errors 32-47 are HPIL Errors
181                *
182                =eNOFND EQU   32          Device not found
183                *
184                =eTERM  EQU   32          (Terminator match)
185 000FE 80        CON(2)   8
186 00100 02        CON(2)  32          Message number 32
187 00102 E          CON(1)  14
188 00103 00        CON(2)  =eDVCNF
189 00105 C          CON(1)  12
190                *
191                =eNORDY EQU   34          Device not ready
192 00106 B1        CON(2)  27
193 00108 22        CON(2)  34          Message number 34
194 0010A D          CON(1)  13
195 0010B 14        CON(2)  =eDEVIC
196 0010D 8          CON(1)   8
197 0010E E4F6      NIBASC  \Not Read\
          4702
          2556
          1646
198 0011E 97        NIBASC  \y\
199 00120 C          CON(1)  12
200                *
201                =eLTIMO EQU   35          Loop broken

```


202	00121	C1	CON(2)	28	
203	00123	32	CON(2)	35	Message number 35
204	00125	A	CON(1)	10	
205	00126	C4F6 F607 0224 27F6	NIBASC	\Loop Bro\ 	
206	00136	B656 E6	NIBASC	\ken\ 	
207	0013C	C	CON(1)	12	
208		*			
209		=eFLOST	EQU	36	Frame Error
210	0013D	31	CON(2)	19	
211	0013F	42	CON(2)	36	Message number 36
212	00141	D	CON(1)	13	
213	00142	04	CON(2)	=eFRAME	
214	00144	4	CON(1)	4	
215	00145	5427 27F6 27	NIBASC	\Error\ 	
216	0014F	C	CON(1)	12	
217		*			
218		=eOVRUN	EQU	37	Frame Overrun
219	00150	80	CON(2)	8	
220	00152	52	CON(2)	37	Message number 37
221	00154	D	CON(1)	13	
222	00155	42	CON(2)	=eFLOST	
223	00157	C	CON(1)	12	
224		*			
225		=eLPERR	EQU	38	Frame Changed
226	00158	80	CON(2)	8	
227	0015A	62	CON(2)	38	Message number 38
228	0015C	D	CON(1)	13	
229	0015D	42	CON(2)	=eFLOST	
230	0015F	C	CON(1)	12	
231		*			
232		=eUNEXP	EQU	39	Unexpected Frame
233	00160	F1	CON(2)	31	
234	00162	72	CON(2)	39	Message number 39
235	00164	A	CON(1)	10	
236	00165	55E6 5687 0756 3647	NIBASC	\Unexpect\ 	
237	00175	5646 02	NIBASC	\ed \ 	
238	0017B	D	CON(1)	13	
239	0017C	04	CON(2)	=eFRAME	
240	0017E	C	CON(1)	12	
241		*			
242		=eXXXXX	EQU	40	Frame Lost
243	0017F	80	CON(2)	8	
244	00181	82	CON(2)	40	Message number 40
245	00183	D	CON(1)	13	
246	00184	42	CON(2)	=eFLOST	

```

247 00186 C          CON(1) 12
248                *
249                =eBADMD EQU 41          Invalid Mode
250 00187 11        CON(2) 17
251 00189 92        CON(2) 41          Message number 41
252 0018B E         CON(1) 14
253 0018C 00        CON(2) =eINVLD
254 0018E 3         CON(1) 3
255 0018F D4F6     NIBASC \Mode\
      4656
256 00197 C          CON(1) 12
257                *
258                =eFRTOI EQU 42          Frame Timeout (SCI)
259 00198 80        CON(2) 8
260 0019A A2        CON(2) 42          Message number 42
261 0019C D         CON(1) 13
262 0019D 32        CON(2) =eLTIMO
263 0019F C          CON(1) 12
264                *
265                =eFRTOL EQU 43          Frame Timeout (Loop)
266 001A0 80        CON(2) 8
267 001A2 B2        CON(2) 43          Message number 43
268 001A4 D         CON(1) 13
269 001A5 32        CON(2) =eLTIMO
270 001A7 C          CON(1) 12
271                *
272                =eSYSer EQU 44          System Error (Bad cur addr)
273 001A8 80        CON(2) 8
274 001AA C2        CON(2) 44          Message number 44
275 001AC E         CON(1) 14
276 001AD 00        CON(2) =eMMCOR
277 001AF C          CON(1) 12
278                *
279                =eTESTF EQU 45          Selftest failed
280 001B0 72        CON(2) 39
281 001B2 D2        CON(2) 45          Message number 45
282 001B4 B         CON(1) 11
283 001B5 F         CON(1) 15
284 001B6 3556     NIBASC \Self-tes\
      C666
      D247
      5637
285 001C6 4702     NIBASC \t failed\
      6616
      96C6
      5646
286 001D6 C          CON(1) 12
287                *
288                =eDTYPE EQU 47          Device type
289 001D7 11        CON(2) 17
290 001D9 F2        CON(2) 47          Message number 47
291 001DB D         CON(1) 13
292 001DC 14        CON(2) =eDEVIC
293 001DE 3         CON(1) 3
294 001DF 4597     NIBASC \Type\

```

```

    0756
295 001E7 C          CON(1) 12
296                *
297                * Errors 48-50 are unused
298                *
299                *
300                * Error 51 is reserved
301                *
302                *
303                * =eABORT EQU 52          Aborted operation
304 001E8 41         CON(2) 20
305 001EA 43         CON(2) 52          Message number 52
306 001EC 6          CON(1) 6
307 001ED 1426      NIBASC \Aborted\
      F627
      4756
      46
308 001FB C          CON(1) 12
309                *
310                * =eDSPEC EQU 53          Invalid device spec
311 001FC 41         CON(2) 20
312 001FE 53         CON(2) 53          Message number 53
313 00200 E          CON(1) 14
314 00201 00        CON(2) =eINVLD
315 00203 D          CON(1) 13
316 00204 14        CON(2) =eDEVIC
317 00206 3          CON(1) 3
318 00207 3507      NIBASC \Spec\
      5636
319 0020F C          CON(1) 12
320                *
321                * =eNNUMR EQU 54          Not numeric
322 00210 80         CON(2) 8
323 00212 63         CON(2) 54          Message number 54
324 00214 E          CON(1) 14
325 00215 00        CON(2) =eDATTY
326 00217 C          CON(1) 12
327                *
328                * =eRANGE EQU 56          Invalid Arg
329 00218 80         CON(2) 8
330 0021A 83         CON(2) 56          Message number 56
331 0021C E          CON(1) 14
332 0021D 00        CON(2) =eIVARG
333 0021F C          CON(1) 12
334                *
335                * =eNMBX EQU 57          No loop
336 00220 41         CON(2) 20
337 00222 93         CON(2) 57          Message number 57
338 00224 6          CON(1) 6
339 00225 E4F6      NIBASC \No Loop\
      02C4
      F6F6
      07
340 00233 C          CON(1) 12
341                *

```

```

342          =eNORAM EQU    59          Insufficient memory
343 00234 80          CON(2)  8
344 00236 B3          CON(2)  59          Message number 59
345 00238 E           CON(1)  14
346 00239 00          CON(2) =eMEM
347 0023B C           CON(1)  12
348          *
349          =eOFFED EQU    60          RESTORE IO Needed
350 0023C 71          CON(2)  23
351 0023E C3          CON(2)  60          Message number 60
352 00240 6           CON(1)   6
353 00241 2554        NIBASC \RESTORE\
          3545
          F425
          54
354 0024F D           CON(1)  13
355 00250 34          CON(2) =eION
356 00252 C           CON(1)  12
357          *
358          * Errors 61-63 are reserved
359          *
360          * Error messages 64-end are building blocks
361          *
362          *
363          =eFRAME EQU    64          "Message" Building block
364 00253 61          CON(2)  22
365 00255 04          CON(2)  64          Message number 64
366 00257 7           CON(1)   7
367 00258 D456        NIBASC \Message \
          3737
          1676
          5602
368 00268 C           CON(1)  12
369          *
370          =eDEVIC EQU    65          "Device " building block
371 00269 41          CON(2)  20
372 0026B 14          CON(2)  65          Message number 65
373 0026D 6           CON(1)   6
374 0026E 4456        NIBASC \Device \
          6796
          3656
          02
375 0027C C           CON(1)  12
376          *
377          =eMEDIA EQU    66          "Medium" building block
378 0027D 21          CON(2)  18
379 0027F 24          CON(2)  66          Message number 66
380 00281 5           CON(1)   5
381 00282 D456        NIBASC \Medium\
          4696
          5706
382 0028E C           CON(1)  12
383          *
384          =eION EQU    67          " IO Needed" building block
385 0028F A1          CON(2)  26

```

386 00291 34	CON(2) 67	Message number 67
387 00293 9	CON(1) 9	
388 00294 0294	NIBASC \ IO Need\	
389 002A4 5646	NIBASC \ed\	
390 002A8 C	CON(1) 12	
391		
392 002A9 FF	NIBHEX FF	Table terminator
393 002AB	END	

=eABORT	Abs	52	#00034	-	303					
=eBADMD	Abs	41	#00029	-	249					
=eBLANK	Abs	24	#00018	-	134					
=eCHSUM	Abs	26	#0001A	-	148					
eDATTY	Ext			-	325					
=eDEVIC	Abs	65	#00041	-	370	195	292	316		
=eDIRFL	Abs	31	#0001F	-	171					
=eDSPEC	Abs	53	#00035	-	310					
=eDTYPE	Abs	47	#0002F	-	288					
eDVCNF	Ext			-	188					
=eEFIE	Abs	30	#0001E	-	164					
=eEOTAP	Abs	17	#00011	-	85					
eEXCHR	Ext			-	42					
eFEXST	Ext			-	168					
eFILE	Ext			-	161					
=eFLOST	Abs	36	#00024	-	209	222	229	246		
eFPROT	Ext			-	82					
=eFRAME	Abs	64	#00040	-	363	213	239			
=eFRTOI	Abs	42	#0002A	-	258					
=eFRTOI	Abs	43	#0002B	-	265					
eFnFND	Ext			-	124					
=eHPIL	Abs	0	#00000	-	19					
eILEXP	Ext			-	63					
=eILEXp	Abs	6	#00006	-	59					
eILPAR	Ext			-	56					
=eILPAR	Abs	5	#00005	-	52					
=eINVAL	Abs	18	#00012	-	93	108	131	138	145	152
eINVLD	Ext			-	99	253	314			
=eION	Abs	67	#00043	-	384	35	355			
eIVARG	Ext			-	332					
=eLPERR	Abs	38	#00026	-	225					
=eLTIMO	Abs	35	#00023	-	201	262	269			
=eMEDIA	Abs	66	#00042	-	377	91	101	117		
eMEM	Ext			-	346					
eMMCOR	Ext			-	276					
eNSPAR	Ext			-	49					
=eNSPAR	Abs	4	#00004	-	45					
=eNEWTA	Abs	23	#00017	-	127					
=eNFILE	Abs	22	#00016	-	120					
=eNMBOX	Abs	57	#00039	-	335					
=eNNUMR	Abs	54	#00036	-	321					
=eNOASN	Abs	1	#00001	-	29					
=eNOFND	Abs	32	#00020	-	182					
=eNOLIF	Abs	19	#00013	-	104					
=eNORAM	Abs	59	#0003B	-	342					
=eNORDY	Abs	34	#00022	-	191					
=eNOTAP	Abs	20	#00014	-	111					
=eOFFED	Abs	60	#0003C	-	349					
=eOVRUN	Abs	37	#00025	-	218					
=eRANGE	Abs	56	#00038	-	328					
=eRECRD	Abs	25	#00019	-	141					
=eSTALL	Abs	18	#00012	-	95					
eSYNTAX	Ext			-	70					
=eSYNTx	Abs	7	#00007	-	66					
=eSYSer	Abs	44	#0002C	-	272					

=eTERM	Abs	32	#00020	-	184
=eTESTF	Abs	45	#0002D	-	279
=eTSIZE	Abs	28	#0001C	-	155
=eUNEXP	Abs	39	#00027	-	232
=eXCESS	Abs	3	#00003	-	38
=eXXXXX	Abs	40	#00028	-	242
=efPROT	Abs	16	#00010	-	78

Input Parameters

Source file name is NZ&ERR::MS

Listing file name is NZ/ERR:TI:ML::-1

Object file name is NZ&ERR:TI:MS::-1

Initial flag settings are
111111
0123456789012345

Errors

None

Saturn Assembler News


```

1      *
2      *      N  N  ZZZZ  &      DDDD  III  RRRR
3      *      N  N      Z  & &      D  D  I  R  R
4      *      NN N      Z  & &      D  D  I  R  R
5      *      N N N      Z      &      D  D  I  RRRR
6      *      N NN  Z      & & &  D  D  I  R R
7      *      N  N  Z      & &      D  D  I  R  R
8      *      N  N  ZZZZ  && &  DDDD  III  R  R
9      *
10     *

```

```

11             TITLE  DIRECTORY SECTION <840106.1804>
12 F06B5      ABS      #F06B5      TIXHP6 address (fixed)
13     ****
14     ****
15     **
16     ** Name:      PILPOL - Poll handler for HPIL ROM (calls others)
17     **
18     ** Category:  PILUTL
19     **
20     ** Purpose:
21     **      Handle the POLL entry (check if this is a poll I
22     **      respond to...if so, jump to the poll handler for that
23     **      specific poll
24     **
25     ** Entry:
26     **      B[A] is the poll number
27     **
28     ** Exit:
29     **      If not handled:
30     **      XM=1, carry clear
31     **      If handled successfully:
32     **      XM=0, carry clear
33     **      If error during handling:
34     **      Carry set
35     **
36     ** Calls:      None
37     **
38     ** Uses.....
39     **      Inclusive: B[A],C[A]
40     **
41     ** Stk lvls:  1 (internal GOSUB){Specific handlers may be more}
42     **
43     ** History:
44     **
45     **      Date      Programmer      Modification
46     **      -----      -
47     **      09/26/83      NZ      Added documentation
48     **
49     ****
50     ****
51 F06B5 20      =PILPOL P=      0
52 F06B7 D2      C=0      A
53 F06B9 31E1    LC(2) ((TEND)-(TSTART))/5  Number of table entries
54 F06BD 04      SETHEX      Just to be SURE
55 F06BF 8B5     ?B<C      A

```

```

56 F06C2 60          GOYES  POLCH1      Check if ROM entry point
57 F06C4 6E80       GOTO   POLCHR      ROM entry point
58                  *
59                  * Now compute the offset to the Poll handler
60                  *
61 F06C8 7690 POLCH1  GOSUB  POLCH2      Set RSTK=TSTART (to get address)
62                  *
63                  * This is the jump table
64                  *
65 F06CC           TSTART
66 F06CC 0000       REL(5) =hVER$      #00 VER$
        0
67 F06D1 0000       REL(5) =DEVSPp     #01 Device parse
        0
68 F06D6 0000       REL(5) =PILDC      #02 File decompile
        0
69 F06DB 4800       REL(5) =RTNSXM     #03 Device execute
        0
70 F06E0 0000       REL(5) =FILSPp     #04 File spec parse
        0
71 F06E5 0000       REL(5) =FILSPx     #05 File spec XEQ
        0
72 F06EA 0000       REL(5) =hCAT       #06 CAT
        0
73 F06EF 0000       REL(5) =hCAT$      #07 CAT$
        0
74 F06F4 0000       REL(5) =hCOPYx     #08 COPY execute
        0
75 F06F9 0000       REL(5) =hCREAT     #09 Create XEQ
        0
76 F06FE 0000       REL(5) =hDIDST     #0A Device ID store (HPIL)
        0
77 F0703 0000       REL(5) =hFPROT     #0B Private/Secure/Unsecure
        0
78 F0708 7800       REL(5) =RTNSXM     #0C LIST (File not in mainframe)
        0
79 F070D 2800       REL(5) =RTNSXM     #0D MERGE (File not in mainframe)
        0
80 F0712 0000       REL(5) =hPRCL      #0E Print class
        0
81 F0717 0000       REL(5) =PRTIS      #0F Print (part 1)
        0
82 F071C 0000       REL(5) =hPURGE     #10 PURGE
        0
83 F0721 0000       REL(5) =hRENAM     #11 ReNAME
        0
84 F0726 0000       REL(5) =hENTER     #12 Enter
        0
85 F072B 4600       REL(5) =RTNSXM     #13 HPIL poll 2
        0
86 F0730 F500       REL(5) =RTNSXM     #14 HPIL poll 3
        0
87 F0735 A500       REL(5) =RTNSXM     #15 HPIL poll 4
        0
88 F073A 5500       REL(5) =RTNSXM     #16 HPIL poll 5
  
```

```

      0
89 F073F 0000      REL(5) =hFINDF      #17 Find file
      0
90 F0744 0000      REL(5) =hRDCBF      #18 Read current record to file bufr
      0
91 F0749 0000      REL(5) =hRDNBF      #19 Write bufr out & read next recor
      0
92 F074E 0000      REL(5) =hWRCBF      #1A Write file bufr to current recor
      0
93 F0753 0000      REL(5) =hKYDF      #1B Build key defn
      0
94 F0758 7300      REL(5) =RTNSXM      #1C WTKY - waiting for key in KEYRD
      0
95 F075D 0000      REL(5) =ENTUSG      #1D IMAGE execution starts
      0
96          *
97          * End of polls handled by HPIL ROM
98          *
99 F0762      TEND
100         *
101         * REMAINING CODE FOR TABLE LOOKUP
102         *
103 F0762 07      POLCH2  C=RSTK
104 F0764 C9          C=B+C  A
105 F0766 C5          B=B+B  A
106 F0768 C5          B=B+B  A      B*4
107 F076A C9          C=B+C  A      C[A] is now address of jump address
108         *
109 F076C D5          B=C    A      Save address in B[A] for offset
110 F076E 137        CD1EX      D1 @ address, D1 value in C[A]
111 F0771 06          RSTK=C      Push D1 value (to allow restore)
112 F0773 147        C=DAT1  A      Read offset to actual address
113 F0776 C1          B=C+B  A      B[A] is address of specific handler
114 F0778 07          C=RSTK      Restore D1 from RSTK...
115 F077A 135        D1=C      ...to D1
116 F077D D9          C=B    A      Copy address to C[A]...
117 F077F 06          RSTK=C      ...Push address onto stack...
118 F0781 03          RTNCC      ...and jump to the routine
119         *
120         *
121         *
122         * Check for system polls (#F0 through #FF)
123         *
124 F0783 BED      POLCHR  B=-B-1 B      Ones complement of poll # in B[A]
125 F0786 3190      LC(2)  ((TEND2)-(TSTAR2))/5  Load # of ROM entries
126 F078A 8B5          ?B<C  A      In the range HPIL knows?
127 F078D 40          GOYES  POLCH3      Yes...compute specific handler addr
128 F078F 00      RTNSXM  RTNSXM      No...return, carry clear, XM=1
129         *
130         *
131 F0791 7DCF      POLCH3  GOSUB  POLCH2      Same driver, given the table addr
132         *
133         * This is the table for system polls
134         *
135 F0795      TSTAR2

```

```
136 F0795 0000      REL(5) =PILCST      #FF CLDST Cold start address
      0
137 F079A 0000      REL(5) =PILWNK      #FE DSWNK Deep sleep wakeup-no key
      0
138 F079F 0000      REL(5) =PILWKP      #FD DSWKY Deep sleep wakeup
      0
139 F07A4 0000      REL(5) =PILPOF      #FC PWROF Power off
      0
140 F07A9 0000      REL(5) =PILCNF      #FB CONFG Configuration
      0
141 F07AE 0000      REL(5) =PILMLP      #FA MNLP Main loop
      0
142 F07B3 0000      REL(5) =PILSRQ      #F9 SREQ Service request
      0
143 F07B8 0000      REL(5) =hEXCPT      #F8 Excpt Exception check after strt
      0
144 F07BD 0000      REL(5) =hZERPG      #F7 ZERPG The Math stack is collapse
      0
145          *
146          * End of polls handled by HPIL ROM
147          *
148 F07C2      TEND2
149 F07C2          END
```


Input Parameters

Source file name is NZ&DIR::MS

Listing file name is NZ/DIR:TI:ML::-1

Object file name is NZ&DIR:TI:MS::-1

111111
0123456789012345

Initial flag settings are

Errors

None

Saturn Assembler News

```
1      *
2      *
3      *      N  N  ZZZZZ  &      GGG  PPPP  RRRR
4      *      N  N      Z  &&    G  G  P  P  R  R
5      *      NN N      Z  &&    G      P  P  R  R
6      *      N N N      Z  &      G GGG  PPPP  RRRR
7      *      N NN  Z      && &  G  G  P      R R
8      *      N  N  Z      & &    G  G  P      R R
9      *      N  N  ZZZZZ  && &    GGG  P      R  R
```

```
10     *
11     *
```

```
12     TITLE GENERAL ROUTINES <840106.1701>
13 F07C2  ABS #F07C2 TIXHP6 address (fixed)
```

```
14     *****
15     *****
```

```
16     **
17     ** Name:      FRAME+ - Evaluate an HPIL message, return type
18     ** Name:      FRAME- - Evaluate a message, return type (not 3dat
```

```
19     **
20     ** Category:  PILUTL
```

```
21     **
22     ** Purpose:
23     **   Parses a frame
```

```
24     **
25     ** Entry:
26     **   C[6:0] contains the input frame from GET
27     **   ST[3:0] contains the HPIL handshake nibble
28     **
29     **   FRAME+: C[S] is the status nibble from DIAMOND
```

```
30     **
31     ** Exit:
32     **   Frame type in P:                                MNEMONIC:
33     **       0: ACKNOWLEDGE                               (pACK )
34     **       1: CURRENT PIL STATE                         (pSTATE)
35     **       2: DIAGNOSTIC (TEST RESULTS)                 (pDIAGR)
36     **       3: DIAGNOSTIC (LOCATION CONTENTS)              (pDIAGL)
37     **       4: ADDRESS                                    (pADDR )
38     **       5: IFC RECEIVED (NOT SYS CONTROLLER)         (pIFC )
39     **       6: ETO RECEIVED                               (pEOT )
40     **       7: CONVERSATION HALTED (COUNT, NOT L)      (pHALTD)
41     **       8: TERMINATOR MATCH                          (pTERM )
42     **       9: ETE RECEIVED                              (pETE )
43     **      10: UNRECOGNIZED TYPE                          (pUTYPE)
44     **      11: DATA/END FRAME                            (pDATA )
45     **      12: COMMAND RECEIVED                          (pCMD )
46     **      13: READY FRAME                                (pRDY )
47     **      14: IDY FRAME                                  (pIDY )
48     **      15: THREE BYTE DATA TRANSFER                (p3DATA)
```

```
49     **   If illegal frame or error, sets carry; else clears it
```

```
50     **
51     ** Calls:      None
```

```
52     **
53     ** Uses.....
54     ** Inclusive: C[S],P (C[S] only for FRAME+)
```

```
55     **
```

```

56      ** Stk lvls:  0
57      **
58      ** History:
59      **
60      **      Date      Programmer      Modification
61      **      -----      -
62      **      09/22/83      NZ          Updated documentation again
63      **      01/03/83      NZ          Updated documentation
64      **
65      ****
66      ****
67 F07C2 A46 =FRAME+ C=C+C S          If carry, 3 byte data transfer
68 F07C5 80FF          CPEX  15
69 F07C9 560          GONC  FRAME0      No carry...not 3 byte data
70      *
71      * Three byte data transfer!
72      *
73 F07CC 20          P=      =p3DATA
74 F07CE 03          RTNCC
75      *-
76      *-
77 F07D0          =FRAME-
78 F07D0 0B          FRAME0 CSTEMX      Put the frame into status bits
79 F07D2 86B          ?ST=0 11      Is the MSB clear?
80 F07D5 41          GOYES  FROXXX      Yes!
81      *
82      * (1XXX XXXX XXXX) is data class
83      *
84      * (10XX XXXX XXXX) is DATA or END
85      * (1100 XXXX XXXX) is COMMAND received
86      * (1101 XXXX XXXX) is READY received
87      * (111X XXXX XXXX) is IDY received
88      *
89 F07D7 86A          FR1XXX ?ST=0 10      Is bit 10 clear?
90 F07DA 20          GOYES  FR11XX      Yes...DATA or END
91      *
92      * Carry clear:
93      * (11XX XXXX XXXX) is COMMAND, READY, or IDY
94      * Carry set:
95      * (10XX XXXX XXXX) is DATA or END
96      *
97 F07DC 0B          FR11XX CSTEMX      Swap frame back into C[X]
98 F07DE 80D2          P=C      2          P is now the type!
99 F07E2 575          GONC  FREND      Go if COMMAND, READY, or IDY
100     *FR10XX
101     *
102     * (10XX XXXX XXXX) is DATA or END
103     *
104 F07E5 20          P=      =pDATA      Data/End
105 F07E7 03          RTNCC
106     *-
107     *-
108 F07E9          FROXXX
109     *
110     * (0XXX XXXX XXXX) is status, diagnostic, or address
  
```



```

111          *
112          * (0000 XXXX XXXX) is status message
113          * (0001 XXXX XXXX) is current state
114          * (001X XXXX XXXX) is diagnostic
115          * (01SS SSSP PPPP) is address
116          *
117 F07E9 86A      ?ST=0 10          Is it an address?
118 F07EC 80       GOYES FRO0XX      No!
119 F07EE 20       P=      =pADDR    Address
120 F07F0 0B      CSTEM
121 F07F2 03      RTNCC
122          *
123          *
124 F07F4          FRO0XX
125          *
126          * (00XX XXXX XXXX) is either status or diagnostic class
127          *
128          * (0000 XXXX XXXX) is status message
129          * (0001 XXXX XXXX) is current state
130          * (001X XXXX XXXX) is diagnostic
131          *
132 F07F4 0B      CSTEM
133 F07F6 80D2    P=C      2
134 F07FA 880     ?P#     0
135 F07FD D3      GOYES FREN0          Current state or diagnostic
136          *
137          * (0000 ZZZZ XXXX) is status message if Z=0, else error
138          *
139 F07FF 21      P=      1
140 F0801 90E     ?C#0    P
141 F0804 34      GOYES FRERR          Error!
142 F0806 0B      CSTEM
143 F0808 873     ?ST=1 3
144 F080B A3      GOYES FRERRS         Unrecognized frame!
145          *
146          * (0000 0000 0XXX) is a status message...
147          *
148 F080D 0B      CSTEM
149 F080F 80D0    P=C      0          Decode it!
150 F0813 890     ?P=     =pACK
151 F0816 42      GOYES FREN0          NOP (Acknowledge)
152 F0818 883     ?P#     3          Is it ETE?
153 F081B 60      GOYES FRO0-3        No...
154 F081D 20      P=      =pETE        Yes...report it!
155 F081F 03      RTNCC
156          *
157          *
158 F0821 882    FRO0-3 ?P#     2          Is it now an EOT?
159 F0824 60      GOYES FRO0-2        No...check further!
160 F0826 20      P=      =pEOT        Yes...
161 F0828 03      RTNCC
162          *
163          *
164 F082A 884    FRO0-2 ?P#     4          Conversation halted?
165 F082D 60      GOYES FRO0-1        No...check further

```

```

166 F082F 20          P=      =pHALTD
167 F0831 03          RTNCC
168                  *_
169                  *_
170 F0833 881  FROO-1 ?PH      1          IFC received?
171 F0836 60          GOYES  FROO-0      Check further
172 F0838 20          P=      =pIFC      Yes...set P to value!
173 F083A 03  FRENDD  RTNCC
174                  *_
175                  *_
176 F083C 885  FROO-0 ?PH      5          Terminator match?
177 F083F 80          GOYES  FRERR      No...error!
178 F0841 20          P=      =pTERM
179 F0843 03          RTNCC
180                  *_
181                  *_
182 F0845 0B  FRERRS  CSTEM          Status back in ST, frame in C[X]
183 F0847 20  FRERR   P=      =pUTYPE  This means unrecognized frame
184 F0849 02          RTNSC
185                  *****
186                  *****
187                  **
188                  ** Name:      END - Clean up the loop
189                  ** Name:      ENDST - Clean up the loop, exit through NXTSTM
190                  ** Name:      ENDFN - Clean up the loop, preserve C[W] in RO
191                  ** Name:      UTLEND - Unaddress talkers&listeners, clean up
192                  **
193                  ** Category:  PILUTL
194                  **
195                  ** Purpose:
196                  **      Clean up after accessing a loop
197                  **
198                  ** Entry:
199                  **      MBOX^ points to the mailbox used by this routine
200                  **
201                  ** Exit:
202                  **      Carry clear:
203                  **      DO at last mailbox used before call
204                  **      ENDST: Jumps to NXTSTM
205                  **      ENDFN: Restores value of C[W] (saved at entry)
206                  **      UTLEND: First unaddress talkers/listeners, then END
207                  **      Carry set:
208                  **      Error (P, C[0] are error code)
209                  **
210                  ** Calls:  END:GETMBX
211                  **      ENDST:END
212                  **      UTLEND:UNT,UNLPUT
213                  **      ENDFN:UTLEND
214                  **
215                  ** Uses.....
216                  **      Inclusive: C[W],DO,P,ST[3:0]
217                  **
218                  ** Stk lvls:  END: 0 <GETMBX>
219                  ** Stk lvls:  ENDST: 1 (END)
220                  ** Stk lvls:  UTLEND: 1 (UNT)(UNLPUT)<END>

```

```
221      ** Stk lvs:   ENDFN: 2 (UTLEND)
222      **
223      ** History:
224      **
225      **      Date      Programmer      Modification
226      **      -----      -
227      **      09/22/83      NZ      Updated documentation again
228      **      01/03/83      NZ      Updated documentation
229      **
230      *****
231      *****
232 F084B 7820 =ENDST  GOSUB  END
233 F084F 8C00      GOLONG =nXTSTM      Next basic statement!
      00
234      * _
235      * _
236 F0855 108 =ENDFN  RO=C      Save value of C in R0!
237 F0858 7500      GOSUB  UTLEND
238 F085C 118      C=R0
239 F085F 01      RTN      (Preserve carry!)
240      * _
241      * _
242 F0861 7210 =UTLEND GOSUB  Getmbx      Get the mailbox address
243 F0865 8E00      GOSUBL =UNT      Unaddress talkers
      00
244 F086B 400      RTNC
245 F086E 7E84      GOSUB  UNLPUT      Unaddress listeners
246 F0872 821      XM=0      Clear XM flag (for statements)
247 F0875 01      RTN
248      * _
249      * _
250 F0877      =END
251 F0877 8C00 Getmbx  GOLONG =GETMBX      Return, DO @ mailbox
      00
252      *****
253      *****
254      **
255      ** Name:      START - Set up entry conditions for the loop
256      ** Name:      START+ - Set up loop information (loop # in C[S])
257      ** Name:      START- - Set up loop (loop # in C[S], sReadd=1)
258      **
259      ** Category:  PILUTL
260      **
261      ** Purpose:
262      **      Set up the loop, given the device specifier
263      **
264      ** Entry:
265      **      D[3:0] contains the device address (if known).
266      **      If the address is not known, D[B]=#1F/3F/5F/7F/9F
267      **      #1F: (DevTyp) B[X] is the accessory ID
268      **      #3F: (DevID) B[W] is the device ID
269      **      #5F: (VolLbl) B[W] is the volume label
270      **      #7F: (Null) B[W] is "don't care"
271      **      #9F: (Loop) B[W] is "don't care"
272      **      D[2] is the sequence number for #1F and #3F
```

```

273      **      If D[X] is an address, bits 8 and 9 are the mailbox #
274      **      If D[X] is not an address, D[3] is the mailbox #
275      **
276      ** Exit:
277      **      Carry clear:
278      **          Device address in D[X] (+mailbox*1024)
279      **          D[S] is 0 if address given, 1 if device type,
280      **          2 if device ID, 3 if volume label, 4 if NULL,
281      **          5 if LOOP
282      **          Sets DO to the HPIL mailbox
283      **          ST(sReadd) set if loop was readdressed, else clear
284      **      Carry set:
285      **          Error (P, C[0] are error code)
286      **
287      ** Calls:      SETLP,FNDCH-,GETDev,PUTGF-,PUTE,GETERR,GETST,
288      **              SFLAG?,RESTRT,GETMBX,SWAPO1,I/OFND
289      **
290      ** Uses.....
291      ** Exclusive:  C[W],D[15 ],      DO,P,ST[4 ]
292      ** Inclusive: A[W],C[W],D[15:13],D[5:0],DO,P,ST[4:0]
293      **
294      ** Stk lvls:  3 (RESTRT)(FNDCH-)<GADDR>
295      **
296      ** Algorithm:
297      **      START: Derive loop # from D[X] (into C[S])      (SETLP)
298      **      START+:Set flag (sReadd) to not force readdressing
299      **      START-:Find mailbox, check for reset, OFFED (FNDCH-)
300      **          Check if controller...if so, goto STARTn
301      **          Check if NULL, LOOP, or zero (if not, error)
302      **          goto START3
303      **          ----
304      **      (Controller)
305      **      STARTn:
306      **          If force readdressing (sReadd=1)
307      **          then send IFC to power up the loop
308      **          else send power up the loop message (NOP frame)
309      **      STARTS:Check if error powering up the loop      (GETERR)
310      **      START!:Get Diamond status bits
311      **          If sReadd=1 then goto START2
312      **          If loop is unconfigured (sUNCNF)
313      **          then
314      **              If (supress readdress)=1 then goto START2
315      **              Set all internal addresses=unknown (RESTRT)
316      **              Set DO to mailbox address      (GETMBX)
317      **          goto START3
318      **          ----
319      **      (Readdressing the loop)
320      **      START2:
321      **          Set all internal addresses=unknown      (RESTRT)
322      **          If (extended address flag=0) or
323      **          (an ASSIGNIO is active)
324      **          then readdress the loop, primary only
325      **          else readdress the loop, extended addresses
326      **          Send readdress message, get result      (PUTGF-)
327      **          If address not returned by Diamond then error

```

```

328      **      (Check the device specifier)
329      **      START3:If not (find device)
330      **              then return (all OK)
331      **              else goto GADDR (Get device address)
332      **
333      ** History:
334      **
335      **      Date      Programmer      Modification
336      **      -----      -
337      **      09/22/83      NZ      Updated documentation
338      **      08/02/83      NZ      Added check of =fLNZ4 to check if
339      **              readdress the loop automatically
340      **      06/03/83      NZ      Removed setting of IDY timeout
341      **              (now done in CHKSET)
342      **      05/04/83      NZ      Removed redundant code to set the
343      **              device bit in LOOPST
344      **      03/29/83      NZ      Added check of =fLEXTD to decide
345      **              whether to use extended addresses
346      **      03/15/83      NZ      Changed FNDMB-, CHKSTS to FNDCH-
347      **      03/09/83      NZ      Changed code to call CHKSTS
348      **      03/08/83      NZ      Changed call to FNDMBX to FNDMB-
349      **      01/03/83      NZ      Updated documentation
350      **
351      ****
352      ****
353 F087D      =START
354      *
355      * First set C[S] to be the mailbox #, minus 1
356      *
357 F087D 8E00      GOSUBL =SETLP      Set loop # into C[S] from D[A]
          00
358      *
359 F0883 840      =START+ ST=0      =sReadd      START does NOT force readdress!
360      *
361      * Set DispOK bit false (Display is NOT set up on loop)
362      *
363 F0886      =START-
364      *
365      * Get the mailbox address (search the device table for it)
366      * (also clears DispOK and other bits in that nibble)
367      *
368 F0886 7683      GOSUB FNDCH-      Do all the above, FNDMBX,CHKSTS
369 F088A 400      RTNC
370      *
371      * Now D0 points to the mailbox
372      *
373      * Check if I am the controller on this loop
374      *
375 F088D 7F53      GOSUB GETDev      Check if I am controller on loop
376 F0891 542      GONC STARTn      I AM controller...continue
377      *
378      * If device is not "LOOP", "NULL" or zero then error, else
379      * continue
380      *
381 F0894 96B      ?D=0      B      Zero?

```

```

382 F0897 B1          GOYES  STARTd    Yes...OK
383 F0899 3100       LC(2)  =Null
384 F089D 963       ?C=D   B          "NULL"?
385 F08A0 21        GOYES  STARTd    Yes...OK!
386 F08A2 3100       LC(2)  =Loop
387 F08A6 963       ?C=D   B          "LOOP"?
388 F08A9 90        GOYES  STARTd    Yes...OK!
389                  *
390                  * Error...Diamond is not controller and not LOOP, NULL, or 0
391                  *
392 F08AB 300        LC(1)  =eBADMD    Illegal mode (not controller)
393 F08AE 20        P=      =ePIL
394 F08B0 02        RTNSC
395                  *-
396                  *-
397 F08B2          STARTd
398                  *
399                  * I am in device mode!
400                  *
401 F08B2 6AB0       GOTO   START3    Continue following controller
402                  *-
403                  *-
404                  *
405                  * I am controller...continue
406                  *
407 F08B6          STARTn
408                  *
409                  * Diamond status in C[X]
410                  *
411                  * Power up the loop (check if need IFC or just mPULOP)
412                  *
413 F08B6 870        ?ST=1  =sReadd    Force readdressing?
414 F08B9 61        GOYES  START#    Yes...power up the loop with IFC
415 F08BB 3100       LC(2)  =mPULOP    Power up the loop
416 F08BF 7BB3       GOSUB  PUTGF-   Put it, GET, FRAME+
417 F08C3 4C1       GOC    STARTS   Error...get the error message
418 F08C6 890       ?P=    =pSTATE   Status message?
419 F08C9 71        GOYES  STARTS   Yes...status message
420 F08CB 64C0       GOTO   START5   No...unexpected frame
421                  *-
422                  *-
423 F08CF 3500       START#  LC(6)  =mTAKEI    Take control with IFC
      0000
424 F08D7 8E00       GOSUBL  =PUTE
      00
425 F08DD 400        RTNC          Carry if error
426                  *
427                  * Status message...check if error
428                  *
429 F08E0 7500       STARTS  GOSUB  Geterr    Get error message
430 F08E4 5A0        GONC   START!   If no carry, loop is UP!
431 F08E7 02        STARTe  RTNSC    Error...exit with carry set
432                  *-
433                  *-
434 F08E9 8C00       Geterr  GOLONG  =GETERR    (P,C[0] are error, Carry set)

```

```

00
435      *_-
436      *_-
437      *
438      * Now the loop is powered up!
439      *
440 F08EF 8E00 START!  GOSUBL =GETST      Get the Diamond status again
00
441 F08F5 400          RTNC              If carry, ERROR!
442 F08F8 870  STARTO ?ST=1  =sReadd    Force readdressing?
443 F08FB 62          GOYES  START2     Yes...do it!
444      *
445      * Check if loop needs to be readdressed (not done now)
446      *
447 F08FD 0B          CSTEM              Put Diamond status in ST bits
448 F08FF 860        ?ST=0  =sUNCNF     Is the loop unconfigured?
449 F0902 20          GOYES  START1     Set/Clear carry...
450 F0904 0B  START1  CSTEM              If carry is set, loop is OK!
451 F0906 466        GOC   START3
452 F0909 3100       LC(2) =f1NZ4      Check if suppress auto readdress
453 F090D 7170       GOSUB  sflag?     Save D[A] in D0;SFLAG?;restore D
454 F0911 5F0        GONC  START2     Flag is clear...DO readdress!
455 F0914 8E00       GOSUBL =RESTRT    Restart all devices! (unknown)
00
456 F091A 795F       GOSUB  Getmbx     Flag is set...just get mailbox
457 F091E 5E4        GONC  START3     Go always
458      *_-
459      *_-
460 F0921 8E00  START2  GOSUBL =RESTRT  Set all devices to be restarted.
00
461 F0927 850        ST=1  =sReadd     Indicate loop was readdressed!
462 F092A 3100       LC(2) =f1EXTD     Check if extended addressing
463 F092E 7050       GOSUB  sflag?
464      *
465      * D[A] is the value of D0, which was saved there by SFLAG?
466      *
467 F0932 3100       LC(2) (=mAUTOR)+1  Preset primary only!
468 F0936 522        GONC  STARTs     If flag is clear, use simple addr
469 F0939 8E00       GOSUBL =SWAP01    Swap D0, D1 to save D1
00
470 F093F 3200       LC(3) =bPILAI
0
471 F0944 8E00       GOSUBL =i/OFND    Find the buffer
00
472 F094A 8E00       GOSUBL =SWAP01    Restore D1 from D0
00
473      *
474      * Now carry is SET if assignio buffer found
475      *
476 F0950 3100  STARTp LC(2) =mAUTOR    Loop needs to be reconfigured...
477 F0954 540        GONC  STARTs     If no carry, then no assignio
478 F0957 E6         C=C+1  A          If carry, then primary only
479      *
480 F0959 06  STARTs  RSTK=C          Save message on RSTK
481 F095B 781F       GOSUB  Getmbx     Get back the mailbox!!!

```

```

482 F095F 07          C=RSTK          Restore message
483 F0961 7913       GOSUB PUTGF-   Put message, get last addr,decode
484 F0965 400        RTNC
485 F0968 880        ?P#   =pADDR   (address frame)
486 F096B 52         GOYES START5
487 F096D AC3 START3 D=0   S          Set initial value of source flag
488 F0970 20         P=    0
489 F0972 310E       LCHEX EO
490 F0976 0EFF       C=C!D  A        Check for address unknown
491 F097A B66        C=C+1  B        (address remains in D[3:0])
492 F097D 461        GOC    GADDR    Go if address unknown
493 F0980 03         RTNCC          Address is valid or 0
494                *_-
495                *_-
496 F0982 DF sflag? CDEX  A          Swap flag into D[A], D[A] to C
497 F0984 134        DO=C          Save D[A] in DO (SFLAG? restores)
498 F0987 DB         C=D    A          Restore flag from D[A]
499 F0989 8D00 =sFLAG? GOVLNG =SFLAG? Go to SFLAG? now
      000
500                *_-
501                *_-
502 F0990           START5
503 F0990 6741       GOTO  GADDRe    Unexpected frame error!
504                *****
505                *****
506                **
507                ** Name:          GADDR - Get the address of a device from loop
508                **
509                ** Category:     PILUTL
510                **
511                ** Purpose:
512                **      Get device address, given search information for the
513                **      device
514                **
515                ** Entry:
516                **      DO points to the HPIL mailbox
517                **      D[B] is the search type (#1F,3F,5F,7F,9F)
518                **      #1F: (Device type) -B[B] is accessory ID
519                **      #3F: (Device ID)   -B[W] is device ID
520                **      #5F: (Volume label)-B[W] is the label
521                **      #7F: (Null)       -B[W] is "don't care"
522                **      #9F: (LOOP)      -B[W] is "don't care"
523                **      D[2] is the sequence number
524                **      D[3] is the loop number
525                **      D[S]=0 (for search type at exit)
526                **
527                ** Exit:
528                **      Carry clear:
529                **      HPIL handshake in ST[3:0]
530                **      Device address,(mailbox #)*1024 in D[X]
531                **      D[S] is search type (1=device type, 2=device ID,
532                **      3=volume label,4=NULL,5=LOOP)
533                **      D[3] is sequence number (was in D[2] at entry)
534                **      Carry set: P, C[S] are error code
535                **

```



```

536      ** Calls:      PUTGF+, UNLPUT, PUTC+, GETERR, GETID, PUTGF-, UNT,
537      **              TSTAT, SEEKA, DDT, TSTAT, READRG, ASRC4, MTYL, DDL
538      **
539      ** Uses.....
540      ** Exclusive:  A[A], C[W], D[15:14], D[5:0], P
541      ** Inclusive:  A[W], C[W], D[15:13], D[5:0], P, ST[3:0]
542      **              (If volume label, blankfills B[W], uses B[15:12])
543      **
544      ** Stk lvls:   3 (GETID)(TSTAT)(SEEKA)
545      **
546      ** Algorithm:
547      **   GADDR: if device type is not NULL then goto GADDR0
548      **             (Type=NULL)
549      **             set D[S] to DsNull-1
550      **   GADDRN: set address to zero
551      **             goto GADDR'
552      **   -----
553      **   GADDR0: if device type is not LOOP then goto GADDR1
554      **             (Type=LOOP)
555      **             set D[S] to DsLoop-1
556      **             goto GADDRN (set address=0, goto GADDR')
557      **   -----
558      **   GADDR1: if device type is not Acc ID then goto GADDR3
559      **             (Type=Accessory ID)
560      **             find that Acc ID (& sequence #)          (PUTGF+)
561      **             if not found then {Device Not Found}
562      **             (Device found, address message from Diamond in C[X])
563      **             GADDR': increment D[S] (search type)
564      **             set D[X]=address + (loop number)*1024 {bits 8&9}
565      **             set D[3]=sequence number (D[2] entry value)
566      **             return, all OK
567      **   -----
568      **   (Either Volume Label or Device ID)
569      **   GADDR3: determine length of word in B[W] by searching
570      **             from B[15] toward B[0], check for first non-
571      **             zero nibble (all unused nibbles of B[W]=0)
572      **             set D[14]=length (WP length)
573      **             if device type is not Device ID then goto GADDR6
574      **             (Type=Device ID)
575      **             make a copy of sequence number in D[5]
576      **             unaddress all listeners on loop          (UNLPUT)
577      **             reset Diamond current address            (PUTC+)
578      **             check for Diamond error (if so, exit)    (GETERR)
579      **             if loop is unaddressed then {Device Not Found}
580      **   GADDR4: get Device ID of the current device        (GETID)
581      **             if no response then goto GADDR5
582      **             if response matches requested ID (for given length
583      **             then
584      **                 decrement sequence # in D[5]
585      **                 if not right sequence number yet
586      **                 then goto GADDR5
587      **             else
588      **                 set D[S]=0 (will be incremented twice)
589      **   GADDR&: increment D[S]
590      **             get current address                      (PUTGF-)

```

```

591      **          if not address then {Unexpected Frame}
592      **          goto GADDR'
593      **          ----
594      **          GADDR5:increment current address          (PUTGF-)
595      **          if valid address then goto GADDR4
596      **          if end of addresses then {Device Not Found}
597      **          else {Unexpected Message}
598      **          ----
599      **          GADDR6:if device type <> Volume Label
600      **          then {Unexpected Frame}
601      **          (Type=Volume Label)
602      **          blankfill requested label (B[11:0])
603      **          set tape counter (D[4]) to first drive
604      **          GADDRv:find D[4]th tape drive          (PUTGF+)
605      **          if not found then {Device Not Found}
606      **          check tape status          (TSTAT)
607      **          if status <> all OK and status <> new tape
608      **          then goto GADDRn
609      **          GADDR7:seek sector zero on the tape          (SEEKA)
610      **          if seek error then goto GADDRn
611      **          GADDR8:read sector zero          (DDT)
612      **          if read error then goto GADDRn          (TSTAT)
613      **          read 8 bytes from the tape          (READRG)
614      **          if tape is not LIF format then goto GADDRn
615      **          if tape volume label matches requested label
616      **          then
617      **          set search type to 1 (will have 2 added)
618      **          goto GADDR&
619      **          (rewind the tape, goto next tape)
620      **          GADDRn:rewind the current tape          (MTYL)(DDL)
621      **          increment tape counter (D[4])
622      **          if tape counter is >16 then {Device Not Found}
623      **          goto GADDRv
624      **
625      ** History:
626      **
627      **      Date          Programmer          Modification
628      **      -----          -
629      **      09/22/83      NZ          Updated documentation extensively
630      **      02/09/83      NZ          Added LOOP to valid lists
631      **      01/03/83      NZ          Updated documentation
632      **
633      ** *****
634      ** *****
635      ** F0994 DB      =GADDR C=D      A          Copy D[2] (sequence #)
636      ** *
637      ** * Decode what type it is
638      ** *
639      ** F0996 3100      LC(2) =Null          Is this a NULL assignment?
640      ** F099A 967      ?C#D      B
641      ** F099D F0      GOYES GADDRO          Not NULL...continue
642      ** *
643      ** * NULL assignment!
644      ** *
645      ** F099F 2F      P=          15

```

```

646 F09A1 300          LC(1) (=DsNull)-1   Code for NULL-1
647 F09A4 AC7  GADDRN D=C      S
648 F09A7 D2         C=0      A      Clear "ADDRESS"
649 F09A9 503        GONC      GADDR'   Go always (Continue with coding)
650                *_-
651                *_-
652 F09AC 3100  GADDR0 LC(2)  =Loop    Is this LOOP?
653 F09B0 967          ?CHD    B
654 F09B3 A0          GOYES   GADDR1   Not LOOP...continue
655 F09B5 2F          P=      15
656 F09B7 300          LC(1) (=DsLoop)-1   Code for LOOP-1
657 F09BA 59E        GONC      GADDRN   Go always
658                *_-
659                *_-
660 F09BD 3100  GADDR1 LC(2)  =DevTyp  Is this a device type?
661 F09C1 967          ?CHD    B
662 F09C4 34          GOYES   GADDR3   No...check further!
663                *
664                * Accessory ID...search for it!
665                *
666 F09C6 AE9          C=B      B      Type in C[B] for FIND Nth device
667 F09C9 23          P=      3
668 F09CB 300          LC(1)  =mFIND1  FIND Nth device, type M
669 F09CE 70B2        GOSUB  PUTGF+  Put message, get address,decode
670 F09D2 400          RTNC
671 F09D5 880          ?P#     =pADDR  Check if address frame
672 F09D8 B2          GOYES   GADDR2  Not address...error
673                *
674                * Entry with C[X] = Diamond "address" message
675                *
676 F09DA 0B          GADDR'  CSTEX   Clear the opcode bit!
677 F09DC 84A          ST=0    10
678 F09DF 0B          CSTEX
679                *
680                * Now address is in C[X], Seq # in D[2], loop # in D[3]
681                *
682 F09E1 B47          D=D+1  S      Set type flag=flag + 1
683 F09E4 DF          CDEX    A      Copy address to D[X]
684                *
685                * Now loop # in C[3], seq # in C[2]
686                *
687 F09E6 F2          CSL      A      Loop in C[4], seq in C[3]
688 F09E8 80D4        P=C      4
689 F09EC 80F2        CPEX    2      Loop in C[2], seq in C[3]
690 F09F0 AE2          C=0      B      Clear lower bits of C[X]
691 F09F3 A36          C=C+C   X
692 F09F6 A36          C=C+C   X      Now (loop #)*4 in C[XS]
693 F09F9 0E3F        C=C!D  X      C[X] is address+loop*1024
694 F09FD D7          D=C      A      D[X] is address,loop; D[3] is seq
695 F09FF 20          P=      0
696 F0A01 03          RTNCC
697                *_-
698                *_-
699 F0A03 68A0  GADDR2  GOTO    GADDRn   Device not found
700                *_-

```

```

701      * _
702 FOR07 GADDR3
703      *
704      * Determine length of user-supplied string (store in D[14])
705      *
706 FOR07 20      P=      0      First time through, P=15
707      *
708 FOR09 979      ?B=0    W
709 FOR0C 90      GOYES  GADDR$      This SHOULD never happen!!!
710      *
711 FOR0E 0D      GADDR?  P=P-1
712 FOR10 909      ?B=0    P
713 FOR13 BF      GOYES  GADDR?      Zero...continue checking
714 FOR15 AFF    GADDR$  CDEX  W
715 FOR18 80FE    CPEX   14      Put length in D[14]
716 FOR1C AFF    CDEX   W
717      *
718      * Now D[14] is user-supplied length
719      *
720 FOR1F 20      P=      0
721 FOR21 3100    LC(2)  =DevID      Is this a device ID?
722 FOR25 963    ?C=D    B
723 FOR28 60     GOYES  GADDRd      Yes...device ID
724 FOR2A 66B0   GOTO   GADDR6      No...check volume label
725      * _
726      * _
727      *
728      * Device ID...search for the device!
729      *
730      * First unaddress all listeners on the loop
731      *
732 FOR2E 7EC2  GADDRd  GOSUB  UNLPUT
733 FOR32 400      RTNC
734      *
735      * Now search the loop, asking each device its device ID
736      *
737      * Set current address to the start of the loop
738      *
739 FOR35 3100    LC(2)  =MRSTCA      Reset current address to start
740 FOR39 8E00    GOSUBL  =PUTC+
741      00
741 FOR3F 400      RTNC
742      *
743      * Read error message to clear the error flag (used to decide
744      * when I'm done searching)
745      *
746 FOR42 73AE    GOSUB  Geterr      Get error #
747 FOR46 400      RTNC      If carry, had an error!
748      *
749      * Status bits are in C[X] now...check if addresses are valid
750      *
751 FOR49 C6      C=C+C  A
752 FOR4B C6      C=C+C  A
753 FOR4D A66    C=C+C  B      Check if loop is unaddressed
754 FOR50 4B5    GOC    GADDRn      If so, say "Device Not Found"

```

```

755      *
756      * Addresses ARE valid...continue search
757      *
758 FOR53 F3      DSL      A      Now seq # in D[3], loop in D[4]
759 FOR55 DB      C=D      A      C[3] is seq #
760 FOR57 80D3    P=C      3      (Make a copy of seq # in D[5])
761 FOR5B 80C5    C=P      5      C[5] is now a copy of the seq #
762 FOR5F AB2     C=0      X      Clear the address field
763 FOR62 25      P=       5
764 FOR64 A97     D=C      WP     Copy back to D[5]
765      *
766      * Loop to check for the device ID!
767      *
768 FOR67 8E00 GADDR4 GOSUBL =GETID      Get ID of this device
      00
769 FOR6D 400     RTNC      Error (not "NOT READY")
770 FOR70 94B     ?D=0     S      ID response?
771 FOR73 B4      GOYES GADDR5      No...try next
772 FOR75 970     ?A=B     W      Match exactly?
773 FOR78 E0      GOYES GADDR-      Match...check for Nth item
774 FOR7A AFB     C=D      W      Not match...check user-given len
775 FOR7D 80DE    P=C      14
776 FOR81 914     ?A#B     WP
777 FOR84 A3      GOYES GADDR5      Not a match...continue
778 FOR86 25      GADDR- P=      5      Decrement copy of seq #
779 FOR88 80F     D=D-1    P
780 FOR8B 523     GONC GADDR5      Not Nth device...keep looking
781 FOR8E AC3     D=0      S      Set find flag=0 (+2 below=dev ID)
782
783      *
784      * Exact length match, Nth device!
785      *
786 FOR91 F7      DSR      A      Move loop # to D[3], seq to D[2]
787      *
788      * Now D[2] is sequence #, D[3] is loop #
789      *
790 FOR93 B47     GADDR& D=D+1 S      Add 1 to current find flag
791 FOR96 20      P=       0
792 FOR98 3100    LC(2) =hGETCA      Get current address
793 FOR9C 7ED1    GOSUB  PUTGF-
794 FORA0 400     RTNC
795 FORA3 880     ?P#      =pADDR      Not an address?
796 FORA6 23      GOYES GADDRe      Error...unexpected frame!
797      *
798      * GADDR' adds 1 to flag value!
799      *
800 FORA8 613F    GOTO GADDR'      Common exit code
801      *-
802      *-
803 FORAC GADDRn
804      *
805      * Device not found!
806      *
807 FORAC 8E00    GOSUBL =UNT      Unaddress talkers on loop
      00

```

```

808 FOAB2 400          RTNC
809 FOAB5 20          P=      0
810 FOAB7 300        LC(1)  =eNOFND
811 FOABA 20          P=      =ePIL
812 FOABC 02          RTNSC          Device not found!
813                  *-
814                  *-
815 FORBE             GADDR5
816                  *
817                  * Not found yet...keep looking
818                  *
819 FORBE 20          P=      0
820 FOACO 3100       LC(2)  =nINCCA          Increment current address
821 FOAC4 76B1       GOSUB  PUTGF-
822 FOAC8 400        RTNC          Error
823 FOACB 880        ?P#    =pADDR          Address?
824 FORCE 50          GOYES  GADDRf          No...check frame further
825 FORDO 569        GONC   GADDR4          Yes...poll the device for ID
826                  *-
827                  *-
828 FORD3 890        GADDRf ?P=    =pSTATE          Current state (error message)?
829 FORD6 6D         GOYES  GADDRn          Yes...end of table (not found)
830                  *
831                  * Error...other than "NOT FOUND"
832                  *
833 FORD8             GADDRu          Unknown device type...?
834 FORD8 20         GADDRe P=      0
835 FORDA 300        LC(1)  =eUNEXP
836 FORDD 20         P=      =ePIL
837 FORDF 02         RTNSC
838                  *-
839                  *-
840 FOAE1             GADDR6
841                  *
842                  * Volume label?
843                  *
844 FOAE1 3100       LC(2)  =VolLb1          Check if volume label
845 FOAE5 967        ?C#D   B
846 FOAE8 0F         GOYES  GADDRu          Unknown command
847                  *
848                  * Volume label!!!
849                  *
850                  * Find the 1st through 16th tapes, check the volume label
851                  *
852                  * First blank-fill the volume label!!!
853                  * D[14] is first non-zero character in B...
854                  *
855 FOAEA ADB         C=D     M          Get length from D[14] to C[14]
856 FOAED 3B02       LCASC  \      \          Blank-fill the volume label!
      0202
      0202
      02
857 FOAFB 80DE       P=C     14
858 FOAFF A99        C=B     WP
859 FOB02 AF5        B=C     W          Leave B[11:0] blank-filled

```

```

860      *
861      * D[4] is the current sequence # we are on!
862      *
863 F0B05 24      P=      4
864 F0B07 A83    D=0    P      Start with 1st device
865 F0B0A AB3    D=0    X      Clear address of tape for TSTAT
866 F0B0D 20    GADDRv P=      0
867 F0B0F 3300   LC(4) (=mFINDD)+#10 Find the Nth (Acc ID=16) drive
      00
868 F0B15 F7     DSR    A
869 F0B17 F7     DSR    A
870 F0B19 AAB    C=D    XS      Copy N from D[4]
871 F0B1C F3     DSL    A      Restore D[4]
872 F0B1E F3     DSL    A      Restore D[4]
873 F0B20 7E51   GOSUB  PUTGF+  Find Nth device, type #10
874 F0B24 400    RTNC
875 F0B27 880    ?P#    =pADDR  Return if error, else check addr
876 F0B2A 9A     GOYES  GADDRf  No...either "NOT FOUND" or error!
877      *
878      * Now current address is a tape device
879      *
880 F0B2C 8E00   GOSUBL =TSTAT  Check tape status first
      00
881 F0B32 571   GONC   GADDR7  OK...seek record zero
882      *
883      * Check if "NEW TAPE" or other error!
884      *
885 F0B35 880   ?P#    =eTAPE
886 F0B38 00    RTNYES
887 F0B3A 80F0   CPEX    0      Not a tape error!
888 F0B3E 880   ?P#    =eNEWTA New tape?
889 F0B41 20    GOYES  GADDR+
890 F0B43 80F0  GADDR+ CPEX    0      Carry if NOT new tape
891 F0B47 4B5   GOC    GADDRn  Next item!
892 F0B4A D0    GADDR7 A=0    A
893 F0B4C 8E00  GOSUBL =SEEKA  Seek record zero
      00
894 F0B52 590   GONC   GADDR8  OK!
895 F0B55 890  GADDR- ?P=    =eTAPE  Tape error?
896 F0B58 B4    GOYES  GADDRn  Tape error...goto next item
897 F0B5A 02    RTNSC
898      *
899      *
900 F0B5C 22    GADDR8 P=      2
901 F0B5E 8E00  GOSUBL =DDT    Read record zero
      00
902 F0B64 400   RTNC
903 F0B67 8E00  GOSUBL =TSTATA Check status
      00
904 F0B6D 47E   GOC    GADDR-  Not OK
905 F0B70 3500  LC(6) (=mSDA)+8 Send 8 bytes
      0000
906 F0B78 8E00  GOSUBL =READRG  Read register (A[W])
      00
907 F0B7E 400   RTNC

```

```
908      *
909      * D[S] is # characters in A[W] (rest is zero)
910      * (don't even check count...if less than 8 for any reason,
911      * will not match blankfilled volume label)
912      *
913      * Now A[3:0] is LIF ID (#8000), A[15:4] is volume label
914      *
915 F0B81 3308      LC(4) #0080      LIF ID, byte-reversed
916      00
916 F0B87 23      P=      3
917 F0B89 916      ?A#C      WP
918 F0B8C 71      GOYES      GADDRn      Tape not LIF...continue search
919      *
920      * This is an LIF tape...do the labels match???
921      *
922 F0B8E 7D83      GOSUB      ASRC4      Shift to A[11:0]
923 F0B92 2B      P=      11
924 F0B94 914      ?A#B      WP
925 F0B97 C0      GOYES      GADDRn      Label differs...try next!
926      *
927      * This volume label matches...found the device!
928      *
929 F0B99 AC3      D=0      S
930 F0B9C B47      D=D+1      S      Set find flag=1(+2) for vol label
931 F0B9F 63FE      GOTO      GADDR&      Get address, return!
932      *_-
933      *_-
934 F0BA3 7171      GADDRn      GOSUB      MTYL
935 F0BA7 400      RTNC
936 F0BA8 20      P=      =Rewind      Remind the tape
937 F0BAC 8E00      GOSUBL      =DDL
938      00
938 F0BB2 400      RTNC
939 F0BB5 24      P=      4
940 F0BB7 B07      D=D+1      P      Increment tape counter
941 F0BBA 460      GOC      GADDR9      If carry, have searched 16 drives
942 F0BBD 6F4F      GOTO      GADDRv      Continue volume label search
943      *_-
944      *_-
945 F0BC1      GADDR9
946      *
947      * Device "NOT FOUND"
948      *
949 F0BC1 6AEE      GOTO      GADDRn      Device not found!
950      *****
951      *****
952      **
953      ** Name:      ATNCHK - Check if ATTN key has been hit twice
954      **
955      ** Category:      PILUTL
956      **
957      ** Purpose:
958      **      Check if ATNFLG has been decremented to "E" or less
959      **
960      ** Entry:
```



```
961      **      None
962      **
963      ** Exit:
964      **      Carry set: ATTN hit twice
965      **      Carry clear: ATTN hit 0 or 1 times
966      **
967      ** Calls:      None
968      **
969      ** Uses.....
970      ** Inclusive: C[S],P (P only if carry set)
971      **
972      ** Stk lvls:   1 (Internal push)
973      **
974      ** History:
975      **
976      **      Date      Programmer      Modification
977      **      -----      -
978      **      02/08/83      NZ              Wrote routine
979      **
980      ****
981      ****
982      FOBC5 860 =ATNCHK ?ST=0 =Attn
983      FOBC8 62      GOYES ATNChc      Not aborting! (RTNCC)
984      *
985      * Attn set...check if ATNFLG true
986      *
987      FOBCA 06      RSTK=C          Save C[A] on RSTK
988      FOBCC 136     CDOEX          Save DO in C[A]
989      FOBCF 1B00    DO=(5) =ATNFLG
990      000
991      FOBD6 1564    C=DATO S
992      FOBDA 134    DO=C          Restore DO
993      FOBDD 07     C=RSTK        Restore C[A]
994      FOBDF 94A    ?C=0 S
995      FOBE2 C0     GOYES ATNChc   Not abort...(RTNCC)
996      FOBE4 B46    C=C+1 S       Check if "F"
997      FOBE7 460    GOC ATNChc    Yes...not abort (RTNCC)
998      FOBEA 20     P= =eABORT    No...ABORT!
999      FOBEC 02     RTNSC
1000     *
1001     *
1002     FOBEE 03     ATNChc RTNCC
1003     ****
1004     ****
1005     ** Name:      GETDev - Get device status bit from LOOPST
1006     **
1007     ** Category:   PILUTL
1008     **
1009     ** Purpose:
1010     **      Indicate whether the last call to CHKSTS found Diamond
1011     **      in device or controller mode
1012     **
1013     ** Entry:
1014     **      None
```

```
1015      **
1016      ** Exit:
1017      **     LOOPST in ST[3:0]
1018      **     Carry set if device, clear if controller
1019      **
1020      ** Calls:      None
1021      **
1022      ** Uses.....
1023      ** Inclusive: ST[3:0]
1024      **
1025      ** Stk lvls:  1 (internal push)
1026      **
1027      ** History:
1028      **
1029      **      Date      Programmer      Modification
1030      **      -----      -
1031      **      03/17/83      NZ      Added code to save C[A] on RSTK
1032      **      02/02/83      NZ      Added documentation
1033      **
1034      ** *****
1035      ** *****
1036 F0BF0 06 =GETDev RSTK=C      Save C[A] on RSTK
1037 F0BF2 136      CDOEX      Save DO in C[A]
1038 F0BF5 1B00      DO=(5) =LOOPST
1039      000
1039 F0BFC 0B      CSTEM
1040 F0BFE 15E0      C=DATO 1      Read status into C[0]
1041 F0C02 0B      CSTEM
1042 F0C04 134      DO=C      Restore DO
1043 F0C07 07      C=RSTK      Restore C[A]
1044 F0C09 870      ?ST=1 (=Device)-8      (Device is set up for XS read)
1045 F0C0C 00      RTNYES      Carry set if device
1046 F0C0E 03      RTNCC      Carry clear if not device
1047      ** *****
1048      ** *****
1049      **
1050      ** Name:      CHKSTS - Check Diamond status, errors, etc
1051      ** Name:      FNDCHK - Find a mailbox, CHKSTS
1052      ** Name:      FNDCH- - Check OFFED, Find a mailbox, CHKSTS
1053      **
1054      ** Category:  EXCUTL
1055      **
1056      ** Purpose:
1057      **      Check that the status is OK for messages (ie NOT in
1058      **      manual mode), clear the error bit in Diamond, set/clear
1059      **      bit for device/controller
1060      **
1061      ** Entry:
1062      **      FNDCH-:C[S] is mailbox desired
1063      **      FNDCHK:C[S] is mailbox desired
1064      **      CHKSTS:DO points to mailbox
1065      **
1066      ** Exit:
1067      **      Carry clear:
1068      **      P=0, C[X] is Diamond status
```

```

1069      **      CHKSTS:DO unchanged
1070      **      FNDCH-,FNDCHK:DO points to mailbox
1071      **      Carry set: error (P, C[0] are the error #)
1072      **
1073      ** Calls:      GETHS2,CHKSET,GETERR,GETST,GETMBX
1074      **
1075      ** Uses.....
1076      ** Exclusive:  C[X],P
1077      ** Inclusive:  A[W],C[W],P,ST[3:0], bit(Device) of LOOPST
1078      **
1079      ** Stk lvls:   2 (GETST)(GETERR)(CHKSET)(pushed status;GETMBX)
1080      **
1081      ** History:
1082      **
1083      **      Date      Programmer      Modification
1084      **      -----      -
1085      **      09/22/83      NZ      Updated documentation
1086      **      03/09/83      NZ      Wrote code and documentation
1087      **
1088      *****
1089      *****
1090 FOC10 8E00 =FNDCH- GOSUBL =FNDMB-      Find the mailbox, check it
1091      00
1091 FOC16 5D0      GONC  CHKSTS      If no error, continue
1092 FOC19 02      RTNSC
1093      * _
1094      * _
1095 FOC1B 8E00 =FNDCHK GOSUBL =FNDMBX      Find the mailbox first
1096      00
1096 FOC21 400      RTNC      Error (not found)
1097 FOC24      =CHKSTS
1098 FOC24 8E00      GOSUBL =GETHS2
1099      00
1099 FOC2A 870      ?ST=1 =sMANUL      Manual mode?
1100 FOC2D 64      GOYES  CHKST+      Yes..Illegal mode (not auto mode)
1101 FOC2F 8E00      GOSUBL =CHKSET      Check if RESET: if so, initialize
1102      00
1102 FOC35 400      RTNC      Error during initialize!
1103 FOC38 7DAC      GOSUB  Geterr      Get Gemstone status! (&clear err)
1104 FOC3C 5B0      GONC  CHKST.      If no carry, all is fine
1105 FOC3F 8E00      GOSUBL =GETST      If carry, get status bits
1106      00
1106 FOC45 400      RTNC      Error!
1107 FOC48 0B  CHKST. CSTEM      Put C[X] in the status bits
1108      *
1109      * Now check if I am the controller
1110      *
1111 FOC4A 870      ?ST=1 =sCONTR      Am I the controller on loop?
1112 FOC4D D2      GOYES  CHKSTn      Yes...done
1113      *
1114      * I am in device mode...set the Device bit of LOOPST
1115      *
1116 FOC4F 0B      CSTEM      Restore status bits,PILST-->C[X]
1117 FOC51 06      RSTK=C      Save PILST on RSTK
1118 FOC53 1B00      DO=(5) =LOOPST      Set =Device bit in LOOPST

```

```
000
1119 FOC5A 1562      C=DATO XS
1120 FOC5E 0B       CSTEM
1121 FOC60 850      ST=1 =Device      Set Device Status bit
1122 FOC63 0B       CSTEM
1123 FOC65 1542     DATO=C XS         Write it out to LOOPST
1124 FOC69 7A0C     GOSUB Getmbx     Get DO back at mailbox
1125 FOC6D 07       C=RSTK           Restore PILST from RSTK
1126 FOC6F 03       RTNCC           Return, status in C[X]
1127                * _
1128                * _
1129                *
1130                * Error...Diamond is in manual mode!
1131                *
1132 FOC71 0B       CHKSTe CSTEM
1133 FOC73 300     CHKST+ LC(1) =eBADMD      Illegal mode (not controller)
1134 FOC76 20      P= =ePIL
1135 FOC78 02      RTNSC
1136                * _
1137                * _
1138 FOC7A 0B       CHKSTn CSTEM           Restore status bits
1139 FOC7C 03       RTNCC
1140                *****
1141                *****
1142                **
1143                ** Name:      PUTGF- - CSL A,CSL A, call PUTC, GET, FRAME+
1144                ** Name:      PUTGF+ - call PUTC, GET, FRAME+
1145                ** Name:      PUTGF - check carry, call GET, FRAME+
1146                **
1147                ** Category:  LOCAL
1148                **
1149                ** Purpose:
1150                **      Save code by grouping commonly called subroutines
1151                **
1152                ** Entry:
1153                **      DO points to mailbox
1154                **      PUTGF-:C[B] is the message to send
1155                **      PUTGF+:C[3:0] is the message to send
1156                **      PUTGF: Carry set if previous error
1157                **
1158                ** Exit:
1159                **      DO unchanged
1160                **      Carry clear: P is frame type, C[X] is frame
1161                **      Carry set: Error (P, C[0] are error code)
1162                **
1163                ** Calls:      PUTC,GET,<FRAME+>
1164                **
1165                ** Uses.....
1166                **      Inclusive: C[W],P,ST[3:0]
1167                **
1168                ** Stk lvls:  1 (PUTC)(GET)
1169                **
1170                ** History:
1171                **
1172                **      Date      Programmer      Modification
```

```

1173      ** -----
1174      ** 09/22/83      NZ      Updated documentation
1175      ** 02/28/83      NZ      Added PUTGF- entry point
1176      ** 12/05/82      NZ      Added routine and documentation
1177      **
1178      ****
1179      ****
1180 FOC7E F2 =PUTGF- CSL      A
1181 FOC80 F2          CSL      A
1182 FOC82 7470 =PUTGF+ GOSUB Putc      Put the message...
1183 FOC86 400 =PUTGF RTNC
1184 FOC89 7580          GOSUB Get      ...Get the response...
1185 FOC8D 400          RTNC
1186 FOC90 613B          GOTO FRAME+    Exit through FRAME+!
1187      ****
1188      ****
1189      **
1190      ** Name:          GTYPE - Get the device type (Acc id) from loop
1191      **
1192      ** Category:     PILI/O
1193      **
1194      ** Purpose:
1195      **   Get the accessory id of a device (address in D[X])
1196      **
1197      ** Entry:
1198      **   DO points to the HPIL mailbox
1199      **   D[X] contains the address of the device to be checked
1200      **
1201      ** Exit:
1202      **   Carry clear:
1203      **     P=0
1204      **     Device type in A[B] (if 2 byte response, A[3:2] is
1205      **       first byte received, A[B] is second)
1206      **     If device does not respond to Acc ID, A[A]=0
1207      **     Carry set: error (P, C[0] are error code)
1208      **
1209      ** Calls:         YTML, PUTE, PUTGF
1210      **
1211      ** Uses.....
1212      ** Exclusive: A[A], C[W], P
1213      ** Inclusive: A[A], C[W], P, ST[3:0]
1214      **
1215      ** Stk lvls:     2 (YTML)(PUTGF)
1216      **
1217      ** History:
1218      **
1219      **   Date          Programmer      Modification
1220      ** -----
1221      ** 09/22/83      NZ      Updated documentation
1222      ** 05/17/83      NZ      Rewrote to fix early EOT error
1223      ** 01/03/83      NZ      Updated documentation
1224      **
1225      ****
1226      ****
1227 FOC94 7890 =GTYPE GOSUB YTML      YOU TALK, ME LISTEN
  
```

```

1228 FOC98 400          RTNC          RETURN IF ERROR (CARRY SET)
1229 FOC9B DO          A=0    A          Clear value of acc id first
1230 FOC9D 3500        LC(6)  (=MSAI)+#2    LIMIT OF TWO BYTES
          0000
1231 FOCA5 8E00        GOSUBL =PUTE    START ACCESSORY POLL
          00
1232 FOCA8 77DF GTYPE- GOSUB  PUTGF    Do a GET, FRAME+
1233 FOCAF 400        RTNC          If carry, error
1234                *
1235                * Now P is frame type
1236                *
1237 FOCB2 880          ?P#    =pDATA    Is this a data byte?
1238 FOCB5 51          GOYES  GTYPE2    No...check if EOT
1239 FOCB7 8AC          ?A#0   A          Is this an error message?
1240 FOCA 20           GOYES  GTYPE0    Set carry if A#0 before this byte
1241 FOCBC FO         GTYPE0 ASL    A          Save any previous data in A[3:2]
1242 FOCBE FO         ASL    A          Copy data byte to A[B]
1243 FOCC0 AEA        A=C    B          If no carry (A=0) then get next
1244 FOCC3 57E        GONC   GTYPE-    Reset P=0
1245 FOCC6 20        GTYPE1 P=    0          Done...return!
1246 FOCC8 03        RTNCC
1247                *-
1248                *-
1249 FOCCA 890        GTYPE2 ?P=    =pEOT    Is this an EOT frame?
1250 FOCCD 9F        GOYES  GTYPE1    Yes...done
1251 FOCCF 890        ?P=    =pSTATE    Is this an error message?
1252 FOCD2 C0        GOYES  GTYPE4    Yes...must mean error!
1253 FOCD4 20        P=    =eUNEXP    No...unexpected frame
1254 FOCD6 80C0 GTYPE3 C=P    0          Put the error message into C[0]
1255 FOCD8 20        P=    =ePIL
1256 FOCD0 02        RTNSC
1257                *-
1258                *-
1259 FOCD8 80D4 GTYPE4 P=C    4          Read error code
1260 FOCE2 880        ?P#    =eNORDY    Is it other than "NOT READY"?
1261 FOCE5 1F        GOYES  GTYPE3
1262 FOCE7 5ED        GONC   GTYPE1    Return, clear carry, P=0
1263                *****
1264                *****
1265                **
1266                ** Name:      ULYL - Unaddress listeners, address D[X] as Listen
1267                ** Name:      LISTEN - Address D[X] as listener
1268                **
1269                ** Category:   PILUTL
1270                **
1271                ** Purpose:
1272                **      Unaddress all listeners, address D[X] as listener
1273                **
1274                ** Entry:
1275                **      Desired listener address in D[X]
1276                **      DO points to mailbox
1277                **
1278                ** Exit:
1279                **      Carry clear: OK, P=0
1280                **      Carry set: error (P=error #)

```

```
1281      **
1282      ** Calls:      PUTC
1283      **
1284      ** Uses.....
1285      ** Inclusive: C[W],P,ST[3:0]
1286      **
1287      ** Stk lvls:   1 (PUTC)
1288      **
1289      ** History:
1290      **
1291      **      Date      Programmer      Modification
1292      **      -----      -
1293      **      01/03/83      NZ      Updated documentation
1294      **
1295      ****
1296      ****
1297 FOCER 7210 =ULYL  GOSUB  UNLPUT
1298 FOCEE 400      RTNC
1299 FOCF1 3300 =LISTEN LC(4) =MADDRL      Address ( ) as listener
1300      00
1300 FOCF7 ABB PUTC=D C=D X      Fill in ( )
1301 FOCFA 8C00 Putc  GOLONG =PUTC      Carry indicates return status
1302      00
1302      *-
1303      *-
1304 FODO0 20 =UNLPUT P= 0
1305 FODO2 3300      LC(4) =MUNL      Unaddress all listeners
1306      00
1306 FODO8 61FF      GOTO  Putc
1307      *-
1308      *-
1309 FODOC 8C00 =Putd  GOLONG =PUTD
1310      00
1310      *-
1311      *-
1312 FOD12 8C00 Get  GOLONG =GET
1313      00
1313      ****
1314      ****
1315      **
1316      ** Name:      MTYL - Unaddress listeners, me talk, D[X] listen
1317      ** Name:      MTYLL- Address me as talker, D[X] as listener
1318      **
1319      ** Category:   PILUTL
1320      **
1321      ** Purpose:
1322      **      Address me as talker, D[X] as listener
1323      **
1324      ** Entry:
1325      **      D[X] is the address of the device to be listener
1326      **      D0 points to mailbox
1327      **
1328      ** Exit:
1329      **      Carry clear: OK, P=0
1330      **      Carry set: error (P=error code)
```

```
1331      **
1332      ** Calls:      UNLPUT,LISTEN,<PUTC>
1333      **
1334      ** Uses.....
1335      ** Inclusive: C[W],P,ST[3:0]
1336      **
1337      ** Stk lvls:  1 (UNLPUT)(LISTEN)
1338      **
1339      ** History:
1340      **
1341      **      Date      Programmer      Modification
1342      **      -----      -
1343      **      01/03/83      NZ          Updated documentation
1344      **
1345      ****
1346      ****
1347 FOD18 74EF =MTYL  GOSUB  UNLPUT      Unaddress all listeners
1348 FOD1C 400          RTNC          RETURN IF ERROR (CARRY SET)
1349 FOD1F 7ECF =MTYLL GOSUB  LISTEN    Address D[X] as listener
1350 FOD23 400          RTNC          RETURN IF ERROR (CARRY SET)
1351 FOD26 3300 =MTYLC  LC(4)  (=MADDRM)+#4 / ADDRESS ME AS TALKER
1352      00
1352 FOD2C 6DCF          GOTO  Putc      \ (carry=status)
1353      ****
1354      ****
1355      **
1356      ** Name:      YTML - "You" (D[X]) talk, "me" listen
1357      **
1358      ** Category:  PILUTL
1359      **
1360      ** Purpose:
1361      **      Address D[X] as talker, me as listener
1362      **
1363      ** Entry:
1364      **      DO points to mailbox
1365      **      D[X] contains the address of the device to be talker
1366      **
1367      ** Exit:
1368      **      Carry clear: P=0
1369      **      Carry set: Error # in P
1370      **
1371      ** Calls:      UNLPUT,PUTC,<PUTC=D>
1372      **
1373      ** Uses.....
1374      ** Inclusive: C[W],P,ST[3:0]
1375      **
1376      ** Stk lvls:  1 (UNLPUT)(PUTC)
1377      **
1378      ** History:
1379      **
1380      **      Date      Programmer      Modification
1381      **      -----      -
1382      **      01/03/83      NZ          Updated documentation
1383      **
1384      ****
```



```

1385 *****
1386 F0D30 7CCF =YTML GOSUB UNLPUT Unaddress all listeners
1387 F0D34 400 RTNC Return if error (carry set)
1388 F0D37 3300 =YTMLL LC(4) (=HADDRM)+#2 Address me as listener
      00
1389 F0D3D 79BF GOSUB Putc
1390 F0D41 400 RTNC Return if error (carry set)
1391 F0D44 3300 =TALK LC(4) =HADDRT
      00
1392 F0D4A 6CAF GOTO PUTC=D Address D[X] as talker
1393 *****
1394 *****
1395 **
1396 ** Name: PRMSGA - Output message from C (uses A)
1397 **
1398 ** Category: PILI/O
1399 **
1400 ** Purpose:
1401 ** Output message from C (ASCII) (use A[W] to store it)
1402 **
1403 ** Entry:
1404 ** C[W] has an ASCII string, C[B] is the first character
1405 ** Message is terminated by a #00 character
1406 ** D0 points to mailbox
1407 **
1408 ** Exit:
1409 ** Carry clear: OK, P=0
1410 ** Carry set: error (P,C[0] are error code)
1411 **
1412 ** Calls: PUTD
1413 **
1414 ** Uses.....
1415 ** Inclusive: A[W],C[W],ST[3:0]
1416 **
1417 ** Stk lvls: 1 (PUTD)
1418 **
1419 ** Algorithm:
1420 ** PRMSGA:Copy C[W] to A[W]
1421 ** PRMSG1:shift A[W] right twice (next char in A[B] now)
1422 ** output the character in C[B] (PUTD)
1423 ** if next character (A[B]) <> #00 then goto PRMSG1
1424 ** return
1425 **
1426 ** History:
1427 **
1428 ** Date Programmer Modification
1429 ** -----
1430 ** 01/03/83 NZ Updated documentation
1431 **
1432 *****
1433 *****
1434 F0D4E AFA =PRMSGA A=C W First byte is still in C[B]
1435 F0D51 BF4 PRMSG1 ASR W Get next char into A[B]
1436 F0D54 BF4 ASR W
1437 F0D57 71BF GOSUB Putd Output the character
  
```

```

1438 F0D5B 400          RTNC          Return if error (carry set)
1439 F0D5E D6          C=A      A          Get next byte
1440 F0D60 96E        ?C#0    B          Is this the end (NULL byte)?
1441 F0D63 EE          GOYES   PRMSG1     No...output it!
1442 F0D65 01          RTN      Yes...return, carry clear
1443 *****
1444 *****
1445 **
1446 ** Name:           DTOH - Convert from decimal to HEX
1447 **
1448 ** Category:      PILUTL
1449 **
1450 ** Purpose:
1451 **       Convert value in A[A] from decimal to hex
1452 **
1453 ** Entry:
1454 **       A[A] contains the BCD value
1455 **       A[S] contains the sign of the value (for exit only)
1456 **
1457 ** Exit:
1458 **       Hex value in C[A], sign in C[S] (copied from A[S])
1459 **       P=0, carry clear
1460 **
1461 ** Calls:         None
1462 **
1463 ** Uses.....
1464 ** Inclusive:    A[A],B[A],C[A],P
1465 **
1466 ** Stk lvls:     0
1467 **
1468 ** History:
1469 **
1470 **       Date      Programmer      Modification
1471 ** -----
1472 ** 01/03/83      NZ              Updated documentation
1473 **
1474 *****
1475 *****
1476 F0D67 04          =DTOH   SETHEX
1477 F0D69 20          P=      0
1478 F0D6B 3401       LC(5)   10000
1479          720
1479 F0D72 D1          B=0    A
1480 F0D74 24          P=      4
1481 F0D76 908        DTOH0   ?A=0   P
1482 F0D79 A0          GOYES   DTOH1
1483 F0D7B C1          B=B+C   A
1484 F0D7D A0C        A=A-1   P
1485 F0D80 55F        GONC    DTOH0          Go always
1486 *_-
1487 *_-
1488 F0D83 0D          DTOH1   P=P-1
1489 F0D85 136        CDOEX          Use D0 to set value!
1490 F0D88 883        ?PH     3
1491 F0D8B B0          GOYES   DTOH2

```

```

1492 F0D8D 1A8E      DO=(4) 1000
      30
1493 F0D93 591      GONC   DTOH4      Go always
1494      *_
1495      *_
1496 F0D96 882      DTOH2  ?P#   2
1497 F0D99 B0       GOYES  DTOH3
1498 F0D9B 1A46     DO=(4) 100
      00
1499 F0DA1 5B0      GONC   DTOH4      Go always
1500      *_
1501      *_
1502 F0DA4 881      DTOH3  ?P#   1
1503 F0DA7 60       GOYES  DTOH4
1504 F0DA9 19A0     DO=(2) 10
1505      *
1506 F0DAD 136      DTOH4  CDOEX
1507 F0DB0 55C      GONC   DTOH0      If carry clear, not done yet
1508      *
1509      * Done! (P=0, carry set)
1510      *
1511 F0DB3 D9        C=B    A
1512 F0DB5 C2        C=C+A  A           Now HEX result in C[A]!
1513 F0DB7 AC6      C=A    S           (Copy sign from A[S])
1514 F0DBA 03       RTNCC

```

```

*****
*****
**
** Name:          HTOD - Convert C[B] value from hex to decimal
**
** Category:     PILUTL
**
** Purpose:
**   Convert C[B] from hex into decimal, use only B,C,P
**
** Entry:
**   C[B] contains a HEX value
**
** Exit:
**   Decimal value in B[X]
**   Decimal mode set!
**   Carry set, P=3
**
** Calls:        None
**
** Uses.....
**   Inclusive:  B[A],C[A],P
**
** Stk lvls:    0
**
** History:
**
**   Date          Programmer          Modification
**   -----
**   01/03/83      NZ                  Updated documentation

```

```
1545      **
1546      ****
1547      ****
1548 F0DBC D1 =HTOD  B=0  A          Clear destination register
1549 F0DBE F2          CSL  A
1550 F0DC0 F2          CSL  A          Save digits in C[3:2]
1551 F0DC2 20          P=   0
1552 F0DC4 05          SETDEC
1553      *
1554      * Loop for the case of A-F
1555      *
1556 F0DC6 A2E HTOD1  C=C-1 XS      Is the least sig. digit zero?
1557 F0DC9 470          GOC  HTOD2  Yes...next digit
1558 F0DCC E5          B=B+1 A      No...increment result
1559 F0DCE 57F          GONC HTOD1  Go always
1560      *
1561      *
1562 F0DD1 3261 HTOD2  LCHEX 016   Now the digit value is 16(DEC)
      0
1563 F0DD6 23          P=   3      Point to the other digit
1564 F0DD8 A0E HTOD3  C=C-1 P      Is the digit zero yet?
1565 F0ddb 400          RTNC          Yes...done!
1566 F0DDE A31          B=B+C X      No...add another 16!
1567 F0DE1 56F          GONC HTOD3  Go always
1568      ****
1569      ****
1570      **
1571      ** Name:      HTODX - Convert A[W] from HEX to decimal
1572      **
1573      ** Category:  PILUTL
1574      **
1575      ** Purpose:
1576      **      Convert A[W] from HEX to DECIMAL
1577      **
1578      ** Entry:
1579      **      A[W] contains the HEX value
1580      **
1581      ** Exit:
1582      **      Carry clear: Decimal value in B[W], P#0
1583      **      Carry set: Error (range error) (P=Error #)
1584      **
1585      ** Calls:      None
1586      **
1587      ** Uses.....
1588      **      Inclusive: A[W],B[W],C[W],P
1589      **
1590      ** Stk lvls:  0
1591      **
1592      ** History:
1593      **
1594      **      Date      Programmer      Modification
1595      **      -----      -
1596      **      01/03/83      NZ          Updated documentation
1597      **
1598      ****
```

```

1599 *****
1600 FODE4 AF1 =HTODX B=0 W
1601 FODE7 AF2 C=0 W
1602 FODEA 20 P= 0
1603 FODEC 301 LC(1) 1
1604 FODEF 05 SETDEC
1605 FODF1 AOC HTODX1 A=A-1 P Is this digit zero yet?
1606 FODF4 480 GOC HTODX2 Yes...continue with next!
1607 FODF7 A71 B=B+C W No...add HEX place value to B[W]
1608 FODFA 56F GONC HTODX1 Go always!
1609 *-
1610 *-
1611 FODFD A80 HTODX2 A=0 P Clear digit when done with it!
1612 FOE00 97C ?A#0 W Done with whole word?
1613 FOE03 60 GOYES HTODX3 No...continue
1614 *
1615 * Carry clear if fall through
1616 *
1617 FOE05 04 HTODXr SETHEX Done...return in HEX mode!
1618 FOE07 01 RTN (Carry is result)
1619 *-
1620 *-
1621 FOE09 0C HTODX3 P=P+1 Go to next digit
1622 FOE0B 411 GOC HTODX4 Error!
1623 FOE0E A76 C=C+C W Do a multiply by 16 in DEC mode
1624 FOE11 A76 C=C+C W
1625 FOE14 A76 C=C+C W
1626 FOE17 A76 C=C+C W
1627 FOE1A 56D GONC HTODX1
1628 FOE1D 20 HTODX4 P= =eRANGE Range error (Overflow)
1629 FOE1F 45E GOC HTODXr Go always
1630 *****
1631 *****
1632 **
1633 ** Name: A-MULT - Multiply A[A] by C[A], result in A[9:0]
1634 **
1635 ** Category: MTHUTL
1636 **
1637 ** Purpose: Multiply 20-bit hex integers
1638 **
1639 ** Entry:
1640 ** A[A], C[A] are the operands
1641 ** If HEXMODE, does HEX multiply; if DECMODE, DECIMAL mult
1642 **
1643 ** Exit:
1644 ** P has been preserved
1645 ** A[9:0] = product
1646 ** Carry set
1647 **
1648 ** Uses.....
1649 ** Inclusive: A[W],B[W],C[W]
1650 **
1651 ** Stk lvls: 0
1652 **
1653 ** Date Programmer Modification

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```

1654      ** -----
1655      ** 09/22/83      NZ      Updated documentation
1656      ** 12/06/82      NZ      Changed result to A[9:0]
1657      ** 01/01/00      SA      Wrote original (mainframe)
1658      **
1659      ****
1660      ****
1661 F0E22 AF1 =A-MULT B=0      W
1662 F0E25 DC      ABEX      A      B[A] is multiplicand, B[15:5]=0
1663 F0E27 AF0      A=0      W      Clear result register
1664 F0E2A 8AA      ?C=0     A      Zero multiplier?
1665 F0E2D 00      RTNYES
1666 F0E2F 80FE     CPEX      14      Save P in C[14]
1667 F0E33 20      P=      0
1668 F0E35 570     GONC      M-STRT      Go always
1669      *-
1670      *-
1671 F0E38 0C      NXTDGT P=P+1      Go to next digit
1672 F0E3A BF1      BSL      W      Shift multiplicand left one digit
1673 F0E3D B8A      M-STRT C=-C      P      Zero digit?
1674 F0E40 57F     GONC      NXTDGT      Yes...go to next digit
1675      *
1676 F0E43 A70     ADCYCL A=A+B      W      ADD MULTIPLICAND TO RESULT
1677 F0E46 431     GOC      OVFLOW      ***This will NEVER happen!***
1678 F0E49 B06     C=C+1     P      Increment digit
1679 F0E4C 56F     GONC      ADCYCL      No carry=not done...repeat ADCYCL
1680 F0E4F 8AE     ?C#0     A      More digits remaining?
1681 F0E52 6E      GOYES     NXTDGT      Yes...go to next digit
1682 F0E54 80DE     P=C      14      No...restore P from C[14]
1683 F0E58 02     RTNSC
1684      *-
1685      *-
1686 F0E5A AF0     OVFLOW   A=0      W      ***This code will never be used***
1687 F0E5D A7C     A=A-1    W      ***
1688 F0E60 80DE     P=C      14      ***
1689 F0E64 03     RTNCC
1690      ****
1691      ****
1692      **
1693      ** Name:      UCRANG - Convert to upper case, check if [A-Z]
1694      ** Name:      CONVUC - Convert to upper case
1695      ** Name:      RANGE - Check if in given range
1696      ** Name:      RANGEN - Check if in [0-9]
1697      ** Name:      RANGEA - Check if in [A-Z]
1698      **
1699      ** Category:   PILUTL
1700      **
1701      ** Purpose:
1702      **      A[B] is item to work with:
1703      **      UCRANG: Determine if letter, convert to upper case
1704      **      CONVUC: Convert to upper case (if lower case)
1705      **      RANGE: Determine if in specified range of characters
1706      **      RANGEN: Check if in [0-9]
1707      **      RANGEA: Check if in [A-Z]
1708      **

```

```

1709      ** Entry:
1710      **      A[B] contains the character to be checked
1711      **      P=0, HEXMODE
1712      **
1713      ** Exit:
1714      **      P=0
1715      **      Carry set if not in range
1716      **      Carry clear if in range
1717      **
1718      ** Calls:(UCRANG):          RANGEA,<CONVUC>
1719      ** Calls:(CONVUC):         RANGE
1720      ** Calls:(RANGE):          None
1721      **
1722      ** Uses.....
1723      ** Inclusive: C[A] (CONVUC also changes A[B] if in [a-z])
1724      **
1725      ** Stk lvls (UCRANG):        1 (RANGEA)<CONVUC>
1726      ** Stk lvls (CONVUC):       1 (RANGE)
1727      ** Stk lvls (RANGE):        0
1728      **
1729      ** History:
1730      **
1731      **      Date      Programmer      Modification
1732      **      -----      -
1733      **      01/03/83      NZ          Updated documentation
1734      **
1735      ****
1736      ****
1737 F0E66 7910 =UCRANG GOSUB RANGEA      Check if in [A-Z]
1738 F0E6A 500      RTNCC          If carry clear, Done!
1739      *
1740      * Fall through to convert to upper case
1741      *
1742 F0E6D 3316 =CONVUC LCASC  \za\
1743      A7
1743 F0E73 7C10      GOSUB RANGE
1744 F0E77 400      RTNC
1745 F0E7A 3102      LCHEX 20
1746 F0E7E B6A      A=A-C B
1747 F0E81 03      RTNCC
1748      *-
1749      *-
1750 F0E83 3314 =RANGEA LCASC  \ZA\
1751      A5
1751 F0E89 6900      GOTO RANGE
1752      *-
1753      *-
1754 F0E8D 3303 =RANGEN LCASC  \90\
1755      93
1755 F0E93 9E2 =RANGE ?A<C B
1756 F0E96 00      RTNYES
1757 F0E98 F6      CSR A
1758 F0E9A BB6      CSR X
1759 F0E9D B62      C=C-A B
1760 F0EA0 01      RTN

```

```
1761 *****
1762 *****
1763 **
1764 ** Name:      GETALR - Get data into A[W] from @D1,left>right
1765 **
1766 ** Category:  PILUTL
1767 **
1768 ** Purpose:
1769 **     Read data from @ D1 into A[W], from A[15:14] to A[B]
1770 **
1771 ** Entry:
1772 **     D1 points to the data in RAM
1773 **     P is a count of bytes to be read into A[W]
1774 **     Bytes are to be entered with the last byte in A[B]
1775 **
1776 ** Exit:
1777 **     "P" data bytes in A[W]
1778 **     P=0
1779 **
1780 ** Calls:     None
1781 **
1782 ** Uses.....
1783 **     Inclusive: A[W],C[B],D1,P
1784 **
1785 ** Stk lvls:  0
1786 **
1787 ** History:
1788 **
1789 **     Date      Programmer      Modification
1790 **     -----      -
1791 **     01/03/83      NZ              Updated documentation
1792 **
1793 *****
1794 *****
1795 FOER2 14F =GETALR C=DAT1 B
1796 FOER5 171      D1=D1+ 2
1797 FOER8 BFO =ALRNOG ASL W
1798 FOERB BFO      ASL W
1799 FOERE AEA      A=C B
1800 FOEB1 OD      P=P-1
1801 FOEB3 880     ?PH O
1802 FOEB6 CE      GOYES GETALR
1803 FOEB8 01      RTN
1804 *****
1805 *****
1806 **
1807 ** Name:      PUTARL - Put data from A[W] (Right to left)
1808 ** Name:      PUTALR - Put data from A[W] (Left to right)
1809 **
1810 ** Category:  PILUTL
1811 **
1812 ** Purpose:
1813 **     Output data from A[W] to the HPIL loop
1814 **
1815 ** Entry:
```



```

1816      **      DO points to mailbox
1817      **      I am talker on loop
1818      **      P is a count of bytes to be output from A[W]
1819      **      PUTARL outputs bytes starting with A[B]
1820      **      PUTALR outputs bytes starting with A[15:14]
1821      **
1822      ** Exit:
1823      **      Carry clear: P=0, all OK
1824      **      Carry set: error (P, C[0] are error code)
1825      **
1826      ** Calls:      PUTD
1827      **
1828      ** Uses.....
1829      ** Exclusive: A[W],C[A],P
1830      ** Inclusive: A[W],C[W],P,ST[3:0]
1831      **
1832      ** Stk lvls:   1 (PUTD)
1833      **
1834      ** History:
1835      **
1836      **      Date      Programmer      Modification
1837      **      -----      -
1838      **      01/03/83      NZ              Updated documentation
1839      **
1840      ****
1841      ****
1842 FOEBA D6      =PUTARL C=A      A
1843 FOEBC 814      ASRC
1844 FOEBF 814      ASRC
1845      *
1846      * Put A[W] from right to left, no shift
1847      *
1848 FOEC2 764E    =ARLNOS GOSUB Putd
1849 FOEC6 400      RTNC              Return if error (carry set)
1850 FOEC9 0D      P=P-1
1851 FOECB 880      ?PH      0
1852 FOECE CE      GOYES PUTARL
1853 FOEDO 01      RTN              Done!
1854      *
1855      *
1856 FOED2 810      =PUTALR ASLC
1857 FOED5 810      ASLC
1858 FOED8 D6      C=A      A
1859      *
1860      * Put A[W] from left to right, no shift
1861      *
1862 FOEDA 7E2E    =ALRNOS GOSUB Putd
1863 FOEDE 400      RTNC              Return if error (carry set)
1864 FOEE1 0D      P=P-1
1865 FOEE3 880      ?PH      0
1866 FOEE6 CE      GOYES PUTALR
1867 FOEE8 01      RTN              Done!
1868      ****
1869      ****
1870      **
  
```

```
1871      ** Name:      PUTDX - Output multiple data bytes (P is count)
1872      **
1873      ** Category:  PILI/O
1874      **
1875      ** Purpose:
1876      **      Output data to the loop: first the contents of C[B],
1877      **      then P-1 zero bytes
1878      **
1879      ** Entry:
1880      **      D0 points to mailbox
1881      **      I am talker
1882      **      P contains the total number of bytes to send
1883      **
1884      ** Exit:
1885      **      P=0
1886      **      Carry set if error (P is error #)
1887      **
1888      ** Calls:     PUTD
1889      **
1890      ** Uses.....
1891      ** Exclusive: C[A],P
1892      ** Inclusive: C[W],P,ST[3:0]
1893      **
1894      ** Stk lvls:  1 (PUTD)
1895      **
1896      ** History:
1897      **
1898      **      Date      Programmer      Modification
1899      **      -----      -
1900      **      01/03/83      NZ              Updated documentation
1901      **
1902      **
1903      **
1904      **
1904 FOEEA 7E1E =PUTDX GOSUB Putd
1905 FOEEE D2      C=0  A
1906 FOEF0 400      RTNC              Return if error (carry set)
1907 FOEF3 0D      P=P-1
1908 FOEF5 880      ?PH  0
1909 FOEF8 2F      GOYES  PUTDX
1910 FOEFA 01      RTN              Done!
1911      **
1912      **
1913      **
1914      ** Name:      ASLcN - Shift the A register n nibbles LEFT
1915      ** Name:      ASRCn - Shift the A register n nibbles RIGHT
1916      **
1917      ** Category:  PILUTL
1918      **
1919      ** Purpose:
1920      **      Shift the A register by a given number of nibbles
1921      **
1922      ** Entry:
1923      **      None
1924      **
1925      ** Exit:
```

```
1926      **      A[W] is rotated the given # of nibbles
1927      **
1928      ** Calls:      None
1929      **
1930      ** Uses.....
1931      ** Inclusive: A[W] (shifted as per instructions)
1932      **
1933      ** Stk lvls:  0
1934      **
1935      ** NOTE: Does not alter P or carry!!!
1936      **
1937      ** History:
1938      **
1939      **      Date      Programmer      Modification
1940      **      -----      -
1941      ** 01/03/83      NZ      Updated documentation
1942      **
1943      ****
1944      ****
1945 FOEFC      =ASRC8
1946 FOEFC 810  =ASLC8  ASLC
1947 FOEFF      =ASRC9
1948 FOEFF 810  =ASLC7  ASLC
1949 FOF02      =ASRC10
1950 FOF02 810  =ASLC6  ASLC
1951 FOF05      =ASRC11
1952 FOF05 810  =ASLC5  ASLC
1953 FOF08      =ASRC12
1954 FOF08 810  =ASLC4  ASLC
1955 FOF0B      =ASRC13
1956 FOF0B 810  =ASLC3  ASLC
1957 FOF0E      =ASRC14
1958 FOF0E 810  =ASLC2  ASLC
1959 FOF11      =ASRC15
1960 FOF11 810  =ASLC1  ASLC
1961 FOF14 01   RTN
1962      * _
1963      * _
1964 FOF16      =ASRC7
1965 FOF16 814  =ASLC9  ASRC
1966 FOF19      =ASRC6
1967 FOF19 814  =ASLC10 ASRC
1968 FOF1C      =ASRC5
1969 FOF1C 814  =ASLC11 ASRC
1970 FOF1F      =ASRC4
1971 FOF1F 814  =ASLC12 ASRC
1972 FOF22      =ASRC3
1973 FOF22 814  =ASLC13 ASRC
1974 FOF25      =ASRC2
1975 FOF25 814  =ASLC14 ASRC
1976 FOF28      =ASRC1
1977 FOF28 814  =ASLC15 ASRC
1978 FOF2B 01   RTN
1979      ****
1980      ****
```

```
1981      **
1982      ** Name:      CSLCn - Shift C[W] the given # of nibbles LEFT
1983      ** Name:      CSRCn - Shift C[W] the given # of nibbles RIGHT
1984      **
1985      ** Category:   PILUTL
1986      **
1987      ** Purpose:
1988      **      Shift the C register by a given number of nibbles
1989      **
1990      ** Entry:
1991      **      None
1992      **
1993      ** Exit:
1994      **      C[W] is rotated the given # of nibbles
1995      **
1996      ** Calls:      None
1997      **
1998      ** Uses.....
1999      **      Inclusive: C[W] (rotated as per instructions)
2000      **
2001      ** Stk lvls:   0
2002      **
2003      ** NOTE: Does not alter P or carry!!!
2004      **
2005      ** History:
2006      **
2007      **      Date      Programmer      Modification
2008      **      -----      -
2009      **      01/03/83      NZ              Updated documentation
2010      **
2011      ****
2012      ****
2013 FOF2D      =CSRC8
2014 FOF2D 812  =CSLC8  CSLC
2015 FOF30      =CSRC9
2016 FOF30 812  =CSLC7  CSLC
2017 FOF33      =CSRC10
2018 FOF33 812  =CSLC6  CSLC
2019 FOF36      =CSRC11
2020 FOF36 812  =CSLC5  CSLC
2021 FOF39      =CSRC12
2022 FOF39 812  =CSLC4  CSLC
2023 FOF3C      =CSRC13
2024 FOF3C 812  =CSLC3  CSLC
2025 FOF3F      =CSRC14
2026 FOF3F 812  =CSLC2  CSLC
2027 FOF42      =CSRC15
2028 FOF42 812  =CSLC1  CSLC
2029 FOF45 01   =RTN
2030      *
2031      *
2032 FOF47      =CSRC7
2033 FOF47 816  =CSLC9  CSRC
2034 FOF4A      =CSRC6
2035 FOF4A 816  =CSLC10 CSRC
```

```
2036 FOF4D      =CSRC5
2037 FOF4D 816  =CSLC11 CSRC
2038 FOF50      =CSRC4
2039 FOF50 816  =CSLC12 CSRC
2040 FOF53      =CSRC3
2041 FOF53 816  =CSLC13 CSRC
2042 FOF56      =CSRC2
2043 FOF56 816  =CSLC14 CSRC
2044 FOF59      =CSRC1
2045 FOF59 816  =CSLC15 CSRC
2046 FOF5C 01   RTN
2047           *****
2048           *****
2049           **
2050           ** Name:          BLANKC - Load C[W] with 8 blanks
2051           **
2052           ** Category:     GENUTL
2053           **
2054           ** Purpose:
2055           **      Load 8 blanks into C[W]
2056           **
2057           ** Entry:
2058           **      None
2059           **
2060           ** Exit:
2061           **      P=0, C[W]="      "
2062           **      Carry unchanged!!!
2063           **
2064           ** Calls:        None
2065           **
2066           ** Uses.....
2067           **      Inclusive: C[W],P
2068           **
2069           ** Stk lvls:     None
2070           **
2071           ** History:
2072           **
2073           **      Date      Programmer      Modification
2074           **      -----      -
2075           **      12/06/82      NZ          Added routine and documentation
2076           **
2077           *****
2078           *****
2079 FOF5E 20     =BLANKC P=      0
2080 FOF60 3F02   LCASC \      \
           0202
           0202
           0202
           02
2081 FOF72 01   RTN
2082           *****
2083           *****
2084           **
2085           ** Name:          D1=AVE,D1=AVS,D1@AVE,D1@AVS - Set D1 to pointer
2086           **
```

```
2087      ** Category:  PTRUTL
2088      **
2089      ** Purpose:
2090      **      Set D1 either at AVMEME/AVMEMS or (AVMEME)/(AVMEMS)
2091      **
2092      ** Entry:
2093      **      None
2094      **
2095      ** Exit:
2096      **      D1 @ pointer, carry unchanged
2097      **      (D1@xxx:C[A]=pointer address)
2098      **
2099      ** Calls:      None
2100      **
2101      ** Uses.....
2102      ** Inclusive: C[A],D1
2103      **
2104      ** Stk lvls:  0 (D1@xxx uses 1 stack level)
2105      **
2106      ** NOTE: Does not change P or carry!
2107      **
2108      ** History:
2109      **
2110      **      Date      Programmer      Modification
2111      **      -----      -
2112      **      02/07/83      NZ      Changed D1=C to CD1EX (Exit cond)
2113      **      01/12/83      NZ      Added documentation
2114      **
2115      ****
2116      ****
2117 FOF74 1F00 =D1=AVE D1=(5) =AVMEME
          000
2118 FOF7B 01      RTN
2119      *_-
2120      *_-
2121 FOF7D 1F00 =D1=AVS D1=(5) =AVMEMS
          000
2122 FOF84 01      RTN
2123      *_-
2124      *_-
2125 FOF86 7AEF =D1@AVE GOSUB  D1=AVE
2126 FOF8A 147  =ReadD1 C=DAT1 A
2127 FOF8D 137      CD1EX      Leave pointer address in C[A]
2128 FOF90 01      RTN
2129      *_-
2130      *_-
2131 FOF92 77EF =D1@AVS GOSUB  D1=AVS
2132 FOF96 63FF      GOTO    ReadD1
2133 FOF9A      END
```

=A-MULT	Abs	986658	#FOE22	-	1661			
ADCYCL	Abs	986691	#FOE43	-	1676	1679		
=ALRNOG	Abs	986792	#FOEA8	-	1797			
=ALRNOS	Abs	986842	#FOEDA	-	1862			
=ARLNOS	Abs	986818	#FOEC2	-	1848			
=ASLC1	Abs	986897	#FOF11	-	1960			
=ASLC10	Abs	986905	#FOF19	-	1967			
=ASLC11	Abs	986908	#FOF1C	-	1969			
=ASLC12	Abs	986911	#FOF1F	-	1971			
=ASLC13	Abs	986914	#FOF22	-	1973			
=ASLC14	Abs	986917	#FOF25	-	1975			
=ASLC15	Abs	986920	#FOF28	-	1977			
=ASLC2	Abs	986894	#FOFOE	-	1958			
=ASLC3	Abs	986891	#FOFOB	-	1956			
=ASLC4	Abs	986888	#FOF08	-	1954			
=ASLC5	Abs	986885	#FOF05	-	1952			
=ASLC6	Abs	986882	#FOF02	-	1950			
=ASLC7	Abs	986879	#FOEFF	-	1948			
=ASLC8	Abs	986876	#FOEFC	-	1946			
=ASLC9	Abs	986902	#FOF16	-	1965			
=ASRC1	Abs	986920	#FOF28	-	1976			
=ASRC10	Abs	986882	#FOF02	-	1949			
=ASRC11	Abs	986885	#FOF05	-	1951			
=ASRC12	Abs	986888	#FOF08	-	1953			
=ASRC13	Abs	986891	#FOFOB	-	1955			
=ASRC14	Abs	986894	#FOFOE	-	1957			
=ASRC15	Abs	986897	#FOF11	-	1959			
=ASRC2	Abs	986917	#FOF25	-	1974			
=ASRC3	Abs	986914	#FOF22	-	1972			
=ASRC4	Abs	986911	#FOF1F	-	1970	922		
=ASRC5	Abs	986908	#FOF1C	-	1968			
=ASRC6	Abs	986905	#FOF19	-	1966			
=ASRC7	Abs	986902	#FOF16	-	1964			
=ASRC8	Abs	986876	#FOEFC	-	1945			
=ASRC9	Abs	986879	#FOEFF	-	1947			
=ATNCHK	Abs	986053	#FOBC5	-	982			
ATNCHc	Abs	986094	#FOBEE	-	1001	983	994	996
ATNFLG	Ext			-	989			
AVMEME	Ext			-	2117			
AVMEMS	Ext			-	2121			
Attn	Ext			-	982			
=BLANKC	Abs	986974	#FOF5E	-	2079			
CHKSET	Ext			-	1101			
CHKST+	Abs	986227	#FOC73	-	1133	1100		
CHKST.	Abs	986184	#FOC48	-	1107	1104		
=CHKSTS	Abs	986148	#FOC24	-	1097	1091		
CHKSTe	Abs	986225	#FOC71	-	1132			
CHKSTn	Abs	986234	#FOC7A	-	1138	1112		
=CONVUC	Abs	986733	#FOE6D	-	1742			
=CSLC1	Abs	986946	#FOF42	-	2028			
=CSLC10	Abs	986954	#FOF4A	-	2035			
=CSLC11	Abs	986957	#FOF4D	-	2037			
=CSLC12	Abs	986960	#FOF50	-	2039			
=CSLC13	Abs	986963	#FOF53	-	2041			
=CSLC14	Abs	986966	#FOF56	-	2043			

=CSLC15	Abs	986969	#F0F59	-	2045			
=CSLC2	Abs	986943	#F0F3F	-	2026			
=CSLC3	Abs	986940	#F0F3C	-	2024			
=CSLC4	Abs	986937	#F0F39	-	2022			
=CSLC5	Abs	986934	#F0F36	-	2020			
=CSLC6	Abs	986931	#F0F33	-	2018			
=CSLC7	Abs	986928	#F0F30	-	2016			
=CSLC8	Abs	986925	#F0F2D	-	2014			
=CSLC9	Abs	986951	#F0F47	-	2033			
=CSRC1	Abs	986969	#F0F59	-	2044			
=CSRC10	Abs	986931	#F0F33	-	2017			
=CSRC11	Abs	986934	#F0F36	-	2019			
=CSRC12	Abs	986937	#F0F39	-	2021			
=CSRC13	Abs	986940	#F0F3C	-	2023			
=CSRC14	Abs	986943	#F0F3F	-	2025			
=CSRC15	Abs	986946	#F0F42	-	2027			
=CSRC2	Abs	986966	#F0F56	-	2042			
=CSRC3	Abs	986963	#F0F53	-	2040			
=CSRC4	Abs	986960	#F0F50	-	2038			
=CSRC5	Abs	986957	#F0F4D	-	2036			
=CSRC6	Abs	986954	#F0F4A	-	2034			
=CSRC7	Abs	986951	#F0F47	-	2032			
=CSRC8	Abs	986925	#F0F2D	-	2013			
=CSRC9	Abs	986928	#F0F30	-	2015			
=D1=AVE	Abs	986996	#F0F74	-	2117	2125		
=D1=AVS	Abs	987005	#F0F7D	-	2121	2131		
=D1@AVE	Abs	987014	#F0F86	-	2125			
=D1@AVS	Abs	987026	#F0F92	-	2131			
DDL	Ext			-	937			
DDT	Ext			-	901			
=DTH	Abs	986471	#F0D67	-	1476			
DTHO	Abs	986486	#F0D76	-	1481	1485	1507	
DTH1	Abs	986499	#F0D83	-	1488	1482		
DTH2	Abs	986518	#F0D96	-	1496	1491		
DTH3	Abs	986532	#F0DA4	-	1502	1497		
DTH4	Abs	986541	#F0DAD	-	1506	1493	1499	1503
DevID	Ext			-	721			
DevTyp	Ext			-	660			
Device	Ext			-	1044	1121		
DsLoop	Ext			-	656			
DsNull	Ext			-	646			
=END	Abs	985207	#F0877	-	250	232		
=ENDFN	Abs	985173	#F0855	-	236			
=ENDST	Abs	985163	#F084B	-	232			
=FNDCH-	Abs	986128	#F0C10	-	1090	368		
=FNDCHK	Abs	986139	#F0C1B	-	1095			
FNDMB-	Ext			-	1090			
FNDMBX	Ext			-	1095			
FROO-0	Abs	985148	#F083C	-	176	171		
FROO-1	Abs	985139	#F0833	-	170	165		
FROO-2	Abs	985130	#F082A	-	164	159		
FROO-3	Abs	985121	#F0821	-	158	153		
FROOXX	Abs	985076	#F07F4	-	124	118		
FROXXX	Abs	985065	#F07E9	-	108	80		
FR11XX	Abs	985052	#F07DC	-	97	90		

FR1XX	Abs	985047	#F07D7	-	89				
=FRAME+	Abs	985026	#F07C2	-	67	1186			
=FRAME-	Abs	985040	#F07D0	-	77				
FRAME0	Abs	985040	#F07D0	-	78	69			
FREND	Abs	985146	#F083A	-	173	99	135	151	
FRERR	Abs	985159	#F0847	-	183	141	177		
FRERRS	Abs	985157	#F0845	-	182	144			
=GADDR	Abs	985492	#F0994	-	635	492			
GADDR\$	Abs	985621	#F0A15	-	714	709			
GADDR&	Abs	985747	#F0A93	-	790	931			
GADDR'	Abs	985562	#F09DA	-	676	649	800		
GADDR+	Abs	985923	#F0B43	-	890	889			
GADDR-	Abs	985734	#F0A86	-	778	773			
GADDR0	Abs	985516	#F09AC	-	652	641			
GADDR1	Abs	985533	#F09BD	-	660	654			
GADDR2	Abs	985603	#F0A03	-	699	672			
GADDR3	Abs	985607	#F0A07	-	702	662			
GADDR4	Abs	985703	#F0A67	-	768	825			
GADDR5	Abs	985790	#F0ABE	-	815	771	777	780	
GADDR6	Abs	985825	#F0AE1	-	840	724			
GADDR7	Abs	985930	#F0B4A	-	892	881			
GADDR8	Abs	985948	#F0B5C	-	900	894			
GADDR9	Abs	986049	#F0BC1	-	945	941			
GADDR?	Abs	985614	#F0A0E	-	711	713			
GADDRN	Abs	985508	#F09A4	-	647	657			
GADDRd	Abs	985646	#F0A2E	-	732	723			
GADDRe	Abs	985816	#F0AD8	-	834	503	796		
GADDRf	Abs	985811	#F0AD3	-	828	824	876		
GADDRn	Abs	985772	#F0A8C	-	803	699	754	829	949
GADDRu	Abs	985816	#F0AD8	-	833	846			
GADDRv	Abs	985869	#F0B0D	-	866	942			
GADDR-	Abs	985941	#F0B55	-	895	904			
GADDRm	Abs	986019	#F0BA3	-	934	891	896	918	925
GET	Ext			-	1312				
=GETALR	Abs	986786	#F0ER2	-	1795	1802			
=GETDev	Abs	986096	#F0BFO	-	1036	375			
GETERR	Ext			-	434				
GETHS2	Ext			-	1098				
GETID	Ext			-	768				
GETMBX	Ext			-	251				
GETST	Ext			-	440	1105			
=GTYPE	Abs	986260	#F0C94	-	1227				
GTYPE-	Abs	986283	#F0CAB	-	1232	1244			
GTYPE0	Abs	986300	#F0CBC	-	1241	1240			
GTYPE1	Abs	986310	#F0CC6	-	1245	1250	1262		
GTYPE2	Abs	986314	#F0CCA	-	1249	1238			
GTYPE3	Abs	986326	#F0CD6	-	1254	1261			
GTYPE4	Abs	986334	#F0CDE	-	1259	1252			
Get	Abs	986386	#F0D12	-	1312	1184			
Geterr	Abs	985321	#F08E9	-	434	429	746	1103	
Getrbx	Abs	985207	#F0877	-	251	242	456	481	1124
=HTOD	Abs	986556	#F0DBC	-	1548				
HTOD1	Abs	986566	#F0DC6	-	1556	1559			
HTOD2	Abs	986577	#F0DD1	-	1562	1557			
HTOD3	Abs	986584	#F0DD8	-	1564	1567			

=HTODX	Abs	986596	#FODE4	-	1600				
HTODX1	Abs	986609	#FODF1	-	1605	1608	1627		
HTODX2	Abs	986621	#FODFD	-	1611	1606			
HTODX3	Abs	986633	#FOE09	-	1621	1613			
HTODX4	Abs	986653	#FOE1D	-	1628	1622			
HTODXr	Abs	986629	#FOE05	-	1617	1629			
=LISTEN	Abs	986353	#FOCF1	-	1299	1349			
LOOPST	Ext			-	1038	1118			
Loop	Ext			-	386	652			
M-STRT	Abs	986685	#FOE3D	-	1673	1668			
=MTYL	Abs	986392	#FOD18	-	1347	934			
=MTYLC	Abs	986406	#FOD26	-	1351				
=MTYLL	Abs	986399	#FOD1F	-	1349				
NXTDGT	Abs	986680	#FOE38	-	1671	1674	1681		
Null	Ext			-	383	639			
OVFLOW	Abs	986714	#FOE5A	-	1686	1677			
PRMSG1	Abs	986449	#FOD51	-	1435	1441			
=PRMSGA	Abs	986446	#FOD4E	-	1434				
=PUTALR	Abs	986834	#FOED2	-	1856	1866			
=PUTARL	Abs	986810	#FOEBA	-	1842	1852			
PUTC	Ext			-	1301				
PUTC+	Ext			-	740				
PUTC=D	Abs	986359	#FOCF7	-	1300	1392			
PUTD	Ext			-	1309				
=PUTDX	Abs	986858	#FOEEA	-	1904	1909			
PUTE	Ext			-	424	1231			
=PUTGF	Abs	986246	#FOC86	-	1183	1232			
=PUTGF+	Abs	986242	#FOC82	-	1182	669	873		
=PUTGF-	Abs	986238	#FOC7E	-	1180	416	483	793	821
Putc	Abs	986362	#FOCFA	-	1301	1182	1306	1352	1389
=Putd	Abs	986380	#FODOC	-	1309	1437	1848	1862	1904
=RANGE	Abs	986771	#FOE93	-	1755	1743	1751		
=RANGEA	Abs	986755	#FOE83	-	1750	1737			
=RANGEN	Abs	986765	#FOE8D	-	1754				
READRG	Ext			-	906				
RESTRT	Ext			-	455	460			
=ReadD1	Abs	987018	#FOF8A	-	2126	2132			
Rewind	Ext			-	936				
SEEKA	Ext			-	893				
SETLP	Ext			-	357				
SFLAG?	Ext			-	499				
=START	Abs	985213	#F087D	-	353				
START1	Abs	985327	#F08EF	-	440	430			
START#	Abs	985295	#F08CF	-	423	414			
=START+	Abs	985219	#F0883	-	359				
=START-	Abs	985222	#F0886	-	363				
START0	Abs	985336	#F08F8	-	442				
START1	Abs	985348	#F0904	-	450	449			
START2	Abs	985377	#F0921	-	460	443	454		
START3	Abs	985453	#F096D	-	487	401	451	457	
START5	Abs	985488	#F0990	-	502	420	486		
STARTS	Abs	985312	#F08E0	-	429	417	419		
STARTd	Abs	985266	#F08B2	-	397	382	385	388	
STARTn	Abs	985270	#F08B6	-	407	376			
STARTp	Abs	985424	#F0950	-	476				

STARTs	Abs	985433	#F0959	-	480	468	477				
STARTe	Abs	985319	#F08E7	-	431						
SWAPO1	Ext			-	469	472					
=TALK	Abs	986436	#F0D44	-	1391						
TSTAT	Ext			-	880						
TSTATA	Ext			-	903						
=UCRANG	Abs	986726	#FOE66	-	1737						
=ULYL	Abs	986346	#FOCEA	-	1297						
=UNLPUT	Abs	986368	#F0D00	-	1304	245	732	1297	1347	1386	
UNT	Ext			-	243	807					
=UTLEND	Abs	985185	#F0861	-	242	237					
VolLb1	Ext			-	844						
=YTML	Abs	986416	#F0D30	-	1386	1227					
=YTMLL	Abs	986423	#F0D37	-	1388						
bPILAI	Ext			-	470						
eABORT	Ext			-	997						
eBADMD	Ext			-	392	1133					
eNEWTA	Ext			-	888						
eNOFND	Ext			-	810						
eNORDY	Ext			-	1260						
ePIL	Ext			-	393	811	836	1134	1255		
eRANGE	Ext			-	1628						
eTAPE	Ext			-	885	895					
eUNEXP	Ext			-	835	1253					
f1EXTD	Ext			-	462						
f1NZ4	Ext			-	452						
i/OFND	Ext			-	471						
mADDRl	Ext			-	1299						
mADDRM	Ext			-	1351	1388					
mADDRT	Ext			-	1391						
mAUTOA	Ext			-	467	476					
mFIND1	Ext			-	668						
mFINDD	Ext			-	867						
mGETCA	Ext			-	792						
mINCCA	Ext			-	820						
mPULOP	Ext			-	415						
mRSTCA	Ext			-	739						
mSAI	Ext			-	1230						
mSDA	Ext			-	905						
mTAKEI	Ext			-	423						
mUNL	Ext			-	1305						
nXTSTM	Ext			-	233						
p3DATA	Ext			-	73						
pACK	Ext			-	150						
pADDR	Ext			-	119	485	671	795	823	875	
pDATA	Ext			-	104	1237					
pEOT	Ext			-	160	1249					
pETE	Ext			-	154						
pHALTD	Ext			-	166						
pIFC	Ext			-	172						
pSTATE	Ext			-	418	828	1251				
pTERM	Ext			-	178						
pUTYPE	Ext			-	183						
sCONTR	Ext			-	1111						
=sFLAG?	Abs	985481	#F0989	-	499						

sMANUL	Ext	-	1099			
sReadd	Ext	-	359	413	442	461
sUNCNF	Ext	-	448			
sflag?	Abs	985474 #F0982	- 496	453	463	

Input Parameters

Source file name is NZ&GPR::MS

Listing file name is NZ/GPR:TI:ML::-1

Object file name is NZ%GPR:TI:MS::-1

Initial flag settings are
111111
0123456789012345

Errors

None

Saturn Assembler News

```

1      *
2      *      N  N  ZZZZ  &      BBBB  A      SSS
3      *      N  N      Z  & &  B  B  A  A  S  S
4      *      NN N      Z  & &  B  B  A  A  S
5      *      N N N      Z  &      BBBB  A  A  SSS
6      *      N NN  Z      & & &  B  B  AAAAA  S
7      *      N  N  Z      & &  B  B  A  A  S  S
8      *      N  N  ZZZZ  && &  BBBB  A  A  SSS
9      *
10     *
11     *      TITLE  BASIC ROUTINES <840116.1657>
12 FOF9A      *      ABS      #FOF9A      TIXHP6 address (fixed)
13     *      *****
14     *      *****
15     *      **
16     *      ** Name:      PRTIS - Poll handler for the PRINT statement
17     *      ** Name:      PRTIS+ - Poll handler for pPRTCL (D1 @ address)
18     *      ** Name:      PRTISc - Address device as listener (D1 @ addr)
19     *      **
20     *      ** Category:  POLL
21     *      **
22     *      ** Purpose:
23     *      **      Handle pPRTIS/pPRTCL/... (address device as listener,
24     *      **      me as talker, load address of routine to send data)
25     *      **
26     *      ** Entry:
27     *      **      P=0, HEXMODE
28     *      **      PRTIS+,PRTISc:
29     *      **      D1 points to the 7 nib device assignment
30     *      **      FUNC D1 contains the value to return in D1
31     *      **
32     *      ** Exit:
33     *      **      Carry clear
34     *      **      If XM=0, A[A] is the address of the PRINT handler
35     *      **      If XM=1, Did NOT handle the poll
36     *      **      PRTIS+,PRTISc: D1 restored from FUNC D1
37     *      **
38     *      ** Calls:      TSAVD1,CHKASN,TRES D1,START,ULYL,MYL
39     *      **
40     *      ** Uses.....
41     *      **      Inclusive: A,B,C,D[15:13,5:0],DO,P,FUNC DO[2:0],FUNC D1
42     *      **
43     *      ** Stk lvls:  4 (START)
44     *      **
45     *      ** NOTE: Does not alter D1 or status bits
46     *      **
47     *      ** History:
48     *      **
49     *      **      Date      Programmer      Modification
50     *      **      -----      -----      -----
51     *      **      11/29/83      NZ      Updated documentation
52     *      **      07/21/83      NZ      Removed check for mass storage
53     *      **      device (not correct as it is)
54     *      **      06/23/83      NZ      Changed call to CHKMSD to inline
55     *      **      code (only reference to CHKMSD)

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56      ** 02/23/83      JH      Added A[S] flag for MeTalk status
57      ** 02/17/83      NZ      Removed multiple devices
58      ** 02/03/83      NZ      Changed MeTalk from 4 to 9 (START
59      **                                     destroys ST4)
60      ** 01/20/83      JH      Added MeTalk status, send MTR
61      ** 12/15/82      NZ      Updated documentation
62      **
63      ****
64      ****
65      SaveIt EQU      6      Need to save this one after start
66      MeTalk EQU      9      Address me as talker
67      *
68 FOF9A ACO =PRTISc A=0 S      Entry for CLEAR, clear A[S] so My
69 FOF9D 6610      GOTO PRTISe      Talk ADR is not sent out
70      *_-
71      *_-
72 FOFA1 8E00 =PRTIS GOSUBL =TSAVD1      Save D1 in FUNCD1
73      00
74 FOFA7 1F00      D1=(5) =IS-PRT
75      000
76 FOFAE ACO =PRTIS+ A=0 S      Set status to address me to talk
77 FOFB1 A4C      A=A-1 S      A[S]=F
78 FOFB4 15F6 PRTISe C=DAT1 7
79 FOFB8 DA      A=C A      Save low 3 nibs in A[A]
80 FOFBA 8E00      GOSUBL =CHKASN
81      00
82 FOFCA 5F3      GONC PRTIS2      This is assigned...do it
83      *
84 FOFCA 5F3      * If carry, check if this is "NULL" or "LOOP"
85      *
86 FOFCA 5F3      *
87 FOFCA 5F3      *
88 FOFCA 5F3      *
89 FOFCA 5F3      *
90 FOFCA 5F3      *
91 FOFCA 5F3      *
92 FOFCA 5F3      *
93 FOFCE 7700      GOSUB PRTIS-      Get my address
94 FOFD2 5000      REL(5) =PREXT      (Address of part 3 handler)
95      0
96      *
97      * Following is the part 2&3 handler for "NULL" (Doesn't use
98      * anything, just clears carry)
99      *
100 FOFD7 03      =PREXT RTNCC
101      *_-
102 FOFD9 07      PRTIS- C=RSTK      Pop my address back
103 FOFDB 137      CD1EX
104 FOFDE 174      D1=D1+ 5      Skip the REL(5)
105 FOFE1 133      AD1EX      Leave address in A[A]
106      *

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107          * Carry is CLEAR from the D1=D1+ 5 above...TRES D1 doesn't
108          * affect the carry
109          *
110 FOFE4 8C00 Tred1  GOLONG =TRES D1      Restore D1, return "handled"
           00
111          *_-
112          *_-
113          *
114          * Not assigned or error...return, carry clear, XM=1
115          *
116 FOFER 1B00 PRTISO  DO=(5) =FUNCD0
           000
117 FOFF1 146          C=DATO A
118 FOFF4 0A          ST=C              Restore status bits from FUNCD0
119 FOFF6 7AEF PRTIS1  GOSUB  Tred1      Restore D1 from FUNCD1
120 FOFFA 21          P= 1
121 FOFFC 0D          P=P-1              Clear carry, P=0
122 FOFFE 00          RTNSXM             Return, not handled
123          *_-
124          *_-
125 F1000 1B00 PRTIS2  DO=(5) =FUNCD0    Save status bits in FUNCD0
           000
126 F1007 0B          CSTEM
127 F1009 15C2        DATO=C 3
128 F100D 0B          CSTEM
129 F100F 846        ST=0  SaveIt        Initially say don't save it
130 F1012 859        ST=1  MeTalk        Set up MeTalk status bit...
131 F1015 B44        A=A+1  S            ...MeTalk = 1 if A[S]=F
132 F1018 450        GOC  PRTIS,        ...MeTalk = 0 if A[S]=0
133 F101B 849        ST=0  MeTalk
134 F101E D7  PRTIS,  D=C  A            Put device specifier in D[A]
135 F1020 94A        ?C=0  S            Did CHKASN say to find it?
136 F1023 50  GOYES  PRTIS"           No...don't need to save it
137 F1025 856        ST=1  SaveIt        Yes...need to save address
138 F1028 7000 PRTIS"  GOSUB  =START    Set up the device
139 F102C 4DB  GOC  PRTISO            Error...can't handle the poll
140          *
141          * Now address listener, make me talker (conditionally)
142          *
143 F102F 96B          ?D=0  B            Is this "LOOP"?
144 F1032 61  GOYES  PRTS01            Yes...don't change addressing
145 F1034 879        ?ST=1  MeTalk        Should I be addressed as talker?
146 F1037 A0  GOYES  PRTIS@           Yes...set it up
147 F1039 7000        GOSUB  =ULYL       No...send UNL, LAD n
148 F103D 6700        GOTO  PRTS00       (Check errors at PRTS00)
149          *_-
150          *_-
151 F1041 7616 PRTIS@  GOSUB  Mtyl        Address device as listener
152 F1045 44A  PRTS00  GOC  PRTISO       MPIL error...don't handle it
153 F1048 866  PRTS01  ?ST=0  SaveIt      Do I need to write it out?
154 F104B 90  GOYES  PRTIS4           No...continue
155 F104D ABB  C=D  X                Yes...copy address from D[X]
156 F1050 15D2        DAT1=C 3          Write out the device address @ D1
157 F1054 729F PRTIS4  GOSUB  PRTISO     Restore caller's status, D1 (XM=1)
158 F1058 821  XM=0

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```
159      *
160 F105B 7000      GOSUB  PRTIS5      Get my current address...
161 F105F 07      PRTIS5  C=RSTK      ...pop it off...
162 F1061 DA      A=C      A      ...move it to A[A]...
163 F1063 3402      LC(5)  (PRASCI)-(PRTIS5) ...Offset of part 2 routine
      000
164 F106A CA      A=A+C  A      (Address of part 2 routine in A)
165 F106C 03      RTNCC
166      *-
167      *-
168 F106E AF2      PREND2  C=0      W
169 F1071 7CE5      GOSUB  Saveit      Deallocate any buffers
170 F1075 583      GONC   PREND3      Go always
171      *-
172      *-
173 F1078 0      CON(1) =FIXSPC      2 nibbles available here
174 F1079      BSS      2-1
175      *****
176      *****
177      **
178      ** Name:      PRASCI - Send ASCII characters to the loop
179      **
180      ** Category:  PILI/0
181      **
182      ** Purpose:
183      **      Send the ASCII characters to the loop (already set up)
184      **
185      ** Entry:
186      **      MBOX^ points to the desired mailbox
187      **      A[A] contains the length of the string in bytes
188      **      D[A] is the start address of the string
189      **
190      ** Exit:
191      **      If loop error, jumps to ERRORX
192      **      P=0
193      **      D1 positioned following last character sent
194      **
195      ** Calls:      GETMBX,WRITIT,TSAVD0,TRESDO,<ERRORX>
196      **
197      ** Uses.....
198      **      Inclusive: A[A],C,D1,P,FUNCD0,ST[8,3:0]
199      **
200      ** Stk lvls:  3 (pushed D0;WRITIT)(pushed D0;TRESDO)
201      **
202      ** History:
203      **
204      **      Date      Programmer      Modification
205      **      -----      -----      -----
206      **      01/27/84      NZ      Moved PRASER to pack 9 nibbles
207      **      12/15/82      NZ      Updated documentation
208      **      01/27/83      NZ      Modified entry, exit save method,
209      **      added exit condition on D1
210      **
211      *****
212      *****
```

```

213 F107A D300      REL(5) =PREND      Address of the final part
      0
214 F107F 09      =PRASCI C=ST
215 F1081 136      CDOEX      ST into DO, DO value into C[A]
216 F1084 7116     GOSUB  TsavdO      Save status in FUNCDO
217 F1088 06      RSTK=C      Save DO on RSTK
218 F108A 8E00     GOSUBL =GETMBX     Get the mailbox address
      00
219 F1090 DB      C=D      A
220 F1092 135     D1=C      Set D1 to the start of the buffer
221 *
222 * Now D1-->buffer, A[A] is length in bytes, DO-->mailbox
223 * Loop is addressed (Talker and Listener(s))
224 *
225 F1095 840      ST=0      =loopOK      Do not abort with one ATTN hit
226 F1098 8E00     GOSUBL =WRITIT     Transfer the data to the loop
      00
227 F109E 435     GOC      PRASER      Error if carry set
228 F10A1 7AF5     GOSUB  TresdO      Get status back to DO
229 F10A5 07      C=RSTK      Get old DO from RSTK
230 F10A7 136     CDOEX      Now DO restored, ST in C[X]
231 F10AA 0A      ST=C      Restore the status bits
232 F10AC 01      RTN
233 *-
234 *-
235 F10AE 8E00     PREND3  GOSUBL =UTLEND     Unaddress all talkers, listeners
      00
236 F10B4 03      PREND4  RTNCC
237 *-
238 *-
239 F10B6 0        CON(1) =FIXSPC      1 nibble available here
240 *****
241 *****
242 **
243 ** Name:      PREND - Clean up the loop after PRINT/OUTPUT
244 **
245 ** Category:  LOCAL
246 **
247 ** Purpose:
248 **      Clean up the loop after a PRINT/OUTPUT sequence
249 **
250 ** Entry:
251 **      Device(s) are addressed as listener(s)
252 **      MBOX^ points to the mailbox used
253 **
254 ** Exit:
255 **      DO points to the mailbox used
256 **      Carry clear (P may be non-zero)
257 **
258 ** Calls:     D1=SRO,SAVEIT,UTLEND
259 **
260 ** Uses.....
261 ** Inclusive: A,B,C,D,R2,R3,DO,D1,P,ST[3:0]
262 **
263 ** Stk lvls:  4 (UTLEND)(SAVEIT)

```

```

264      **
265      ** History:
266      **
267      **      Date      Programmer      Modification
268      **      -----      -
269      **      01/27/84      NZ      Rewrote to fix bug with PRINT not
270      **                                unaddressing the loop (checked
271      **                                LOOP by looking at STMR1!)
272      **      11/29/83      NZ      Updated documentation
273      **      12/15/82      NZ      Added documentation
274      **
275      ****
276      ****
277 F10B7  =PREND
278      *
279      * If device code equals OUTPTt, then need to deallocate the
280      * buffer!
281      *
282 F10B7 7CC5      GOSUB D1=SRO      Device code
283 F10BB 14F      C=DAT1 B      Read in 1 nib
284 F10BE 80D0      P=C 0      Copy device code to P
285 F10C2 1D00      D1=(2) (=STMR1)+2 Point to device spec
286 F10C6 880      ?PW =PRINTt      Is this PRINT?
287 F10C9 80      GOYES PREND1      No...D1 is OK
288 F10CB 1E00      D1=(4) =IS-PRT      Yes...look at IS-PRT
      00
289 F10D1 14F PREND1 C=DAT1 B
290 F10D4 96A      ?C=0 B      NULL or LOOP?
291 F10D7 DD      GOYES PREND4      Yes...exit cleanly
292      *
293 F10D9 880      ?PW =OUTPTt      If OUTPUT, deallocate any buffers
294 F10DC 2D      GOYES PREND3      Not output...Unaddress talk,listen
295 F10DE 6F8F      GOTO PREND2      Could be GONC, but leaves a nib
296      ****
297      ****
298      **
299      ** Name:      OUTPUT - Execute the OUTPUT statement
300      **
301      ** Category:  STExec
302      **
303      ** Purpose:
304      **      Send output to the specified device(s)
305      **
306      ** Entry:
307      **      DO at tokenized device specifier
308      **
309      ** Exit:
310      **      Through mainframe PRINT*
311      **
312      ** Calls:      GETDID,SAVEIT,TRESDO,<PRINT*>,<ERRORX>
313      **
314      ** Uses.....
315      **      Inclusive: A,B,C,D,R0-R4,DO,D1,P,FUNCxx,STMTD1[3:0],STMR1,
316      **      ST[11:0],all RAM that EXPEXC is permitted to use
317      **

```

```
318      ** Stk lvls:  7 (GETDID)
319      **
320      ** History:
321      **
322      **      Date      Programmer      Modification
323      **      -----      -
324      **      11/29/83      NZ      Updated documentation
325      **      03/15/83      NZ      Replaced GETMUL with GETDID
326      **      12/15/82      NZ      Wrote code and documentation
327      **
328      ****
329      ****
330 F10E2 0000      REL(5) =OUTPd      OUTPUT decompile
331      0
331 F10E7 0000      REL(5) =OUTPp      OUTPUT parse
332      0
332 F10EC 8E00 =OUTPUT GOSUBL =GETDID      Get device specifier
333      00
333 F10F2 414 PRASER GOC  OUTPer      Error with device or loop
334 F10F5 1F00      D1=(5) (=STMTR1)+2 (This is where I save the 7 nibs)
335      000
335 F10FC AF0      A=0  W      Clear position, length
336 F10FF 159A      DAT1=A 11      (STMTR1)+9 is position, width
337 F1103 7A55      GOSUB Saveit      Save the source @ D1
338 F1107 7495      GOSUB Tread0      Restore the PC (saved by GETDID)
339 F110B 1F00      D1=(5) =EOLLEN      Point to EOL length, EOL string
340      000
340 F1112 15F6      C=DAT1 7      Read EOLLEN, EOL string
341 F1116 1E00      D1=(4) (=STMTR0)+11 Position to CKINFO location
342      00
342 F111C 15D6      DAT1=C 7      Write it out EOL info out
343 F1120 1CB      D1=D1- 12      Position to MLFFLG
344      *****
345      *
346      *      LC(2) (=OUTPTt)*16+#F Set MLFFLG="F", type=OUTPTt
347 F1123 31F      NIBHEX 31F
348 F1126 0      CON(1) =OUTPTt
349      *
350      *****
351 F1127 14D      DAT1=C B      Write the info out to MLFFLG
352      *
353      * Now have written the info needed for the hPRCTL handler to
354      * do its job
355      *
356 F112A 161      DO=DO+ 2      Skip the t@ used to stop GETDID
357 F112D 8D00      GOVLNG =PRINT*      Now continue with PRINT handler
358      000
358      *-
359      *-
360 F1134 60D4 OUTPer GOTO Errorx
361      ****
362      ****
363      **
364      ** Name:      PRNTIS - Reassign HPIL PRINT device
365      ** Name:      DISPIS - Reassign HPIL DISPLAY device
```

```

366      ** Category:  STExec
367      **
368      ** Purpose:
369      **      PRNTIS executes the PRINTER IS statement, and DISPIS
370      **      executes the DISPLAY IS statement.
371      **
372      ** Entry:
373      **      DO points to the device specifier
374      **
375      ** Exit:
376      **      Exits through ENDST if no error, ERRORX if error
377      **
378      ** Calls:      D1=DST,SAVEDO,GETDID,RESTDO,SWAPO1,SAVEIT,
379      **              D1=DSX,PILCNF,<ENDST>,<ERRORX>
380      **
381      ** Uses.....
382      ** Inclusive: A,B,C,D,RO-R4,DO,D1,P,FUNCxx,STMTDO,STMTD1,
383      **              ST[11:0],all RAM that EXPEXC is permitted to use
384      **
385      ** Stk lvls:  7 (GETDID)
386      **
387      ** History:
388      **
389      **      Date      Programmer      Modification
390      **      -----      -
391      **      01/06/84      NZ          Changed order of DISPIS to set up
392      **                                     to search AFTER calling GETDID
393      **      11/29/83      NZ          Updated documentation and added
394      **                                     PRNT00 as an external entry point
395      **      05/17/83      NZ          Corrected mod of 5/4/83 to error
396      **                                     for bad device spec
397      **      05/04/83      NZ          Modified return from GETDID to
398      **                                     match new exit conditions of same
399      **      03/18/83      NZ          Used STMTD0 instead of STMTD1 to
400      **                                     save address through GETDID
401      **      02/18/83      NZ          Added call to PILCNF for DISPIS
402      **      12/15/82      NZ          Updated documentation
403      **
404      ****
405      ****
406 F1138 0000      REL(5) =PRNTSd      "PRINTER IS" DECOMPILE
407      0
407 F113D 0000      REL(5) =PRNTSp      "PRINTER IS" PARSE
408      0
408 F1142      =DISPIS
409 F1142 3400      LC(5)  =IS-DSP
410      000
410      *
411      * Following statement is a "Go always" because the LEX table
412      * entry for DISPIS is earlier in memory than DISPIS, hence
413      * the calculation of the execution address leaves carry clear
414      *
415 F1149 512      GONC  PRNT00      Go always
416      *-
417      *-

```

```

418 F114C 15D0 DISPI+ DAT1=C 1      Write out the bits
419 F1150 8E00          GOSUBL =PILCNF  Set up DSPCNX if needed
      00
420 F1156 69E4 PRNT50 GOTO  Endst    Clean up, goto next statement
421          *-
422          *-
423 F115A 0000          REL(5) =PRNTSd  "PRINTER IS" decompile
      0
424 F115F 0000          REL(5) =PRNTSp  "PRINTER IS" parse
      0
425 F1164 3400 =PRNTIS LC(5) =IS-PRT
      000
426 F116B 136 =PRNT00 CDOEX          Save PC in C[A],put address in D0
427 F116E 8E00          GOSUBL =SAVEDO  Save location in STMTDO
      00
428 F1174 136          CDOEX          Restore PC from C[A]
429 F1177 8E00          GOSUBL =GETDID  Get device specifier
      00
430          *
431          * Following two routines do not change carry
432          *
433 F117D 8E00          GOSUBL =RESTDO  Now D0 @ intended location
      00
434 F1183 8E00          GOSUBL =SWAPO1  Swap D0, D1
      00
435          *
436          * Now D1 is at the destination
437          *
438 F1189 551          GONC  PRNT45      No error...save it in RAM
439          *
440          * Check for *, "" (Address=0, carry set)
441          *
442 F118C 8AF          ?D#0  A
443 F118F A5          GOYES PRNTER      Not a valid device spec
444 F1191 880          ?P#   =eDSPEC  Is it "", *, or "*" ?
445 F1194 55          GOYES PRNTER      No...error
446          *
447          * Device is "*"...undo it
448          *
449 F1196 AF2          C=0   W
450 F1199 A7E          C=C-1 W
451 F119C AC2          C=0   S          Indicate "fits" in 7 nibs
452 F119F 7EB4 PRNT45 GOSUB  Saveit     Save source @ D1
453          *
454          * Check if this is DISPLAY IS
455          *
456 F11A3 133          AD1EX
457 F11A6 3400          LC(5) =IS-DSP
      000
458 F11AD 8A6          ?A#C  A          Is it DISPLAY?
459 F11B0 6A          GOYES PRNT50      No...exit
460 F11B2 8E00          GOSUBL =D1=DSX  Yes...point to DSPCHX (address)
      00
461 F11B8 D2          C=0   A
462 F11BA 145          DAT1=C A          Clear DISCHX for case of "*"

```

```

463 F11BD 8E00      GOSUBL =D1=DST      Point to DSPSET
      00
464 F11C3 307      LC(1) 7            Printr,Wallby,LoopOK=1; DispOK=0
465 F11C6 658F     GOTO  DISPI+      Go always (reset DSPCHX, clean up)
466      *~
467      *~
468 F11CA 0        CON(1) =FIXSPC     1 nibble available here
469 F11CB          BSS  1-1
470      *****
471      *****
472      **
473      ** Name:      PACKD - Pack the directory of a mass storage dev
474      **
475      ** Category:  STEEXEC
476      **
477      ** Purpose:
478      **      Pack a mass storage device directory
479      **
480      ** Entry:
481      **      D0 points to the device specifier
482      **
483      ** Exit:
484      **      Through NXTSTM or ERRORX
485      **
486      ** Calls:     PDIR,ENDTAP,<NXTSTM>,<ERRORX>
487      **
488      ** Uses.....
489      **      Inclusive: All CPU registers, all RAM EXPEXC is permitted
490      **                  to use, STMTD0[3:0],STMTR1
491      **
492      ** Stk lvls:  7 (PDIR)
493      **
494      ** History:
495      **
496      **      Date      Programmer      Modification
497      **      -----      -
498      **      12/21/83      NZ            Moved call to GETDID to PACKD to
499      **                  fix a stack level problem (PDIR)
500      **      11/29/83      NZ            Updated documentation
501      **
502      *****
503      *****
504 F11CB 0000      REL(5) =PACKd     PACK decompile
      0
505 F11D0 0000      REL(5) =PACKp     PACK parse
      0
506 F11D5 8E00 =PACKD GOSUBL =GETDID     Get the device specifier
      00
507 F11DB 7E00      GOSUB  PDIR       Pack the directory
508 F11DF 490       GOC   PRNTER      Error during pack
509 F11E2 6302     GOTO  PACK90      ENDTAP, NXTSTM
510      *~
511      *~
512 F11E6 0        CON(1) =FIXSPC     3 nibbles available here
513 F11E7          BSS  3-1

```

```
514      *  
515      *  
516      *  
517      * Error detected  
518      *  
519 F11E9 6B14 PRNTER GOTO Errorx      If error, don't change IS-xxx  
520      *****  
521      *****  
522      **  
523      ** Name:          PDIR - Pack a directory (assembly language call)  
524      **  
525      ** Category:     LOCAL  
526      **  
527      ** Purpose:  
528      **      Pack a mass storage device directory  
529      **  
530      ** Entry:  
531      **      Exit conditions from GETDID  
532      **  
533      ** Exit:  
534      **      Carry clear: (successful pack)  
535      **      P=0  
536      **      DO points to the HPIL mailbox  
537      **      D[X] is the address of the mass storage device  
538      **      RO is the information returned in B[W] from GDIRST  
539      **      R1 is the information returned in D[W] from GDIRST  
540      **      Carry set: (error occurred)  
541      **      P,C[0] are the error code  
542      **  
543      ** Calls:         CHKMAS,GDIRST,GETDR",CSRC4,NXTENT,CSRC5,CSLC5,  
544      **                 PDIRBF,CSLC4,PBF->C,GETDR+,F->SCR,CSLC3,  
545      **                 PBF->C:SEEKA,DDT,ULYL,DDL,TSTAT,<DDT>  
546      **                 -----  
547      **                 PDIRBF:MTYL,DDL,CSLC4,PUTD,<PUTDR">  
548      **  
549      ** Uses.....  
550      **      Inclusive: A-D,RO-R4,DO,D1,P,ST[11:0]  
551      **  
552      **      Stk lvls:  4 (GDIRST)  
553      **  
554      **      PDIR:Set up the loop (START)  
555      **      Check for mass storage device  
556      **      Get directory information (GDIRST)  
557      **      (PTRC is current directory entry)  
558      **      (PTRC is B[3:0])  
559      **      (PTRD is where next non-purged directory entry goes)  
560      **      (PTRD is B[15:12])  
561      **      1:Seek correct record & read directory entry  
562      **      2:IF (physical end of directory) THEN GOTO 8..  
563      **      IF (logical end of directory) THEN GOTO 8:  
564      **      Increment PTRC  
565      **      IF (PTRC crossed record boundary) THEN  
566      **      Decrement record count (D[8:5])  
567      **      IF (entry is purged) THEN GOTO 3:  
568      **      Write entry at PTRD (Buffer 1)
```



```

569      **      Increment PTRD
570      **      IF (PTRD not at start of record) THEN GOTO 3:
571      **      Write out buffer 1 contents to tape
572      **      GOTO 1:
573      **      --
574      **      3:Read directory entry
575      **      GOTO 2:
576      **      --
577      **      8:Write out EOD marker (if not at physical EOD)
578      **      9:RETURN
579      **
580      ** History:
581      **
582      **      Date      Programmer      Modification
583      **      -----      -
584      **      12/21/83      NZ      Removed call to GETDID to fix a
585      **                                     bug (stack levels)
586      **      05/25/83      NZ      Added mass storage check in PDIR
587      **      01/06/83      NZ      Rewrote algorithm, documented it
588      **      12/15/82      NZ      Updated documentation
589      **
590      ****
591      ****
592 F11ED 400 =PDIR RTNC Error with device specifier
593 F11F0 8E00 GOSUBL =CHKMAS Check for mass storage
594      00
595 F11F6 400 RTNC Not mass storage...error
596 F11F9 23 P= 3
597 F11FB 304 LC(1) 4 This is Acc ID=16 (for MOVEFL)
598 F11FE A87 D=C P
599 F1201 8E00 GOSUBL =GDIRST Get the directory start info
600      00
601 F1207 400 RTNC
602 F120A AF9 C=B W
603 F120D 108 R0=C Save B[W] in R0 for PACK
604 F1210 AFB C=D W
605 F1213 109 R1=C Save D[W] in R1 for PACK
606 F1216 8E00 PDIR10 GOSUBL =GETDR" Get the entry from B[3:0]
607      00
608 F121C 400 RTNC Error
609 F121F 90D PDIR20 ?B#0 P New record?
610 F1222 31 GOYES PDIR22 No...continue
611      *
612      * New record...check for end of directory
613      *
614 PhyEOD EQU 0
615 F1224 850 ST=1 PhyEOD Physical End Of Directory
616 F1227 AFB C=D W
617 F122A 7F44 GOSUB Csrc4
618 F122E F6 CSR A Now C[3:0] is count, C[4]=0
619 F1230 8AA ?C=0 A Is the record count zero?
620 F1233 A7 GOYES PDIR90 Yes...physical EOD
621 F1235 840 PDIR22 ST=0 PhyEOD No...not physical EOD.
622 F1238 173 D1=D1+ 4 Move to TYPE
623 F123B 15F3 C=DAT1 4 Read in file type

```

```

621          *
622          * Check for end of directory (FFFF)
623          *
624 F123F E6          C=C+1  A
625 F1241 F2          CSL     A          Now C[4:1] is type+1, C[0]=0
626 F1243 8AA        ?C=0   A          Is this logical EOD?
627 F1246 76         GOYES  PDIR90      Yes...done
628 F1248 DD         BCEX   A          No
629 F124A 8E00       GOSUBL =NXTENT      Increment directory pointer
        00
630 F1250 DD         BCEX   A          (Carry if new record)
631 F1252 521        GONC   PDIR24      Not new record...continue
632          *
633          * New record...need to decrement record count in D[8:5]
634          *
635 F1255 AFF        CDEX   W
636 F1258 7E14       GOSUB  Csrc5
637 F125C CE         C=C-1  A          C[3:0] is always >0...use C[A]
638 F125E 7114       GOSUB  Cslc5
639 F1262 AFF        CDEX   W          Replace the count, restore C[A]
640 F1265 F6        PDIR24 CSR   A          Type + 1 in C[3:0], C[4]=0
641 F1267 CE         C=C-1  A          Type in C[A]
642 F1269 8AA        ?C=0   A          Is this a purged entry?
643 F126C F2         GOYES  PDIR30      Yes...read next entry @ PTRC
644          *
645          * Non-purged entry...put directory entry into buffer 1 of tape
646          *
647 F126E 7190       GOSUB  PDIRBF      Write (SCRATCH) to B[12]th entry
648 F1272 400        RTNC
649 F1275 AF9        C=B     W
650 F1278 7AF3       GOSUB  Cslc4      Get the address of buffer 1
651 F127C D5         B=C     A          Save pointer in B[A] for now
652 F127E 8E00       GOSUBL =NXTENT
        00
653 F1284 75F3       GOSUB  Csrc4      Rotate back to C[15:12]
654 F1288 AFD        BCEX   W          Now C[A] is entry, B is restored
655 F128B 5F0        GONC   PDIR30      Not a new record...continue
656          *
657          * This is a new record...write buffer 1 @ recprd C[3:1]
658          *
659 F128E F6         CSR     A          Record # in C[X] now
660 F1290 7240       GOSUB  PBF->C      Write buffer 1 to @C[X]
661 F1294 400        RTNC
662 F1297 6E7F       GOTO   PDIR10      No error...go reread the record
663          *
664          *
665          *
666          * Wrote a new entry into buffer 1, but didn't fill buffer 1
667          *
668 F129B D4        PDIR30 A=B     A
669 F129D 814        ASRC
670 F12A0 8E00       GOSUBL =GETDR+      A[S] is byte pointer div 32
        00          Get next directory entry
671 F12A6 400        RTNC
672 F12A9 657F       GOTO   PDIR20      Error
          No error...process the entry

```

```

673      *-
674      *-
675      *
676      * Reached end of directory...check whether physical or logical
677      *
678 F12AD 860 PDIR90 ?ST=0 PhyEOD      Physical EOD?
679 F12B0 21      GOYES PDIR92      No...continue
680 F12B2 AF9      C=B      W      Yes...check if room for a new EOD
681 F12B5 7DB3     GOSUB  Cslc4      Get PTRD into C[3:0]
682 F12B9 E9      C=C-B  A      Now C[3:0] is PTRC-PTRD
683 F12BB F2      CSL  A      Now C[A]=0 iff PTRC=PTRD
684 F12BD 8AA     ?C=0  A      Is there space for an EOD mark?
685 F12C0 F0      GOYES PDIR95      No...exit
686 F12C2      PDIR92
687      *
688      * Write an end-of-directory mark in buffer 1
689      *
690 F12C2 8E00     GOSUBL =F->SCR      Put "FFF"s in SCRATCH[63:0]
        00
691 F12C8 7730     GOSUB  PDIRBF      Put SCRATCH @ PTRD
692 F12CC 400      RTNC              Error
693 F12CF AF9     PDIR95  C=B      W
694 F12D2 7000     GOSUB  =CSLC3      C[X] is PTRD record # now
695      *
696      * Fall into PBF->C
697      *
698      * PBF->C writes the record in buffer 1 at the record number
699      * in C[X] on the mass storage device
700      *
701 F12D6 D0     PBF->C  A=0    A
702 F12D8 ABA     A=C    X
703 F12DB 8E00     GOSUBL =SEEKA      Go to that record
        00
704 F12E1 400      RTNC
705 F12E4 20      P=      =XchgT      Exchange buffers (talker)
706 F12E6 7310     GOSUB  Ddt
707 F12EA 7000     GOSUB  =ULYL      Address tape as listener
708 F12EE 20      P=      =CloseR      Close record (write buffer 0 out)
709 F12F0 7973     GOSUB  Ddl
710 F12F4 7D53     GOSUB  Tstat      Check tape status
711 F12F8 400      RTNC
712 F12FB 20     DdtXgT  P=      =XchgT      Exchange buffers back (talker)
713 F12FD 8C00     Ddt     GOLONG =DDT      Exit through DDT
        00
714      *-
715      *-
716 F1303 7453     PDIRBF  GOSUB  Mtyl      Address device as listener
717 F1307 400      RTNC              Error
718 F130A 20      P=      =SetBP      Set byte pointer
719 F130C 7D53     GOSUB  Ddl
720 F1310 400      RTNC              Error
721 F1313 AF9     C=B      W
722 F1316 7C53     GOSUB  Cslc4
723 F131A F2      CSL  A
724 F131C C6      C=C+C  A      C[B] is the byte pointer value

```

```
725 F131E 7000      GOSUB =Putd
726 F1322 400      RTNC
727 F1325 20       P=      =Write1      Write to buffer 1 of the device
728 F1327 8C00     GOLONG =PUTDR"    Put out the directory entry.
                   00

729                *_
730                *_
731                *
732                * Bug fix for pack (too many RSTK levels)
733                *
734 F132D 8E00     PACKfx  GOSUBL =GETDID
                   00
735 F1333 76BE     GOSUB  PDIR
736 F1337 6210     GOTO   PACK00
737                *_
738                *_
739 F133B 0        CON(1) =FIXSPC      1 nibble available here
740                ****
741                ****
742                **
743                ** Name:          PACK - Pack an HPIL mass storage device
744                **
745                ** Category:     STExec
746                **
747                ** Purpose:
748                **   Pack an HPIL mass storage device
749                **
750                ** Entry:
751                **   DO @ device spec
752                **   P=0
753                **
754                ** Exit:
755                **   Through NXTSTM...
756                **
757                ** Calls:         PDIR,GETDR",GT2BYT,GETZER,ASRC4,CSLC5,CSLC2,
758                **               PT2BYT,PUTDR#,TSTAT,MOVEFL,NXTEN+,NXTEN-,GETDIR,
759                **               ENDTAP,ASLC4,CSRC5,<NXTSTM>,<ERRORX>
760                **
761                ** Uses.....
762                **   Inclusive: All CPU registers, STMTDO[3:0],STNTR1,FUNCxx,
763                **               all RAM that EXPEXC is permitted to use
764                **
765                ** Stk lvls:     7 (PDIR)
766                **
767                ** Algorithm:
768                **   GOSUB GETDID
769                **   GOSUB PDIR
770                **   Recall directory info from R0,R1
771                **   Read and get directory entry
772                **   IF end of directory THEN GOTO 9:
773                **   2:IF file data area pointer <> PTRF THEN
774                **       Copy file down, update directory
775                **       Update file destination, read next entry
776                **       GOTO 2:
777                **   Get next directory entry
```

```

778      **      IF NOT end of directory THEN GOTO 2:
779      **      9:(end of directory)
780      **      Exit
781      **
782      ** History:
783      **
784      **      Date      Programmer      Modification
785      **      -----      -
786      **      12/21/83      NZ      Changed call to PDIR to add a call
787      **                                     to GETDID (RSTK level bug)
788      **      01/10/83      NZ      Rewrote routine and documentation
789      **
790      ****
791      ****
792 F133C 0000      REL(5) =PACKd
793      0
793 F1341 0000      REL(5) =PACKp
794      0
794 F1346 66EF =PACK GOTO PACKfx      Pack the directory first
795 F134A 493 PACK00 GOC PACKeR      (error during directory pack)
796 F134D 118      C=R0      Recall info from GDIRST
797 F1350 AF5      B=C W
798      *
799      * Now B,RO[3:0] is PTRC...pointer to directory entry,
800      * B,RO[7:4] is PTRF...pointer to data area
801      *
802 F1353 8E00 PACK10 GOSUBL =GETDR"      Get that directory entry
803      00
803 F1359 4A2 PACK20 GOC PACKeR      Error!
804      *
805      * Check for logical end of directory
806      *
807 F135C 173      D1=D1+ 4      Skip to type...
808 F135F 7F90      GOSUB Gt2byt      Read 2 bytes...
809 F1363 E6      C=C+1 A      ...add 1 (if EOD, x0000)
810 F1365 F2      CSL A      If EOD, 00000!
811 F1367 8AE      ?C#0 A      EOD?
812 F136A 60      GOYES PACK30      No...continue
813 F136C 6970      GOTO PACK90      Yes...done with the tape
814      *-
815      *-
816 F1370      PACK30
817      *
818      * Now D1 is positioned at the directory start address
819      *
820 F1370 7F70      GOSUB GETZER      Read 2 bytes of zero, 2 of start
821 F1374 4F0      GOC PACKeR      Error...out of range
822      *
823      * Now C[3:0] is the last 2 bytes of start
824      *
825 F1377 AF4      A=B W
826 F137A 7000      GOSUB =ASRC4      Now PTRF in A[3:0], A[4]=0
827 F137E D5      B=C A      Copy start to B[A]
828 F1380 7F60      GOSUB GETZER      Read 2 bytes of zero, 2 of size
829 F1384 4F4 PACKeR GOC PACKeR      Error...out of range

```

```
830      *
831      * Now C[A] is size of file in sectors
832      *
833 F1387 8A0      ?A=B   A           Is the file already in place?
834 F138A E4      GOYES  PACK40      Yes...continue
835      *
836      * Need to move the file data
837      *
838 F138C 73E2      GOSUB  Cslc5
839 F1390 D6      C=A    A           C[A] is dest, C[9:5] is length
840 F1392 10B      R3=C
841      *
842      * A[A],R3[A] is dest, B[A] is source, R3[9:5] is length,
843      * R2[A] is the source address, R1[A] is dest address
844      *
845 F1395 1CB      D1=D1- 12          Back up to middle of start addr
846 F1398 D6      C=A    A
847 F139A 7000      GOSUB  =CSLC2
848 F139E 8E00      GOSUBL =PT2BYT          Write 2 bytes @ D1
      00
849      *
850      * Now update the directory entry in the directory
851      *
852 F13A4 118      C=R0
853 F13A7 816      CSRC
854 F13AA AD2      C=0    M           Now C[S] is entry, C[X] is addr
855 F13AD 8E00      GOSUBL =PUTDR#          Write the entry to the device
      00
856 F13B3 402      GOC    PACKer          Error
857 F13B6 7B92      GOSUB  Tstat           Check status
858 F13BA 491      GOC    PACKer          Error
859 F13BD 119      C=R1
860 F13C0 10A      R2=C           Copy address to R1,R2 for MOVEFL
861      *
862      * A,C,D and R4 are available to MOVEFL...
863      *
864 F13C3 8E00      GOSUBL =MOVEFL          Move file
      00
865 F13C9 4A0      GOC    PACKer          Error
866      *
867      * Nxtent+ does not return if an error occurs
868      *
869 F13CC 7830      GOSUB  Nxtent+          Go to next entry...
870 F13D0 628F      GOTO   PACK10          ...and continue loop if return
871      *
872      *
873 F13D4 6032      PACKer  GOTO   Errorx
874      *
875      *
876 F13D8          PACK40
877      *
878      * This entry is OK where it is now
879      *
880      * A[A] is PTRF, C[A] is file length
881      *
```

```
882 F13D8 7A30      GOSUB  Nxten-      Increment to next entry
883 F13DC 8E00      GOSUBL =GETDIR     Read the next directory entry
                   00
884 F13E2 667F      GOTO   PACK20      Check error @ PACK20
885                *_-
886                *_-
887                *
888                * If here, reached end of directory
889                *
890 F13E6 8E00 PACK90 GOSUBL =ENDTAP     Clean the device up (rewind, etc)
                   00
891 F13EC 47E       GOC    PACKer      Error
892 F13EF 6093      GOTO   nXTSTM      No error...exit
893                *_-
894                *_-
895 F13F3 D2        =GETZER C=0      A
896 F13F5 7900      GOSUB  Gt2byt
897 F13F9 8AA      ?C=0      A
898 F13FC 60        GOYES  Gt2byt
899 F13FE 20        P=      =eRANGE
900 F1400 02        RTNSC
901                *_-
902                *_-
903 F1402 8C00 Gt2byt GOLONG =GT2BYT
                   00
904                *_-
905                *_-
906 F1408 110 Nxtent+ A=R0
907 F140B 7000      GOSUB  =ASRC4      Get file start address
908 F140F 11B      C=R3
909 F1412 7462      GOSUB  Csrc5       Get length of file into C[A]
910 F1416 23 Nxtent- P=      3
911 F1418 A1A      A=A+C WP          Add length to start of file
912 F141B 20        P=      =eRANGE
913 F141D 46B      GOC    PACKer      Error if carry
914 F1420 7000      GOSUB  =ASLC4      Return to proper location
915 F1424 D6        C=A      A
916 F1426 8E00      GOSUBL =NXTENT
                   00
917 F142C DA        A=C      A
918 F142E 100      RO=A
919 F1431 AF8      B=A      W          Copy to B[W] too
920 F1434 500      RTNNC
921 F1437 119      C=R1
922 F143A 7C32      GOSUB  Csrc5
923 F143E CE        C=C-1 A          Decrement counter
924 F1440 7F22      GOSUB  Cslc5
925 F1444 109      R1=C
926 F1447 4E9      GOC    PACK90      If carry set, EOD (RSTK=garbage)
927 F144A 03        RTNCC           Not at EOD yet...continue
928                *****
929                *****
930                **
931                ** Name:      INITXQ - Execute the INITIALIZE statement
932                **
```

```

933      ** Category:  STExec
934      **
935      ** Purpose:
936      **      Initialize the specified mass storage device's medium
937      **
938      ** Entry:
939      **      D0 points to the device specifier
940      **
941      ** Exit:
942      **      If error, exits through ERRORX;
943      **      If no error, exits through ENDST
944      **
945      ** Calls:      GETPIL,SAVE2C,TRESDO,SAVED1,SAVE1A,GETHEX,RESTD1,
946      **              REST2C,ASRC4,REST1A,START,CHKMAS,FORMAT,<ENDST>,
947      **              <ERRORX>
948      **
949      ** Uses.....
950      ** Inclusive: All CPU registers, STMTD1,STMTRx,FUNCxx,ST[11:0],
951      **              all RAM EXPEXC is permitted to use,SCRATCH[63:0]
952      **
953      ** Stk lvls:  7 (GETPIL)
954      **
955      ** History:
956      **
957      **      Date      Programmer      Modification
958      **      -----      -
959      **      11/29/83      NZ      Updated documentation
960      **      12/15/82      NZ      Updated documentation
961      **
962      ****
963      ****
964 F144C 0000      REL(5) =INITd      INITIALIZE decompile
965      0
966 F1451 0000      REL(5) =INITp      INITIALIZE parse
967      0
968 F1456      =INITXQ
969      *
970 F1456 8E00      GOSUBL =GETPIL
971      00
972 F145C 4F4      GOC      INITXF      Error
973      *
974      * Now B[W] is the device type or word, D[X] is device address,
975      * R0 is the volume label, C[6:0] is the recall word from SETUP
976      *
976 F145F 7E12      GOSUB Save2c      Save recall word in STMTR1
977 F1463 7832      GOSUB Tresd0      Get PC from FUNCDO (from GETPIL)
978 F1467 20      P=      0
979 F1469 3100      LC(2) =tCOMMA
980 F146D 14A      A=DATO B
981 F1470 962      ?A=C      B      # entries specified?
982 F1473 51      GOYES INITX0      Yes...skip the comma first
983      *
984      * Number of entries not specified...use default length

```



```

985          *
986 F1475 110          A=RO          Length field is RO[15:12]
987 F1478 2C          P=          12          Clear nibbles 12-15
988 F147A A80        INITLP  A=0      P
989 F147D 0C          P=P+1
990 F147F 5AF          GONC      INITLP
991 F1482 100          RO=A          Put new vol label, length into RO
992 F1485 426          GOC        INITX1        Go always
993          *-
994          *-
995          *
996          * Found a comma (number of entries specified)
997          *
998 F1488 161        INITX0  DO=DO+ 2          Skip the comma
999 F148B DB          C=D      A          Save D[A] in STMTD1
1000 F148D 135          D1=C
1001 F1490 8E00          GOSUBL  =SAVED1        Save device address in STMTD1
      OO
1002 F1496 118          C=RO
1003 F1499 74E1        GOSUB   Save2c          Save volume label in STMTD1
1004 F149D AF4          A=B      W
1005 F14A0 8E00          GOSUBL  =SAVE1A        Save device word in STMTD1
      OO
1006 F14A6 8E00          GOSUBL  =GETHEX        Get # of entries (4 nibs max)
      OO
1007 F14AC 4C5        INITXF  GOC      INITXE        Error in expression evaluation
1008          *
1009 F14AF 20          P=          =eRANGE        Check if valid range
1010 F14B1 8A8          ?A=0    A          Is the value zero?
1011 F14B4 8F          GOYES   INITXF        Yes...error
1012 F14B6 8E00          GOSUBL  =RESTD1        Restore device address to D[A]
      OO
1013 F14BC 137          CD1EX
1014 F14BF D7          D=C      A
1015 F14C1 8E00          GOSUBL  =REST2C        Restore volume label to RO
      OO
1016 F14C7 108          RO=C
1017 F14CA 7000        GOSUB   =ASRC4          Rotate value into A[15:12]
1018 F14CE AF8          B=A      W          Save value in B[15:12] for now
1019 F14D1 8E00          GOSUBL  =REST1A        Restore device word to A[W]
      OO
1020          *
1021          * Now A[W] is device word, B[15:12] is # of entries, RO is vol
1022          * label, D[A] is device address
1023          *
1024          * Combine volume label and # of entries in RO
1025          *
1026 F14D7 120          AROEX
1027 F14DA 2B          P=          11
1028 F14DC A9C          ABEX    WP          Volume label in B[11:0]
1029 F14DF AFC          ABEX    W          Volume label, # entries in A
1030 F14E2 120          AROEX
1031 F14E5 AF8          B=A      W          Device word back in B[W]
1032          *
1033 F14E8 8E00        INITX1  GOSUBL  =START        Set up the loop, find the device

```

```

      00
1034 F14EE 4R1      GOC   INITXE      Error
1035 F14F1 8E00    GOSUBL =CHKMAS    Check if mass storage (must be!)
      00
1036 F14F7 411      GOC   INITXE      Error
1037          *
1038          * It is mass storage...OK to continue
1039          *
1040 F14FA 8E00    GOSUBL =FORMAT    Format the medium, initialize fields
      00
1041 F1500 480      GOC   INITXE      Error
1042 F1503 6C31    GOTO   Endst      No error...clean up, exit
1043          *-
1044          *-
1045          *
1046          * Following line is never referenced!(?)
1047          *
1048 F1507 20      INITX2 P=      =eDTYPE      Device type error
1049 F1509 6BF0    INITXE GOTO   Errorx
1050          *****
1051          *****
1052          **
1053          ** Name:          LOCAL - Execute the LOCAL [LOCKOUT] statement
1054          **
1055          ** Category:     STEXEC
1056          **
1057          ** Purpose:
1058          **     LOCAL statement sends a NRE to entire loop, or a GTL
1059          **     frame to devices specified. LOCAL LOCKOUT sends
1060          **     a LLO frame to loop specified.
1061          **
1062          ** Entry:
1063          **     D0 points to the token following LOCAL
1064          **
1065          ** Exit:
1066          **     Through CLEARc
1067          **
1068          ** Calls:        <CLEARc>
1069          **
1070          ** Uses.....
1071          ** Inclusive: Same as CLEARc
1072          **
1073          ** Stk lvls:    Same as CLEARc
1074          **
1075          ** History:
1076          **
1077          **     Date      Programmer      Modification
1078          **     -----      -
1079          **     01/25/83      JH          Added Routine
1080          **
1081          *****
1082          *****
1083 F150D 0000      REL(5) =LOCALd
      0
1084 F1512 0000      REL(5) =LOCALp
```

```

0
1085 F1517      =LOCAL
1086            *
1087            *   Is the next token LOCKOUT?
1088            *
1089 F1517 AFA          A=C   W           (Copy high nibs for compare)
1090 F151A 15A5        A=DATO 6         Read next token
1091            *****
1092            *
1093            *   LC(6) (=tLOCKO)~(=LEXPIL)~(=tXWORD)
1094 F151E 35          NIBHEX 35        LC(6)
1095 F1520 00          CON(2) =tXWORD   ...
1096 F1522 00          CON(2) =LEXPIL  ..
1097 F1524 00          CON(2) =tLOCKO  .
1098            *
1099            *****
1100 F1526 976        ?A#C   W           LOCAL LOCKOUT statement?
1101 F1529 D1          GOYES  LCL10      No...execute LOCAL statement
1102 F152B 7161       GOSUB  D1=SDO     Yes...set up LLO frame
1103 F152F 3411       LC(5) #11~#11    Set C[3:0] to value of LLO frame
1104 F1536 145        DAT1=C  A         Save frame in STMTDO
1105 F1539 165        DO=DO+ 6         Skip the LOCKOUT token
1106 F153C 8E00       GOSUBL =CKLOP#   Get the loop # to C[S]
1107 F1542 6F50       GOTO   CLEAR1    Continue with loop
1108            *
1109            *
1110 F1546 3410 LCL10 LC(5) #93~#01    Set C[3:0] to NRE and GTL frames
1111 F154D 6E30       GOTO   CLEARc     Execution same as CLEAR
1112            *****
1113            *****
1114            **
1115            ** Name:      TRIGGER - Execute the TRIGGER statement
1116            **
1117            ** Category:  STExec
1118            **
1119            ** Purpose:
1120            **   Sends a GET to entire loop, or devices specified
1121            **   are addressed to listen and then GET is sent.
1122            **
1123            ** Entry:
1124            **   DO points to the token following TRIGGER
1125            **
1126            ** Exit:
1127            **   Through CLEARc
1128            **
1129            ** Calls:     Same as CLEARc
1130            **
1131            ** Uses.....
1132            ** Inclusive: Same as CLEARc
1133            **
1134            ** Stk lvls:  Same as CLEARc
1135            **

```

```
1136      ** History:
1137      **
1138      **   Date      Programmer      Modification
1139      **   -----      -
1140      ** 01/25/83      JH          Added routine
1141      **
1142      ****
1143      ****
1144 F1551 0000          REL(5) =TRIGd
1145      0
1145 F1556 0000          REL(5) =TRIGp
1146      0
1146 F155B      =TRIGER          Set C[3:0] to values of GET and
1147 F155B 3480          LC(5) #08~#08          GET frame
1148      800
1148 F1562 6920          GOTO CLEARc          Execute same as CLEAR
1149      ****
1150      ****
1151      **
1152      ** Name:          REMOTE - Execute the REMOTE statement
1153      **
1154      ** Category:     STExec
1155      **
1156      ** Purpose:
1157      **   Sends an UNL, RFC, REN, RFC, then addresses the device
1158      **   specified, if any, as listener
1159      **
1160      ** Entry:
1161      **   DO points to the token following REMOTE
1162      **
1163      ** Exit:
1164      **   Through CLEARc
1165      **
1166      ** Calls:         Same as CLEARc
1167      **
1168      ** Uses.....
1169      ** Inclusive:     Same as CLEARc
1170      **
1171      ** Stk lvls:      Same as CLEARc
1172      **
1173      ** History:
1174      **
1175      **   Date      Programmer      Modification
1176      **   -----      -
1177      ** 03/19/83      NZ          Rewrote routine and documentation
1178      ** 01/26/83      JH          Added routine
1179      **
1180      ****
1181      ****
1182 F1566 0000          REL(5) =REMOTd
1183      0
1183 F156B 0000          REL(5) =REMOTp
1184      0
1184 F1570 3429 =REMOTE LC(5) #F9292          Set the REMOTE flag, REN~REN
1185      29F
```

```

1185 F1577 6410      GOTO  CLEARc
1186                *****
1187                *****
1188                **
1189                ** Name:      CLEAR - Execute the CLEAR statement
1190                ** Name:      CLEARc - Execute a loop statement
1191                **
1192                ** Category:   STExec
1193                **
1194                ** Purpose:
1195                **      Execute the CLEAR statement (also TRIGGER, LOCAL,
1196                **      REMOTE)
1197                **
1198                ** Entry:
1199                **      DO points to the device specifier
1200                **      CLEARc: C[3:0] is the 2 frames, C[4] is REMOTE flag-
1201                **      "F" means REMOTE, "O" means other
1202                **
1203                ** Exit:
1204                **      Through ENDST if no error, through ERRORX if error
1205                **
1206                ** Calls:      D1=SRO,FNDCH-,GETDID,CKmode,UNLPUT,PUTC,PRTISc,
1207                **      SAVEIT,D1=SDO,GETMBX,<ENDST>,<ERRORX>
1208                **
1209                ** Uses.....
1210                **      Inclusive: All CPU registers, STMTDx,STMTR1,FUNCxx,ST[11:0],
1211                **      all RAM EXPEXC is permitted to use
1212                **
1213                ** Stk lvls:   7 (GETDID)
1214                **
1215                ** History:
1216                **
1217                **      Date      Programmer      Modification
1218                **      -----      -
1219                **      04/05/83      NZ          Moved controller check to include
1220                **                                     case of device spec given
1221                **      03/19/83      NZ          Rewrote routine and documentation
1222                **
1223                *****
1224                *****
1225 F157B 0000      REL(5) =CLEARd
1226                0
1227 F1580 0000      REL(5) =CLEARp
1228                0
1229 F1585 3440 =CLEAR LC(5) #14~#04      DCL ~ SDC frames (high nib=0)
1230                410
1231 F158C 7001 CLEARc GOSUB D1=SDO      Save C[3:0] in STMTD0 (frames)
1232 F1590 145      DAT1=C A
1233 F1593 14A      A=DAT0 B      Check if there is a device spec
1234 F1596 3100     LC(2) =tCOMMA      (tCOMMA means no device spec)
1235 F159A 966      ?A#C B
1236 F159D 22      GOYES CLEAR.      No device spec...use LOOP
1237 F159F AC2      C=0 S      Use loop 0 if none given
1238 F15A2          CLEAR1
1239 F15A2 AC7      D=C S      Save mailbox # for later...

```

```

1237 F15A5 8E00      GOSUBL =FNDCH-      Find that mailbox
                   00
1238 F15AB 495      GOC      Errorx      Error if carry
1239 F15AE 813      DSLC      Mailbox # to D[0]
1240 F15B1 F3       DSL      A
1241 F15B3 F3       DSL      A      Mailbox # to D[2]
1242 F15B5 C7       D=D+D    A
1243 F15B7 C7       D=D+D    A      (Mailbox #)*16 to D[2]
1244 F15B9 DB       C=D      A      Device = :LOOP:#
1245 F15BB 6C00     GOTO     CLEAR+     (Carry not sure)
1246                *-
1247                *-
1248 F15BF          CLEAR.
1249                *
1250                * Device spec follows...get it
1251                *
1252 F15BF 8E00      GOSUBL =GETDID      Get device spec, don't check MS
                   00
1253 F15C5 4F3      GOC      Errorx      Error
1254 F15C8 8E00     CLEAR+  GOSUBL =CKmode     Controller check (exits to error)
                   00
1255 F15CE 75B0     GOSUB   D1=SRO      Save device spec in STMTRO
1256 F15D2 15D6     DAT1=C 7            (Write it out)
1257 F15D6 1D00     D1=(2) (=STMD0)+2  Check if REMOTE
1258 F15DA 15F2     C=DAT1 3            Read frame, flag (C[XS] is flag)
1259 F15DE 92A     ?C=0   XS           Is it REMOTE?
1260 F15E1 21      GOYES  CLEAR1      No...continue
1261                *
1262                * This is the REMOTE statement
1263                *
1264 F15E3 8E00      GOSUBL =UNLPUT      Send the UNL command
                   00
1265 F15E9 4B1      GOC      Errorx      Error if carry
1266 F15EC 7650     GOSUB   CLEARs      Send the frame @ D1
1267 F15F0 441      GOC      Errorx      Error if carry
1268 F15F3 7090     CLEAR1  GOSUB   D1=SRO  Set D1 @ STMTRO (device spec)
1269 F15F7 821      XM=0
1270 F15FA 7C99     GOSUB   PRTISc      Address the device as listener
1271 F15FE 831      ?XM=0
1272 F1601 A0       GOYES  CLEAR2      Yes...continue
1273                *
1274                * Error detected by PRTISc...must be loop error!?
1275                *
1276 F1603 20       P=      =eABORT      Set eABORT to check it in ERRORX
1277 F1605 8C00     Errorx  GOLONG =ERRORX
                   00
1278                *-
1279                *-
1280 F160B          CLEAR2
1281                *
1282                * Now release any I/O buffers created by GETDID
1283                *
1284 F160B 7870     GOSUB   D1=SRO
1285 F160F 147     C=DAT1  A            Read the device spec for below
1286 F1612 06      RSTK=C              Save device spec on stack

```

```

1287 F1614 AF2      C=0      W
1288 F1617 7640    GOSUB   Saveit      SAVEIT will release any buffers
1289 F161B 07      C=RSTK                      Pop device spec...
1290 F161D DA      A=C      A                      ...and put in A[A]
1291 F161F 7D60    GOSUB   D1=SDO      Set D1 @ STMTDO
1292 F1623 147     C=DAT1  A
1293 F1626 C6      C=C+C   A                      Check if REMOTE (Carry if so)
1294 F1628 471     GOC     CLEAR4      REMOTE...exit
1295 F162B 8E00    GOSUBL  =GETMBX     Get the mailbox address back
00

1296              *
1297              * A[A] contains the device spec, D1 @ STMTDO
1298              *
1299 F1631 96C     ?A#0   B                      Was the device LOOP?
1300 F1634 50     GOYES  CLEAR3      No...REAL device
1301 F1636 171     D1=D1+ 2                      Yes...use the LOOP spec
1302 F1639 7900  CLEAR3  GOSUB   CLEARs     Send the command
1303 F163D 47C     GOC     Errorx      Error if carry
1304 F1640              CLEAR4
1305 F1640 8C00  Endst   GOLONG  =ENDST      Done
00

1306              *-
1307              *-
1308 F1646 3300  CLEARs  LC(4)  =MCMDF      Send the command frame...
00
1309 F164C 14F     C=DAT1  B                      ...from @ D1
1310 F164F 8C00  Putc   GOLONG  =PUTC
00

1311              *-
1312              *-
1313 F1655 8C00  Tstat   GOLONG  =TSTAT
00

1314              *-
1315              *-
1316 F165B 8C00  Mtyl    GOLONG  =MTYL
00

1317              *-
1318              *-
1319 F1661 8C00  Saveit  GOLONG  =SAVEIT
00

1320              *-
1321              *-
1322 F1667 8C00  Nxtchr  GOLONG  =NXTCHR
00

1323              *-
1324              *-
1325 F166D 8C00  Ddl     GOLONG  =DDL
00

1326              *-
1327              *-
1328 F1673 812    Cslc5   CSLC                      Fall into CSLC4
1329 F1676 6000  Cslc4   GOTO    =CSLC4
1330              *-
1331              *-
1332 F167A 816    Csrc5   CSRC                      Fall into CSRC4!

```

```
1333 F167D 6000 Csrc4  GOTO  =CSRC4
1334          *_
1335          *_
1336 F1681 8C00 Save2c  GOLONG =SAVE2C
          00
1337          *_
1338          *_
1339 F1687 1F00 =D1=SRO D1=(5) =STMTR0
          000
1340 F168E 01          RTN
1341          *_
1342          *_
1343 F1690 1F00 =D1=SD0 D1=(5) =STMTD0
          000
1344 F1697 01          RTN
1345          *_
1346          *_
1347 F1699 8C00 Tsavd0  GOLONG =TSAVDO
          00
1348          *_
1349          *_
1350 F169F 8C00 Tresd0  GOLONG =TRESDO
          00
1351          ****
1352          ****
1353          **
1354          ** Name:          STANBY - Execute the STANDBY statement
1355          **
1356          ** Category:    STEXEC
1357          **
1358          ** Purpose:
1359          **          Execute the standby statement
1360          **
1361          ** Entry:
1362          **          D0 points to the first parameter
1363          **
1364          ** Exit:
1365          **          Through NXTSTM if no error, ERRORX if error
1366          **
1367          ** Calls:        GLOOP#,SAVE2C,STANSb,REST2C,IDIV,FNDCHK,PUTC,
1368          **          PUTE,<NXTSTM>
1369          **
1370          **          STANSb:EXPEXC,POP1N,FLTDH
1371          **
1372          ** Uses.....
1373          ** Inclusive: All CPU registers,STMTR1,FUNCxx,ST[11:0],all
1374          **          RAM that EXPEXC is permitted to use
1375          **
1376          ** Stk lvls:    7 (GLOOP#)
1377          **
1378          ** History:
1379          **
1380          **          Date          Programmer          Modification
1381          **          -----          -
1382          **          05/18/83          NZ          Changed # of IDY timeouts (+1)...
```



```

1383          **          due to user misunderstanding
1384          ** 03/21/83      NZ          Changed CHECKC to inline code
1385          ** 02/25/83      NZ          Wrote, added documentation
1386          **
1387          ****
1388          ****
1389 F16A5 0000          REL(5) =STANDd          Standby decompile
           0
1390 F16AA 0000          REL(5) =STANDp          Standby parse
           0
1391 F16AF 8E00 =STANBY GOSUBL =GLOOP#          Get loop # to C[S]
           00
1392 F16B5 AC7          D=C      S          Save in D[S]
1393 F16B8 14A          A=DATO B          Read next token
1394 F16BB 3100          LC(2) =tOFF          Check if "STANDBY OFF"
1395 F16BF 962          ?A=C      B          Is it "OFF"?
1396 F16C2 11          GOYES STAN10          Yes...set up the values
1397 F16C4 3100          LC(2) =tON          Check if "ON"
1398 F16C8 966          ?A#C      B          Is it "ON"?
1399 F16CB 02          GOYES STAN20          No...must be numeric values
1400          *
1401          * This is "STANDBY ON"
1402          *
1403 F16CD D3          D=0      A          Set frame timeout=0
1404 F16CF 6480          GOTO STAN40
1405          *-
1406          *-
1407 F16D3          STAN10
1408          *
1409          * This is "STANDBY OFF"
1410          *
1411 F16D3 3400          LC(5) =Timeout          Frame timeout value
           000
1412 F16DA D7          D=C      A          Put in D[A]
1413 F16DC 3100          LC(2) =#Timeo          # of IDY timeouts
1414 F16E0 D5          B=C      A          Put in B[B]
1415 F16E2 417          GOC STAN40          Go always
1416          *-
1417          *-
1418 F16E5 20 STANra P= =eRANGE          Arg out of range
1419 F16E7 6D1F STANer GOTO Errorx          Error
1420          *-
1421          *-
1422 F16EB          STAN20
1423          *
1424          * This is STANDBY <expr> [, <expr>]
1425          *
1426          * Evaluate the frame timeout after saving loop #
1427          *
1428 F16EB ACB          C=D      S          Recall loop # to C[S]
1429 F16EE 7F8F          GOSUB Save2c          Save in STMTR1[S]
1430 F16F2 7790          GOSUB STANsb          Manipulate frame timeout
1431 F16F6 40F          GOC STANer          Error if carry
1432 F16F9 8E00          GOSUBL =REST2C          Restore loop # to C[S]
           00

```

```

1433      *
1434      * A[A] is now the timeout value
1435      *
1436 F16FF D6      C=A   A
1437 F1701 D7      D=C   A      Put timeout value in D[A]
1438 F1703 D1      B=0   A      Clear B[B] (# of IDY timeouts)
1439 F1705 E5      B=B+1 A      (# of IDY timeouts: 0=infinity)
1440 F1707 767F    GOSUB Save2c Timeout in STMTR1,loop # in [S]
1441 F170B 14A     A=DATO B
1442 F170E 3100    LC(2) =tCOMMA
1443 F1712 966     ?A#C   B      Is there a comma?
1444 F1715 F3      GOYES  STAN40 No...use default (same as first)
1445 F1717 161    DO=DO+ 2      Comma...skip it
1446      *
1447      * Read the IDY timeout value
1448      *
1449 F171A 17F      D1=D1+ 16      Remove the first entry from stack
1450      *
1451      * Now evaluate IDY timeout
1452      *
1453 F171D 7C60    GOSUB  STANsb  Evaluate expr, massage it
1454 F1721 45C    STANeR  GOC   STANer  Error
1455      *
1456      * A[A] is now the IDY timeout
1457      *
1458 F1724 D6      C=A   A
1459 F1726 D7      D=C   A      Set D[A] to IDY timeout
1460 F1728 8E00    GOSUBL =REST2C  Restore frame timeout to C[A]
      00
1461 F172E AC7     D=C   S      Restore loop #
1462 F1731 AFO     A=0   W
1463 F1734 DA      A=C   A      A[W] is now frame timeout
1464 F1736 AF2     C=0   W
1465 F1739 DB      C=D   A      C[W] is now IDY timeout
1466 F173B 8F00    GOSBVL =IDIV
      000
1467      *
1468      * Now A[W] is quotient, B,C[W] are remainder
1469      *
1470 F1742 97A     ?C=0   W
1471 F1745 50      GOYES  STAN30  Exact multiple...OK
1472 F1747 B74     A=A+1  W      Remainder...round up
1473 F174A D8      STAN30  B=A   A      Copy count to B[B]
1474 F174C AEO     A=0   B      Check if too many IDY timeouts
1475 F174F 97C     ?A#0   W      In range?
1476 F1752 39      GOYES  STANra  No...range error
1477 F1754 20      STAN40  P=   0
1478      *
1479      * Now D[A] is timeout value, B[B] is # IDY timeouts, D[S] is
1480      * loop #
1481      *
1482 F1756 ACB     C=D   S
1483 F1759 7386    GOSUB  Fndchk  Find the mailbox (C[S]=loop #)
1484 F175D 43C     GOC   STANer  Error...not found or man mode
1485 F1760 3300    LC(4) =#SETIC  Set number of IDY timeouts...

```

```

00
1486 F1766 AE9      C=B   B      ...to B[B]
1487 F1769 72EE    GOSUB Putc
1488 F176D 43B     GOC   STANr  Error...abort
1489 F1770 25      P=    5
1490 F1772 300     LC(1) =nSTO@5 Set frame timeout...
1491 F1775 DB      C=D   A      ...to D[A]
1492 F1777 8E00    GOSUBL =PUTE
00
1493 F177D 43A     GOC   STANr  Error...abort
1494 F1780 8D00 =nXTSTM GOVLNG =NXTSTM Done
000
1495      * _
1496      * _
1497 F1787 8C00 Pop1n GOLONG =POP1N
00
1498      * _
1499      * _
1500 F178D 8E00 STANsb GOSUBL =eXPEXC Evaluate the expression
00
1501 F1793 70FF    GOSUB Pop1n Pop it off the stack
1502 F1797 400     RTNC      Error
1503      *
1504      * Multiply by 1000 (convert to millisecs)
1505      *
1506 F179A 3230    LC(3) 3      10^3 is 1000
0
1507 F179F 05      SETDEC
1508 F17A1 A3A     A=A+C X      Can't be shortened to A field
1509 F17A4 D6      C=A   A      Check if still negative...
1510 F17A6 A36     C=C+C X
1511 F17A9 04      SETHEX
1512 F17AB 401     GOC   STANsr Range error if carry
1513 F17AE 7B77    GOSUB fLTDH Convert to HEX
1514 F17B2 590     GONC  STANsr Out of range or data type
1515 F17B5 8A8     ?A=0 A      Zero is NOT valid for timeout
1516 F17B8 40      GOYES STANsr
1517 F17BA 03      RTNCC      Good data...return
1518      * _
1519      * _
1520 F17BC 20      STANsr P=    =eRANGE Out of range
1521 F17BE 02      RTNSC
1522      ****
1523      ****
1524      **
1525      ** Name:      LISTIO - Execute the LIST IO statement
1526      **
1527      ** Category:  STExec
1528      **
1529      ** Purpose:
1530      **      LIST IO user statement: list the devices in the ASSIGN
1531      **      IO table (if none, error)
1532      **
1533      ** Entry:
1534      **      P=0

```

```

1535      **
1536      ** Exit:
1537      **     Through NXTSTM if no error, through ERRORX if error
1538      **
1539      ** Calls:      I/OFND,HTOD,D1=SDO,BLANKC,WRTASC,BF2DSP,ASLC2,
1540      **              ASRC2,<NXTSTM>,<ERRORX>
1541      **
1542      ** Uses.....
1543      ** Inclusive: A-D,R3,ST[11:0],STMTxx,FUNCxx
1544      **
1545      ** Stk lvls:   5 (BF2DSP)
1546      **
1547      ** History:
1548      **
1549      **      Date      Programmer      Modification
1550      **      -----      -
1551      **      01/16/84      NZ          Fixed device # count to count in
1552      **                                     DECIMAL, not HEX!
1553      **      12/15/82      NZ          Updated documentation
1554      **
1555      ****
1556      ****
1557 F17C0 300 LISTnb LC(1) =eNORSN      "ASSIGN IO Needed"
1558 F17C3 20      P=      =ePARSE      (parse message)
1559 F17C5 6F3E      GOTO  Errorx
1560      *_-
1561      *_-
1562 F17C9 0000      REL(5) =OFFIOd      IO decompile
1563      0
1563 F17CE 0000      REL(5) =IOp      IO parse
1564      0
1564 F17D3      =LISTIO
1565 F17D3 3200      LC(3) =bPILAI      Assign IO buffer
1566      0
1566 F17D8 8E00      GOSUBL =i/OFND
1567      00
1567 F17DE 51E      GONC LISTnb      No buffer...error
1568 F17E1 AF2      C=0 W      Clear nibs 14 & 15
1569 F17E4 137      CD1EX
1570 F17E7 134      DO=C
1571 F17EA 135      D1=C
1572 F17ED 10B      R3=C      Save buffer pointer in R3
1573      *
1574      * Now D0,D1 point to the ASSIGN IO buffer
1575      *
1576      * First figure out how many devices ARE assigned
1577      *
1578 F17F0 D1      B=0 A      B[A] is the device count
1579 F17F2 E5 LIST10 B=B+1 A      increment count
1580 F17F4 147      C=DAT1 A      Read this entry
1581 F17F7 173      D1=D1+ 4
1582 F17FA 96E      ?C#0 B      Is this entry null?
1583 F17FD 5F      GOYES LIST10      No...continue
1584      *
1585      * Now B[X] is the device count

```

```

1586          *
1587 F17FF CD          B=B-1 A          Back off last count (the null)
1588 F1801 D9          C=B A          Copy count to C[X]
1589 F1803 8E00        GOSUBL =HTOD          Convert to decimal
          00
1590 F1809 04          SETHEX          Now B[B] is the decimal value
1591 F180B 718E        GOSUB D1=SDO          Use STMTDx,FUNCxx to write it
1592 F180F 8E00        GOSUBL =BLANKC          Set C[W]=" "
          00
1593 F1815 1505        DAT1=C 6          Write out 3 blanks
1594 F1819 21          P= 1          Two digits (B[B])
1595 F181B AC3         D=0 S          CLEAR the sign for WRTASC
1596 F181E 8E00        GOSUBL =WRTASC          WRiTe ASCii
          00
1597 F1824 171        D1=D1+ 2          Leave a blank after the number
1598 F1827 20          P= 0
1599 F1829 3F44        LCASC \s(eciveD\          "Device(s"
          5667
          9636
          5682
          37
1600 F183B 1557        DAT1=C W
1601 F183F 17F        D1=D1+ 16
1602 F1842 3F92        LCASC \ngissa )\          ") assign"
          0216
          3737
          9676
          E6
1603 F1854 1557        DAT1=C W
1604 F1858 17F        D1=D1+ 16
1605          *          LC(10) #FF0A0D*(#10000)+\de\ "ed"&Cr&Lf&chr$(255)
1606 F185B 39          NIBHEX 39
1607 F185D 5646        NIBASC \ed\
1608 F1861 D0A0        NIBHEX D0A0FF
          FF
1609          *
1610 F1867 15D9        DAT1=C 10
1611 F186B 1D00        D1=(2) =STMTD0
1612 F186F 8F00        GOSBVL =BF2DSP          Send to display, ignore width
          000
1613          *
1614          * Now have sent the header
1615          *
1616          * Send out lines until reach a zero byte
1617          *
1618 F1876 3F44 LIST20 LCASC \# eciveD\          "Device #"
          5667
          9636
          5602
          32
1619 F1888 1F00        D1=(5) =FUNCRO
          000
1620 F188F 1557        DAT1=C W
1621 F1893 17F        D1=D1+ 16
1622 F1896 3302        LCASC \ \

```

```

02
1623 F189C 15D3    DAT1=C 4      Write blanks out to initialize
1624 F18A0 113     A=R3         Get buffer address, counter
1625 F18A3 8E00    GOSUBL =ASLC5
00
1626 F18A9 05     SETDEC      Increment in DECIMAL mode
1627 F18AB E4     A=A+1 A     Increment A[B]
1628 F18AD 04     SETHEX     Return to HEX mode
1629 F18AF D8     B=A A      Copy to B[B]
1630 F18B1 8E00    GOSUBL =ASRC5
00
1631 F18B7 130    DO=R        Set DO @ buffer
1632 F18BA 163    DO=DO+ 4
1633 F18BD 132    ADOEX     DO @ entry, A[A] @ next entry
1634 F18C0 103    R3=A      Store new count in R3
1635 F18C3 21     P= 1      Write B[B]
1636 F18C5 AC3    D=0 S     Sign is positive
1637 F18C8 8E00    GOSUBL =WRTASC Write ASCII @ D1
00
1638 F18CE 20     P= 0
1639 F18D0 35D3    LCASC \:'=\  "'':"
72A3
1640 F18D8 15D5    DAT1=C 6
1641 F18DC 175    D1=D1+ 6
1642 *
1643 * Now read the 2 letters, put them in RAM, display them
1644 *
1645 F18DF 146     C=DATO A   Read the 2 bytes of name
1646 F18E2 96A     ?C=0 B    Zero byte?
1647 F18E5 83     GOYES LIST50 Yes...done with list
1648 F18E7 145    DAT1=C A   No...write the bytes out
1649 F18EA 171    D1=D1+ 2
1650 F18ED F6     CSR A     Check if second char was null
1651 F18EF F6     CSR A     Now second char in C[B], C[4:2]=0
1652 F18F1 96E    ?C#0 B    Was the second char null?
1653 F18F4 90     GOYES LIST30 No...continue
1654 F18F6 3102    LCASC \ \
1655 F18FA 14D    DAT1=C B   Yes...replace with a blank
1656 F18FD 171    LIST30 D1=D1+ 2 Now D1 @ end of string
1657 *****
1658 *
1659 * LC(8) #FF0A0D*256+\ '\ "'&Cr&Lf&CHR$(255)
1660 F1900 37     NIBHEX 37
1661 F1902 72D0    NIBHEX 72D0A0FF
A0FF
1662 *
1663 *****
1664 F190A 15D7    DAT1=C 8   Write it out
1665 F190E 1D00    D1=(2) =FUNCR0 Point back to start...
1666 F1912 8F00    GOSBVL =BF2DSP ...and send to the display
000
1667 F1919 6C5F    GOTO LIST20 Loop back (not done yet)
1668 *-
1669 *-
1670 F191D LIST50

```

```

1671      *
1672      * Done with LIST IO
1673      *
1674 F191D 626E      GOTO  nXTSTM
1675      *****
1676      *****
1677      **
1678      ** Name:      OFFIO - Execute the OFF IO statement
1679      **
1680      ** Category:  STExec
1681      **
1682      ** Purpose:
1683      **      Execute the "OFF IO" statement
1684      **
1685      ** Entry:
1686      **      Hexmode, P=0
1687      **
1688      ** Exit:
1689      **      Through NXTSTM
1690      **
1691      ** Calls:      D1=DST,<NXTSTM>
1692      **
1693      ** Uses.....
1694      ** Inclusive: A[B],C[A],DO,D1
1695      **
1696      ** Stk lvls:  0
1697      **
1698      ** History:
1699      **
1700      **      Date      Programmer      Modification
1701      **      -----      -
1702      **      12/15/82      NZ      Updated documentation
1703      **
1704      *****
1705      *****
1706 F1921 0000      REL(5) =OFFIOd      Decompile "IO"
1707      0
1707 F1926 0000      REL(5) =OFFIOp      Parse OFF IO/INTR
1708      0
1708 F192B 14A =OFFIO  A=DATO B      Read the first token to check
1709 F192E 3100      LC(2) =tXWORD      for IO vs INTR
1710 F1932 966      ?A#C B      Is it INTR?
1711 F1935 11      GOYES OFFIO1      No...must be OFF IO
1712      *
1713      * It is OFF INTR; clear the ONINTR address
1714      *
1715 F1937 1F00      D1=(5) =ONINTR
1716      000
1716 F193E D2      C=0 A
1717 F1940 145      DAT1=C A
1718 F1943 5D2      GONC OFFIO2      Go always
1719      *-
1720      *-
1721 F1946 1F00 OFFIO1 D1=(5) =LOOPST
1722      000

```

```
1722 F194D 1572      C=DAT1 XS
1723 F1951 0B       CSTEX
1724 F1953 850      ST=1 =Offed      Loop is OFFED by the user
1725 F1956 0B       CSTEX
1726 F1958 1552     DAT1=C XS       Write it back out
1727                *
1728 F195C 8E00     GOSUBL =D1=DST
      00
1729 F1962 1572     C=DAT1 XS
1730 F1966 0B       CSTEX
1731 F1968 840      ST=0 =LoopOK     Loop is NOT ok
1732 F196B 0B       CSTEX
1733 F196D 1552     DAT1=C XS
1734 F1971 6E0E     OFFIO2 GOTO nXTSTM      Exit through nXTSTM
1735                *****
1736                *****
1737                **
1738                ** Name:      RESTIO - Execute the RESTORE IO statement
1739                ** Name:      RESTIO - RESTORE IO, loop # in C[S]
1740                **
1741                ** Category:  STEXEC
1742                **
1743                ** Purpose:
1744                **      Execute the RESTORE IO statement...undo the effects
1745                **      of an OFF IO and reinitialize the specified loop
1746                **
1747                ** Entry:
1748                **      HEXMODE, P=0
1749                **
1750                ** Exit:
1751                **      Through ENDST if no error, through ERRORX if error
1752                **
1753                ** Calls:      CKLOP#,D1=DST,START-,RESTRT,PILCNF,<ENDST>,
1754                **      <ERRORX>
1755                **
1756                ** Uses.....
1757                **      Inclusive: All CPU registers,ST[11:0],FUNCxx,all RAM that
1758                **      EXPEXC is permitted to use
1759                **
1760                ** Stk lvls:  7 (CKLOP#)
1761                **
1762                ** History:
1763                **
1764                **      Date      Programmer      Modification
1765                **      -----
1766                **      08/12/83      NZ          Reordered code between RESTIO and
1767                **                      (former) RESTIO to allow RESTIO
1768                **                      to clear the OFFED flag
1769                **      08/05/83      NZ          Changed to take a loop number
1770                **      12/15/82      NZ          Updated documentation
1771                **
1772                *****
1773                *****
1774 F1975 0000      REL(5) =RESTd
      0
```



```
1775 F197A 0000          REL(5) =RESTp
      0
1776 F197F 8E00 =RESTIO GOSUBL =CKLOP#          Get loop number, if any
      00
1777          *
1778          * C[S] is the loop number
1779          *
1780          * (Entry for ASSIGN IO "" and CONTROL ON)
1781          *
1782 F1985 1F00 =RESTIO D1=(5) =LOOPST
      000
1783 F198C D2          C=0   A          Clear all bits in nibble
1784 F198E 15D0          DAT1=C 1          Loop is no longer offed
1785          *
1786          * Set the loop OK flag for the display device
1787          *
1788 F1992 8E00          GOSUBL =D1=DST
      00
1789 F1998 1572          C=DAT1 XS
1790 F199C 0B          CSTEX
1791 F199E 850          ST=1   =LoopOK          Set the loop "OK"
1792 F19A1 0B          CSTEX
1793 F19A3 1552          DAT1=C XS          Write it back out to RAM
1794          *
1795          * Now readdress loop (loop # still in C[S])
1796          *
1797 F19A7 850          ST=1   =sReadd          Force readdressing
1798 F19AA D3          D=0   A          Set device = NULL
1799          *
1800          * With device=null, START- will not error out if that loop
1801          * is currently in device mode, but will just return
1802          *
1803 F19AC 8E00          GOSUBL =START-          Readdress the loop if controller
      00
1804 F19B2 4C0          GOC   Rester          Error during START
1805 F19B5 8E00          GOSUBL =PILCNF          Restore OFFED devices, set DSPCHX
      00
1806 F19BB 648C          GOTO   Endst          Done...exit
1807          *
1808          *
1809 F19BF 654C Rester GOTO Errorx          Error jump
1810 *****
1811 *****
1812 **
1813 ** Name:          ASGNIO - Execute the ASSIGN IO statement
1814 **
1815 ** Category:      STEXEC
1816 **
1817 ** Purpose:
1818 **          Execute the ASSIGN IO statement (undo all DISPLAY IS
1819 **          and PRINTER IS assignments, allocate/deallocate the
1820 **          assign io device buffer
1821 **
1822 ** Entry:
1823 **          DO points to the device specifier list
```

```

1824      **      P=0, HEXMODE
1825      **
1826      ** Exit:
1827      **      Through ENDST if no error, ERRORX if error
1828      **
1829      ** Calls:      GETSTR, TSAVD0, TSAVD1, NXTCHR, I/ODAL, D1=DSP, I/OALL,
1830      **              START-, TRESDO, TSWAD1, UCRANG, ASRC2, CATCH+, BAKCHR,
1831      **              ASLC2, <REST10>, <BSERR>, <ENDST>
1832      **
1833      ** Uses.....
1834      ** Inclusive: All CPU registers, ST[11:0], STMTD0, STMTR1, FUNCxx,
1835      **              all RAM EXPEXC is permitted to use
1836      **
1837      ** Stk lvls:  7 (GETSTR)
1838      **
1839      ** History:
1840      **
1841      **      Date      Programmer      Modification
1842      **      -----      -
1843      **      11/30/83      NZ          Updated documentation
1844      **      12/21/82      NZ          Added documentation
1845      **
1846      *****
1847      *****
1848 F19C3 0000      REL(5) =ASGNd
1849      0
1849 F19C8 0000      REL(5) =ASGNp
1850      0
1850 F19CD      =ASGNIO
1851      *
1852      * Get the string from program memory
1853      *
1854 F19CD 8E00      GOSUBL =GETSTR
1855      00
1855      *
1856      * GETSTR returns two cases:
1857      * 1) (Literal expression): ST(=sSTK)=0, D0 at start of data
1858      * 2) (String expression): ST(=sSTK)=1, D1 at start of data,
1859      *                          D[A] past end of data
1860      *
1861      * If ST(=sSTK)=0, then this is ASSIGN IO *
1862      *
1863 F19D3 860      ?ST=0 =sSTK      Reading from stack?
1864 F19D6 81      GOYES ASGN00      No...ASSIGN IO *
1865      *
1866      * Reading from stack (ASSIGN IO "????")
1867      *
1868 F19D8 7DBC      GOSUB Tsavd0      Save D0 (to restore after I/OALL)
1869 F19DC 8E00      GOSUBL =TSAVD1      Save D1
1870      00
1870 F19E2 DB      C=D      A
1871 F19E4 108      RO=C      Save end (if string) in RO
1872      *
1873      * The exit conditions of GETSTR match those needed by NXTCHR!
1874      *

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```

1875 F19E7 7C7C      GOSUB Nxtchr      Check if this is a "*"
1876 F19EB 5D0      GONC  ASGN04      No error...exit
1877                *
1878                * ASSIGNIO "" = deallocate the ASSIGNIO buffer
1879                *
1880 F19EE 7631 ASGN00 GOSUB ASGNda      Deallocate,
1881 F19F2 AC2      C=0  S           (loop 1!)
1882 F19F5 6F8F      GOTO  REST10      exit through restore
1883                *
1884                *
1885 F19F9          ASGN04
1886 F19F9 31A2      LCASC  \*\
1887 F19FD 962      ?A=C  B
1888 F1A00 EE        GOYES ASGN00
1889                *
1890                * Not "*"...Unassign all devices
1891                *
1892                * (ASSIGN IO "device list")
1893                *
1894 F1A02 8E00      GOSUBL =D1=DSP
1895                00
1895 F1A08 AF2      C=0  W           C[W]="000...000"
1896 F1A0B A7E      C=C-1 W         C[W]="FFF...FFF"
1897 F1A0E 15DD      DAT1=C 14       Clear IS-DSP, IS-PRT
1898 F1A12 17D      D1=D1+ 14
1899 F1A15 15DD      DAT1=C 14       Clear IS-INP, IS-PLT
1900                *
1901                * Now create the I/O buffer for the ASSIGN words
1902                *
1903 F1A19 D2        C=0  A
1904                *
1905                * Leave 1 byte @ end (terminates LISTIO)
1906                *
1907 F1A1B 31A7      LC(2) 30*2*2+1*2 30 entries of 2 bytes, 2 nib/byte
1908 F1A1F D5        B=C  A           Size in B[A]
1909 F1A21 3200      LC(3) =bPILAI    Assign IO
1910                0
1910 F1A26 8F00      GOSBVL =I/OALL   I/O ALlocate routine
1911                000
1911 F1A2D 490      GOC  ASGN05      OK
1912 F1A30 8D00 =bSERR GOVLNG =BSERR Error (mem)
1913                000
1913                *
1914                *
1915                *
1916                * The I/O buffer is allocated, D1 is the start of the buffer
1917                *
1918                * Initialize the buffer to all zero
1919                *
1920 F1A37 137 ASGN05 CD1EX      Get D1 value into DO...
1921 F1A3A 135      D1=C           ...restore D1
1922 F1A3D 134      DO=C           Use DO for clear loop
1923 F1A40 AF2      C=0  W
1924 F1A43 28      P= 16-(120/15) (30*2*2 = 120)
1925 F1A45 15CE ASGN10 DAT0=C 15

```

```

1926 F1A49 16E      DO=DO+ 15
1927 F1A4C 0C      P=P+1
1928 F1A4E 56F      GONC  ASGN10      Loop back if not done yet
1929 F1A51 14C      DATO=C B        Clear out terminator byte
1930
1931 *
1932 * Now D1 points to the buffer area, A[A] is length
1933 * FUNCDO contains the program pointer
1934 *
1935 * Set OFFED flag = 0 (ASSIGN IO eliminates OFF IO)
1936 F1A54 1B00      DO=(5) =LOOPST
      000
1937 F1A5B D2      C=0  A
1938 F1A5D 1542      DATO=C XS        No longer OFFED, no devices set up
1939 *
1940 * Now readdress the loop (Primary only), use last address as
1941 * a device count
1942 *
1943 F1A61 AC2      C=0  S          Always loop 1 for ASSIGN IO
1944 *
1945 * Since D[A] is the end of the string and could look like
1946 * a request to search for the device to START-, set D[0] to
1947 * 1 (which always looks like an address, no search). This also
1948 * ensures that the HP-71 is the controller on loop 1.
1949 *
1950 F1A64 BF3      DSL  W
1951 F1A67 E7      D=D+1 A        D[0] is now "1"
1952 F1A69 850      ST=1  =sReadd  Force readdressing
1953 F1A6C 8E00      GOSUBL =START- Set it up (first mailbox)
      00
1954 F1A72 560      GONC  ASGN15    Found it, controller...ok
1955 F1A75 6E90      GOTO  ASGMeR    Not found or not controller...error
1956 *
1957 *
1958 *
1959 * If start returns with no carry, then last message in MBOX is
1960 * the address message from readdressing the loop
1961 *
1962 F1A79 BF7      ASGN15 DSR  W        First restore D[A]
1963 F1A7C 169      DO=DO+ 10      Position to the message in mailbox
1964 F1A7F 14E      C=DATO B       Read address
1965 F1A82 189      DO=DO- 10      Restore DO
1966 *
1967 * Now C[B] is the last address
1968 *
1969 F1A85 D5      B=C  A        Save count in B[B]
1970 F1A87 CD      B=B-1 A       Decrement for zero-based loop
1971 *
1972 F1A89 721C      GOSUB Tresd0   Restore DO
1973 F1A8D 8E00      GOSUBL =TSHAD1 Restore D1, save buffer pointer
      00
1974 F1A93 118      C=R0
1975 F1A96 D7      D=C  A        Restore end of string pointer
1976 *
1977 * Now D1 is restored, buffer pointer is in FUNC1

```

```

1978          *
1979          * Loop to get ASSIGN words, copy to assign buffer
1980          *
1981 F1A98 7BCB ASGN20 GOSUB Nxtchr      Get first character
1982 F1A9C 560      GONC  ASGN30      Have NOT reached end of string
1983 F1A9F 60AB ASGN25 GOTO  Endst     Reached end (Done)
1984          *
1985          *
1986 F1AA3 8E00 ASGN30 GOSUBL =UCRANG   Check if a letter (convert to UC)
           00
1987 F1AA9 5B1      GONC  ASGN40      Now in [A-Z]...continue
1988 F1AAC 31A3     LCASC  \:\      Not in [A-Z]...check if ":"
1989 F1AB0 966      ?A#C  B           Is it a ":"?
1990 F1AB3 F5       GOYES ASGNER      No...bad character error
1991 F1AB5 7EAB     GOSUB Nxtchr      Get next character
1992 F1AB9 485      GOC   ASGNER      End of list after ":"...error
1993 F1ABC 8E00     GOSUBL =UCRANG   Check if a letter (convert to UC)
           00
1994 F1AC2 4F4      GOC   ASGNER      Not in [A-Z]...error
1995          *
1996          * Letter...save in A[15:14]
1997          *
1998 F1AC5 8E00 ASGN40 GOSUBL =ASRC2
           00
1999 F1ACB 789B     GOSUB Nxtchr      Read next character
2000 F1ACF 411      GOC   ASGN45      End of string...single letter word
2001 F1AD2 8E00     GOSUBL =cATCH+    Check if letter or digit
           00
2002 F1AD8 4A0      GOC   ASGN50      Letter or digit...OK
2003 F1ADB 8E00     GOSUBL =BAKCHR    Back up unconditionally
           00
2004 F1AE1 DO      ASGN45 A=0   A           Clear A[B] (single letter word)
2005          *
2006          * Valid word...save it in buffer
2007          *
2008 F1AE3 8E00 ASGN50 GOSUBL =TSWAD1   Swap D1 with buffer pointer
           00
2009 F1AE9 8E00     GOSUBL =ASLC2    Rotate word back to A[3:0]
           00
2010 F1AEF 1593     DAT1=A 4       Write the word out to the buffer
2011 F1AF3 173      D1=D1+ 4      Increment pointer
2012 F1AF6 8E00     GOSUBL =TSWAD1   Swap D1 back
           00
2013          *
2014          * Ready for next character
2015          *
2016 F1AFC 776B     GOSUB Nxtchr      No next character (done)
2017 F1B00 4E9      GOC   ASGN25      Got a character...check it
2018 F1B03 31C2     LCASC  \,\      Is it a comma?
2019 F1B07 966      ?A#C  B           No...error
2020 F1B0A 80       GOYES ASGNER      Yes...devices left to get words?
2021 F1B0C A6D      B=B-1 B        Yes...continue on
2022 F1B0F 588      GONC  ASGN20
2023          *
2024          * Fall through to error (too many words)

```

```
2025      *
2026 F1B12 20 ASGNER P=   =eDSPEC      Invalid Device Spec
2027 F1B14 80C1 ASGNeR C=P   1          Save P in C[1]
2028 F1B18 06          RSTK=C        Save error (in C[B]) on RSTK
2029 F1B1A 7A00          GOSUB ASGNda   Deallocate assignio buffer
2030 F1B1E 07          C=RSTK        Restore error from RSTK
2031 F1B20 80D1          P=C   1          Restore P from C[1]
2032 F1B24 60EA          GOTO  Errorx   Error exit
2033      *_
2034      *_
2035 F1B28 20 ASGNda P=   0          Deallocate the ASSIGN buffer
2036 F1B2A 3200          LC(3) =bPILAI
      0
2037 F1B2F 8D00 =I/odal GOVLNG =I/ODAL
      000

2038      *****
2039      *****
2040      **
2041      ** Name:      DEVID - Return the device ID of the device
2042      **
2043      ** Category:   FNEEXEC
2044      **
2045      ** Purpose:
2046      **      Return the device ID of the device indicated by the
2047      **      device specifier passed as a parameter
2048      **
2049      ** Entry:
2050      **      P=0
2051      **      D1 points to the stack
2052      **      D0 points to the PC
2053      **
2054      ** Exit:
2055      **      P=0
2056      **      D1 points to the stack (Device ID string)
2057      **      Returns through FNRTN1
2058      **      If device not found/doesn't respond, null string
2059      **      If bad device spec, error
2060      **
2061      ** Calls:      DEVPAR,GETID+,ENDFN,TRESDO,<FNRTN1>,<ERRORX>
2062      **
2063      ** Uses.....
2064      ** Inclusive:  A,B,C,D,R0-R3,D1,P,FUNCD0,FUNCD1,MLFFLG,ST[7,4:0]
2065      **
2066      ** Stk lvls:   4 (DEVPAR)
2067      **
2068      ** History:
2069      **
2070      **      Date      Programmer      Modification
2071      **      -----      -
2072      **      09/07/83      NZ          Packed at DEVID3
2073      **      12/21/82      NZ          Updated documentation
2074      **
2075      *****
2076      *****
2077 F1B36 C11          NIBHEX C11          One parameter, string or numeric
```

```

2078 F1839 7841 =DEVID GOSUB DEVPAR      Get parameter
2079 F183D 485      GOC   DEVIDe      Error
2080                *
2081                * Now D[A] is address of the device
2082                *
2083                * If D[A]=0, then not found...return null string
2084                *
2085 F1840 AC3      D=0   S          D[S] = length of ID in characters
2086 F1843 8AB      ?D=0  A          Found?
2087 F1846 B0      GOYES DEVID1      No...null ID
2088                *
2089                * Get the device ID of the device
2090                *
2091 F1848 8E00      GOSUBL =GETID+      Get Device ID of device
      OO
2092                *
2093                * GETID returns with the ID in A[W]. The length in characters
2094                * is in D[S]. A[B] is the first character of the ID.
2095                *
2096 F184E 474      GOC   DEVIDe      Error if carry
2097 F1851      DEVID1
2098                *
2099                * Now D1 @ stack-16, D[S] is length of ID in nibbles, A[W] is
2100                * device ID of the device
2101                *
2102 F1851 ACB      C=D   S
2103 F1854 80DF      P=C   15          P is length in characters
2104 F1858 17F      D1=D1+ 16        Point to top of stack (first item)
2105 F185B 890 DEVID2 ?P=   0          Is length zero yet?
2106 F185E 31      GOYES DEVID3      Yes...done writing ID to stack
2107 F1860 1C1      D1=D1- 2          No...write another byte
2108 F1863 149      DAT1=A B
2109 F1866 BF4      ASR   W
2110 F1869 BF4      ASR   W          Set up next data item
2111 F186C OD      P=P-1
2112 F186E 5CE      GONC  DEVID2      Go always (P was not zero)
2113                *
2114                *
2115 F1871      DEVID3
2116                *
2117                * Now write out the string header
2118                *
2119 F1871 A46      C=C+C S          Convert to number of nibbles
2120 F1874 80DF      P=C   15          Now P is number of nibbles
2121 F1878 AF2      C=0   W          Clear C[W] for string header
2122 F187B 80F2      CPEX  2          String length in C[2], P=0
2123                *
2124                * If carry, then length=8...increment C[3] (C[M])
2125                *
2126 F187F 550      GONC  DEVID4
2127 F1882 B56      C=C+1 M          C[3]=1
2128 F1885 A0E DEVID4 C=C-1 P          C[0]="F" (string header)
2129 F1888 8E00      GOSUBL =ENDFN      Clean up loop (C saved in R0)
      OO
2130 F188E 7D0B      GOSUB Tresd0      Restore D0 value (PC)

```

```
2131 F1B92 6CF1      GOTO  Fnrtn1      Return, C[W] is string header
2132                *-
2133                *-
2134 F1B96 6E6A DEVIDE GOTO  Errorx      Error
2135                *****
2136                *****
2137                **
2138                ** Name:      SPOLL - Execute the SPOLL function
2139                **
2140                ** Category:  FNEEXEC
2141                **
2142                ** Purpose:
2143                **      SPOLL is a function which returns the status of the
2144                **      device specified by either an address or a string
2145                **      device specifier.
2146                **
2147                ** Entry:
2148                **      P=0
2149                **      D0 points to PC
2150                **      D1 points to the top of the stack (device spec)
2151                **
2152                ** Exit:
2153                **      P=0
2154                **      Numeric value on stack (D1 points to top of stack),
2155                **      value = -1 if device not found or no response
2156                **      (the numeric value is the decimal equivalent of the
2157                **      first 4 bytes of device status...because more than
2158                **      four bytes may lose accuracy in the conversion to
2159                **      decimal; 2^(8*5) is about 1.1E+12, which would lose
2160                **      a small amount of precision in the FIRST byte.
2161                **      The first byte is SPOLL(x) mod 256, etc
2162                **      Returns through FNRTN4
2163                **      If error, exits through ERRORX
2164                **
2165                ** Calls:      DEVPAR, YTML, READRG, <DEVTYx>, <ERRORX>
2166                **
2167                ** Uses.....
2168                ** Inclusive: A,B,C,D,RO-R3,D1,P,FUNCD0,FUNCD1,MLFFLG,ST[7,4:0]
2169                **
2170                ** Stk lvls:  4 (DEVPAR)
2171                **
2172                **
2173                ** History:
2174                **
2175                **      Date      Programmer      Modification
2176                **      -----      -
2177                **      03/15/83      NZ          Removed extra START call @ SPOLL0
2178                **      02/25/83      NZ          Modified to change order of bytes
2179                **      02/24/83      SC          Wrote routine
2180                **
2181                *****
2182                *****
2183 F1B9A C11          NIBHEX C11      1 parameter, either numeric/string
2184 F1B9D 74E0 =SPOLL GOSUB DEVPAR Process device specifier
2185 F1BA1 4D3          GOC  FINDER      Error
```



```

2186      *
2187      * D[X] is the device address (D[X]=0 if not found)
2188      *
2189 F1BA4 93F      ?D#0  X      Was the device found?
2190 F1BA7 60      GOYES  SPOL10  Yes...continue
2191      *
2192      * If device not found, return -1
2193      *
2194 F1BA9 65C0    SPOL05  GOTO   DEVTY5
2195      *
2196      *
2197 F1BAD 8E00    SPOL10  GOSUBL =YTML      Make the device as a talker
                OO
2198 F1BB3 4B2      GOC    FINDER  Error
2199      *
2200      * Only the first 4 bytes are returned, but READRG expects 8
2201      *
2202 F1BB6 3500    LC(6) (=mSST)+#8  Send ready frame SST, count=8
                OOOO
2203 F1BBE 8E00    GOSUBL =READRG  Read into A[W]
                OO
2204 F1BC4 4A1      GOC    FINDER  Error
2205 F1BC7 94B      ?D=0  S      Any response?
2206 F1BCA FD      GOYES  SPOL05  No...return -1
2207 F1BCC AF2      C=0   W      Clear high 4 bytes
2208 F1BCF 27      P=    7
2209 F1BD1 A96      C=A   WP     Return only first 4 bytes
2210 F1BD4 6680    GOTO   DEVTYx  Convert to floating number, exit
2211      *****
2212      *****
2213      **
2214      ** Name:      FIND - Execute the DEVADDR function
2215      **
2216      ** Category:  FNEEXEC
2217      **
2218      ** Purpose:
2219      **      FIND is a function which returns the address of the
2220      **      device specified by either an address (trival case) or
2221      **      a string device specifier
2222      **
2223      ** Entry:
2224      **      P=0
2225      **      D0 points to the PC
2226      **      D1 points to the stack (device specifier on stack)
2227      **
2228      ** Exit:
2229      **      P=0
2230      **      Numeric expression on stack (D1 points to the address)
2231      **      (-1=not found, else address)
2232      **      Returns through FNRTN4
2233      **      If error, exits through ERRORX
2234      **
2235      ** Calls:      DEVPAR,HTOD,CSLC12,<DEVTY4>,<DEVTY5>,<ERRORX>
2236      **
2237      ** Uses.....

```

```

2238      ** Inclusive: A,B,C,D,R0-R3,D1,P,FUNCD0,FUNCD1,MLFFLG,ST[7,4:0]
2239      **
2240      ** Stk lvls: 4 (DEVPAR)
2241      **
2242      ** History:
2243      **
2244      **      Date      Programmer      Modification
2245      **      -----      -
2246      ** 12/21/82      NZ      Updated documentation
2247      **
2248      ****
2249      ****
2250 F1BD8 C11      NIBHEX C11      One argument, string or numeric
2251 F1BDB 76A0 =FIND  GOSUB  DEVPAR      Evaluate the device specifier
2252 F1BDF 455 FINDER GOC    FINDER      Error
2253      *
2254      * Convert D[X] to a floating number address
2255      *
2256 F1BE2 D2      C=0    A
2257 F1BE4 20      P=      0
2258 F1BE6 31F1      LC(2) #1F      Get primary address
2259 F1BEA 0EF7      C=C&D A
2260 F1BEE 8E00      GOSUBL =HTOD    Convert to decimal (in B[X])
      00
2261 F1BF4 D4      A=B    A      Save in A[X]
2262      *
2263      * Now A[X] is the primary address value
2264      *
2265 F1BF6 20      P=      0
2266 F1BF8 320E      LC(3) #3E0      Mask for secondary address
      3
2267 F1BFD 0EF7      C=C&D A      C[X] is secondary * 32
2268 F1C01 BB6      CSR    X      Cannot be CSR A:need C[XS]=xxx0(2)
2269 F1C04 81E      CSRB
2270 F1C07 8E00      GOSUBL =HTOD    Convert to decimal
      00
2271      *
2272      * Now DECIMAL mode, B[X] is secondary address, A[X] is primary
2273      *
2274 F1C0D 04      SETHEX
2275 F1C0F 20      P=      0      HTOD leaves P non-zero
2276 F1C11 AF2      C=0    W
2277 F1C14 D6      C=A    A      Copy A[B] (A[4:2]=0)
2278 F1C16 F2      CSL    A
2279 F1C18 F2      CSL    A
2280 F1C1A AE9      C=B    B      Now C[3:2] is primary, [B] is sec
2281 F1C1D 8E00      GOSUBL =CSLC12  Rotate into C[15:12]
      00
2282      *
2283      * If C[S] is non-zero, shift RIGHT 1 nibble, add 1 to exponent
2284      * (address is >= 10)
2285      *
2286 F1C23 94A      ?C=0   S
2287 F1C26 70      GOYES  FIND10
2288 F1C28 BF6      CSR    W      (Exponent, low mantissa = 0)

```

```

2289 F1C2B E6          C=C+1  A          C[X]=1
2290 F1C2D          FIND10
2291                *
2292                * Now C[W] is value, D1 points to the stack
2293                *
2294 F1C2D 97E          ?C#0  W          Is it zero? (not found)
2295 F1C30 13          GOYES  DEVTY4      No...value is OK
2296 F1C32 5C3        GONC   DEVTY5      Yes...return -1 (not found)
2297                *_
2298                *_
2299 F1C35 6FC9  FINDER GOTO  Errorx      Error
2300                *****
2301                *****
2302                **
2303                ** Name:          DEVTYP - Execute the DEVAID function
2304                **
2305                ** Category:      FNEEXEC
2306                **
2307                ** Purpose:
2308                **          DEVTYP returns the accessory ID of the device indicated
2309                **          by the device specifier
2310                **
2311                ** Entry:
2312                **          P=0
2313                **          D1 points to the stack (device specifier on the stack)
2314                **          D0 points to the PC
2315                **
2316                ** Exit:
2317                **          P=0
2318                **          Numeric expression for accessory ID (-1 if no response)
2319                **          Returns through FNRTN4
2320                **          Exits through ERRORX if error
2321                **
2322                ** Calls:          DEVPAR,GTYPE,FLOAT!,ENDFN,TRESDO,<FNRTN4>,<ERRORX>
2323                **
2324                ** Uses.....
2325                ** Inclusive: A,B,C,D,R0-R3,D1,P,FUNCD0,FUNCD1,MLFFLG,ST[7,4:0]
2326                **
2327                ** Stk lvls:      4 (DEVPAR)
2328                **
2329                ** History:
2330                **
2331                **          Date          Programmer          Modification
2332                **          -----          -
2333                **          05/17/83          NZ          Changed return from GTYPE
2334                **          12/21/82          NZ          Added documentation
2335                **
2336                *****
2337                *****
2338 F1C39 C11          NIBHEX C11          One parameter, string or numeric
2339 F1C3C 7540 =DEVTYP GOSUB  DEVPAR          Get device parameter
2340 F1C40 404          GOC   DEVTYe      Error
2341                *
2342                * Now D0 points to the mailbox, D[X] is the address
2343                *

```

```

2344 F1C43 8AB      ?D=0  R      Was the device found?
2345 F1C46 92      GOYES  DEVTY5  No...return -1
2346 F1C48 8E00    GOSUBL =GTYPE  Get device type for the device
      00
2347 F1C4E 423     GDC    DEVTYe  Error...exit
2348 F1C51 8A8     ?A=0  R      Was it "NO RESPONSE"?
2349 F1C54 B1      GOYES  DEVTY5  Yes...return -1
2350 F1C56 AF2     C=0   W
2351 F1C59 D6      C=A   R      Copy all info returned from GTYPE
2352 F1C5B 8E00    DEVTYx  GOSUBL =FLOAT!  Convert to floating point #
      00
2353 F1C61 8E00    DEVTY4  GOSUBL =ENDFN  Clean up the loop
      00
2354 F1C67 743A    GOSUB  Tresd0  Restore D0
2355 F1C6B 6F02    GOTO   Fnrtn4  Return the value
2356      *_-
2357      *_-
2358 F1C6F 7300    DEVTY5  GOSUB  LOAD-1  Load a -1 into C[W]
2359 F1C73 5DE     GONC   DEVTY4  Go always
2360      *_-
2361      *_-
2362 F1C76 AF2     LOAD-1  C=0   W
2363 F1C79 2E      P=     14
2364 F1C7B 3119    LCHEX  91      This is -1
2365 F1C7F 03      RTNCC
2366      *_-
2367      *_-
2368 F1C81 6389    DEVTYe  GOTO   Errorx  Error
2369      *****
2370      *****
2371      **
2372      ** Name:      DEVPAR - Parse a device specifier on the stack
2373      ** Name:      DEVPR$ - Parse a string device spec on stack
2374      **
2375      ** Category:  PILUTL
2376      **
2377      ** Purpose:
2378      **      Decode a device parameter (for functions which accept
2379      **      one parameter, either string or numeric, for device
2380      **      specifier)
2381      **
2382      ** Entry:
2383      **      P=0
2384      **      HEXMODE
2385      **      DEVPAR:
2386      **      D1 points to the parameter on stack
2387      **      DEVPR$:
2388      **      D1 points to string header (String is reversed)
2389      **      ST(sSTK)=1
2390      **
2391      ** Exit:
2392      **      FUNCDO contains the calling routine's DO value
2393      **      Carry clear: OK...D[X] is address (0 if not found)
2394      **      D1 set up for 1 numeric parameter return
2395      **      DO points to the mailbox

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2396      **      Carry set: Error...P, C[0] set up for ERRORX
2397      **
2398      ** Calls:      TSAVDO,POP1N,GADRRM,REVPOP,<DEVPR$>
2399      **      DEVPR$: TSAVD1,GETDIX,TRES D1
2400      **
2401      ** Uses.....
2402      ** Inclusive: A,B,C,D,RO-R3,D1,P,FUNCD0,FUNCD1,MLFFLG,ST[7,4:0]
2403      **
2404      ** Stk lvls:   3 (GETDIX - two levels saved in RO)
2405      **
2406      ** History:
2407      **
2408      **      Date      Programmer      Modification
2409      **      -----      -
2410      **      01/06/84      NZ      Made setting of MLFFLG a GOSUB so
2411      **                                     code can be shared by READxxxx and
2412      **                                     STATUS; moved call to the routine
2413      **                                     so that DEVPR$ also sets MLFFLG
2414      **      03/16/83      NZ      Changed error return from GETDIX
2415      **      03/15/83      NZ      Added second stack level save for
2416      **                                     call to GETDIX
2417      **      12/21/82      NZ      Updated documentation
2418      **
2419      ** *****
2420      ** *****
2421 F1C85      =DEVPR
2422 F1C85 1537      A=DAT1 W      Read in the item from the stack
2423 F1C89 850      ST=1 =sSTK      GADRRM needs this if not a string
2424 F1C8C B04      A=A+1 P
2425 F1C8F A64      A=A+A B      Clear bit for string array
2426 F1C92 968      ?A=0 B      Is this a string?
2427 F1C95 F2      GOYES DEVP10      Yes...string device spec
2428      *
2429      * Not string...check for legal input
2430      *
2431 F1C97 7EF9      GOSUB Tsavd0      Save D0 in FUNCD0 (exit condition)
2432 F1C9B 78EA      GOSUB Pop1n      Pop one numeric item into A[W]
2433      *
2434      * Now A[W] is the numeric item
2435      *
2436 F1C9F 8E00      GOSUBL =GADRRM      Get address from RAM (use A[W])
2437      00
2437 F1CA5 D7      D=C A      Put address into D[A]
2438      *
2439      * If carry clear, C[X] is address else error
2440      *
2441 F1CA7 6060      GOTO DEVP20      Check error, continue, C[A] is addr
2442      *-
2443      *-
2444 F1CAB 0      CON(1) =FIXSPC      3 nibbles available here
2445 F1CAC      BSS 3-1
2446      *-
2447      *-
2448      *
2449      * Set the MLFFLG to "F" (Sets A[A] to D0 value, C[0] to "F")

```

```

2450      *
2451 F1CAE 132 MLFG=F  ADOEX          Save DO in A[A]
2452 F1CB1 1B00      DO=(5) =MLFFLG
      000
2453 F1CB8 30F      LC(1) #F          Set C[0]="F"
2454 F1CBB 15C0      DATO=C 1        Write it out
2455 F1CBF 130      DO=A            Restore DO from A[A]
2456 F1CC2 01      RTN
2457      *
2458      *
2459 F1CC4      DEVP10
2460      *
2461      * String item...set it up, call GETDIX with ST(sSTK)=1
2462      *
2463 F1CC4 8F00      GOSBVL =REVPOP      Reverse the string, POP it
      000
2464 F1CCB 137 =DEVPR$ CD1EX
2465 F1CCE D7      D=C      A      D points to start of string
2466 F1CD0 C2      C=C+A  A      C[A] points to end of string
2467 F1CD2 135      D1=C          Now D1, C[A] at end of string
2468 F1CD5 1CF      D1=D1- 16     Point to where numeric should go
2469 F1CD8 8E00      GOSUBL =TSAVD1      Save in FUNC D1
      00
2470 F1CDE DF      CDEX  A      D[A] at end of string, C[A] at start
2471 F1CE0 135      D1=C          Set D1 to the start of string
2472      *
2473      * Now D[A], D1 are set up for a call to GETDIX (Later entry
2474      * into GETDID)
2475      *
2476 F1CE3 07      C=RSTK
2477 F1CE5 7A89      GOSUB  Cslc5
2478 F1CE9 07      C=RSTK
2479 F1CEB 108      RO=C          Save 2 RSTK levels in RO
2480      *
2481      * GETDIX saves DO in FUNC DO...
2482      *
2483 F1CEE 8E00      GOSUBL =GETDIX      Get device address (in D[X])
      00
2484      *
2485 F1CF4 128      CROEX          Save C[W] in RO...
2486 F1CF7 06      RSTK=C          Restore first level...
2487 F1CF9 7D79      GOSUB  Csrc5
2488 F1CFD 06      RSTK=C          Restore second level
2489 F1CFF 118      C=RO          Restore C[A] value
2490      *
2491      * Now restore D1 value for exit, then check error
2492      *
2493 F1D02 8ECD      GOSUBL Tresd1      D1 @ next item on stack
      2F
2494      *
2495      * D1 is now where next item goes, C[A] is address, B[W] is type
2496      *
2497      * If carry, had an error (GETDIX did START)
2498      *
2499 F1D08 461 DEVP20 GOC  DEVP25      Go if error

```

```
2500 F1D0B 7F9F      GOSUB MLFG=F      Set MLFFLG to "F"
2501 F1D0F 8E00      GOSUBL =START    (START for DEVP20 entry)
                00
2502 F1D15 490 DEVP23 GOC   DEVP25    Error...check what it is
2503 F1D18 96F      ?D#0 B          Is this a valid device spec?
2504 F1D1B 41       GOYES DEVPcc     Yes...return, carry clear
2505                *
2506                * (Test at DEVP25 will be true, hence RTNSC...packing technique)
2507                *
2508 F1D1D 20       P=      =eDSPEC    No...Invalid Device Spec
2509                *
2510                * Error...check if "NOT FOUND" or something else
2511                *
2512 F1D1F 880 DEVP25 ?P#   =ePIL     PIL error?
2513 F1D22 00       RTNYES          No...some other error
2514 F1D24 80F0     CPEX  0
2515 F1D28 880     ?P#   =eNOFND   NOT FOUND?
2516 F1D2B 60       GOYES DEVP30    (Set carry if not found)
2517                *
2518                * Error was "Device not Found"...set D[A]=0, continue
2519                *
2520 F1D2D D3        D=0   A
2521 F1D2F 03 DEVPcc RTNCC
2522                *
2523                *
2524 F1D31 80F0 DEVP30 CPEX  0      Restore C[0],P
2525 F1D35 02       RTNSC          Set carry = error
2526                *
2527                *
2528 F1D37 0         CON(1) =FIXSPC    1 nibble available here
2529 F1D38          BSS   1-1
2530                *****
2531                *****
2532                **
2533                ** Name:      READIN - Execute the READ INTR function
2534                **
2535                ** Category:  FNEEXEC
2536                **
2537                ** Purpose:
2538                **      Read the interrupt cause byte for the specified loop
2539                **      and return the value as a decimal number
2540                **
2541                ** Entry:
2542                **      P=0
2543                **      D1 points to the stack
2544                **      C[S]=number of parameters supplied by user
2545                **      If C[S]=1 then top of stack contains a numeric value
2546                **
2547                ** Exit:
2548                **      Numeric result on top of stack
2549                **      D1 at top of stack
2550                **      P=0
2551                **      Returns through FNRTN4
2552                **
2553                ** Calls:      GETLPs,PUTGF-,LOAD-1,FLOAT!,TRESDO,<FNRTN1>
```

```

2554      **
2555      ** Uses.....
2556      ** Inclusive: A,B,C,D,RO,D1,P,FUNCD0,ST[5,3:0]
2557      **
2558      ** Stk lvls: 3 (GETLPs)
2559      **
2560      ** History:
2561      **
2562      **      Date      Programmer      Modification
2563      **      -----      -
2564      **      12/01/83      NZ      Updated documentation
2565      **      08/03/83      NZ      Added optional loop # (sharing
2566      **                                code with STATUS)
2567      **      05/20/83      NZ      Changed to save message in B[A]
2568      **                                instead of A[A] thru FNDMB-
2569      **      02/28/83      NZ      Changed to use TSAVDO & TRESDO
2570      **                                instead of SAVEDO & RESTDO
2571      **                                Reworked routine to reduce code
2572      **      02/07/83      SC      Wrote routine
2573      **
2574      ****
2575      ****
2576 F1D38 20 R&CVEu P= 0
2577 F1D3A 300 LC(1) =eUNEXP Unexpected frame
2578 F1D3D 20 P= =ePIL
2579 F1D3F 65C8 R&CVER GOTO Errorx
2580      *
2581      *
2582 F1D43 801 NIBHEX 801 Zero or one numeric parameter
2583 F1D46 7060 =READIN GOSUB GETLPs Get (optional) loop # from stack
2584 F1D4A 44F GOC R&CVER Error with loop
2585 F1D4D 3100 LC(2) =mREADI
2586 F1D51 845 ST=0 5
2587 F1D54 8E00 RD&CVT GOSUBL =PUTGF- Read the byte from mailbox
2588      00
2588 F1D5A 44E GOC R&CVER
2589 F1D5D 880 ?PH =pDIAGL Contents of location?
2590 F1D60 8D GOYES R&CVEu No...unexpected frame
2591 F1D62 20 P= 0
2592 F1D64 DA A=C A Yes...save in A[B]
2593 F1D66 865 ?ST=0 5 Read interrupt cause?
2594 F1D69 61 GOYES FCNRT1 Yes...return all 8 bits
2595      *
2596      * READDDC...if zero, return -1, else return top 6 bits
2597      *
2598 F1D6B 96C ?A#0 B Any DDCs received?
2599 F1D6E 90 GOYES R&CV10 Yes...return 6 bits
2600 F1D70 720F Fnrtn- GOSUB LOAD-1 No...return -1
2601 F1D74 561 GONC Fnrtn. Go always
2602      *
2603      *
2604 F1D77 31F3 R&CV10 LCHEX 3F Only 6 bits for DDC
2605 F1D7B 0EF6 A=A&C A
2606 F1D7F AF2 FCNRT1 C=0 W
2607 F1D82 AE6 C=A B Copy A[B] for conversion

```



```

2608 F1D85 8E00      GOSUBL =FLOAT!
                00
2609 F1D8B 7019 Fnrtn. GOSUB  Tresd0      Restore PC from FUNCDO
2610 F1D8F 8D00 Fnrtn1 GOVLNG =FNRTN1      Exit with memory check
                000

2611 *****
2612 *****
2613 **
2614 ** Name:      READDC - Execute the READDC functino
2615 **
2616 ** Category:  FNEEXEC
2617 **
2618 ** Purpose:
2619 **      Return the last device dependent command received (low
2620 **      6 bits of the DDT or DDL frame) as a decimal number
2621 **
2622 ** Entry:
2623 **      D1 points to the stack
2624 **      C[S] is the number of parameters passed to the function
2625 **      If C[S]=1, there is a numeric expression on top of stack
2626 **      P=0
2627 **
2628 ** Exit:
2629 **      D1 points to the top of the stack
2630 **      P=0
2631 **      Returns through FNRTN1
2632 **
2633 ** Calls:      GETLPs,<RD&CVT>
2634 **
2635 ** Uses.....
2636 **      Inclusive: A,B,C,D,RO,D1,P,FUNCDO,ST[5,3:0]
2637 **
2638 ** Stk lvls:  3 (GETLPs)
2639 **
2640 ** History:
2641 **
2642 **      Date      Programmer      Modification
2643 **      -----      -
2644 **      08/03/83      NZ      Modified to take a loop #
2645 **      02/28/83      NZ      Updated documentation
2646 **      02/07/83      SC      Wrote routine
2647 **
2648 *****
2649 *****
2650 F1D96 801      NIBHEX 801      Zero or one numeric parameter
2651 F1D99 7D00 =READDC GOSUB  GETLPs      Get (optional) loop # from stack
2652 F1D9D 41A      GOC      R&CVER      Error with loop specifier
2653 F1DA0 3100      LC(2) =MREADDC      Read last ddc
2654 F1DA4 855      ST=1      5
2655 F1DA7 5CA      GONC      RD&CVT      Go always
2656 *****
2657 *****
2658 **
2659 ** Name:      GETLPs - Get (optional) loop #, check status
2660 **

```

```

2661      ** Category:  PILUTL
2662      **
2663      ** Purpose:
2664      **   Check if a loop number was passed to a function; if
2665      **   so, get that mailbox, else get first mailbox.
2666      **   Check the status of the mailbox (reset?, etc)
2667      **
2668      ** Entry:
2669      **   P=0
2670      **   D1 points to the top of the stack
2671      **   C[S] is the parameter count (0 or 1)
2672      **   If C[S]=1, there is a numeric value on top of the stack
2673      **
2674      ** Exit:
2675      **   Carry clear:
2676      **     P=0
2677      **     D0 points to the mailbox
2678      **     Mailbox status in C[X]
2679      **     D1 at (new) top of stack (loop number is popped off)
2680      **     FUNCDO contains the caller's D0
2681      **   Carry set:
2682      **     Error (P, C[0] are the error code)
2683      **
2684      ** Calls:      TSAVDO,POP1N,GHEXB+,<FNDCHK>
2685      **
2686      ** Uses.....
2687      **   Inclusive: A,B,C,D,RO,DO,D1,P,FUNCDO,ST[3:0]
2688      **
2689      ** Stk lvls:  2 (TSAVDO)(GHEXB+)(<FNDCHK>)
2690      **
2691      ** History:
2692      **
2693      **   Date      Programmer      Modification
2694      **   -----      -
2695      **   12/01/83      NZ              Added documentation
2696      **
2697      *****
2698      *****
2699 F1DAA 700F =GETLPs GOSUB MLFG=F      Set MLFFLG to indicate loop changed
2700 F1DAE 77E8      GOSUB Tsavd0      Save PC in FUNCDO
2701 F1DB2 94A      ?C=0 S          Loop number specified?
2702 F1DB5 B2      GOYES Fndchk      No...use default (=first loop)
2703 F1DB7 7CC9      GOSUB Pop1n      Yes...get value from stack
2704 F1DBB 4A2      GOC GETLPe      If complex number, error
2705 F1DBE 8E00      GOSUBL =GHEXB+  Convert value into HEX byte
2706      00
2706 F1DC4 432      GOC ErrorX      Error
2707
2708      * B[B] is now the value of the expression (B[4:2]=0)
2709      *
2710 F1DC7 D2      C=0 A
2711 F1DC9 302      LC(1) 2          Max of 3 loops (0,1, or 2)
2712 F1DCC DD      BCEX A          Loop number in C[A]
2713 F1DCE 20      P= =eRANGE
2714 F1DD0 CE      C=C-1 A          Convert user input to base zero

```

2715 F1DD2 451 GOC ErrorX
2716 F1DD5 8B5 ?B<C A Is the loop number less than 2?
2717 F1DD8 01 GOYES ErrorX No...error
2718 F1DDA 816 CSRC C[S] is now loop number
2719 F1DDD 17F D1=D1+ 16 Pop the numeric field off the stack
2720 F1DE0 8C00 Fndchk GOLONG =FNDCHK Find the mailbox (P can be non-0)
00

2721 *-
2722 *-
2723 F1DE6 20 GETLPe P= =eNUMR Not numeric data
2724 F1DE8 6C18 ErrorX GOTO Errorx
2725 *****
2726 *****
2727 **
2728 ** Name: STATUS - Execute the STATUS function
2729 **
2730 ** Category: FNEEXEC
2731 **
2732 ** Purpose:
2733 ** Return mailbox status as a numeric value
2734 **
2735 ** Entry:
2736 ** P=0
2737 ** D1 points to the top of the stack
2738 ** C[S]=Number of parameters passed to this function
2739 ** If C[S]=1, there is a numeric value on top of the stack
2740 **
2741 ** Exit:
2742 ** P=0
2743 ** D1 points to the top of the stack
2744 ** Numeric value for STATUS on top of the stack
2745 ** Returns through FNRTN1
2746 **
2747 ** Calls: GETLPs,GETHSS,<FCNRT1>,<FNRTN->
2748 **
2749 ** Uses.....
2750 ** Inclusive: R,B,C,D,R0,D1,P,FUNCD0,ST[11:0]
2751 **
2752 ** Stk lvls: 3 (GETLPs)
2753 **
2754 ** History:
2755 **
2756 ** Date Programmer Modification
2757 ** -----
2758 ** 12/01/83 NZ Updated documentation
2759 ** 08/03/83 NZ Changed first part to a subroutine
2760 ** to do multiple loop READINTR/DDC
2761 ** 06/16/83 NZ Changed -1 return to pack code
2762 ** 03/09/83 NZ Changed where PC is saved to RAM
2763 ** 03/07/83 NZ Fixed bug with mailbox not found,
2764 ** added call to GETERR to clear
2765 ** error bit in mailbox
2766 ** 02/28/83 NZ Added check for insufficient mem,
2767 ** mailbox out of range, packed,
2768 ** updated documentation

```

2769          ** 02/08/83      SC          Wrote routine
2770          **
2771          ****
2772          ****
2773 F1DEC 801          NIBHEX 801
2774 F1DEF 77BF =STATUS GOSUB GETLPs          Get loop number, check status
2775          *
2776          * If carry clear, C[X] is the Diamond status
2777          *
2778 F1DF3 5B0          GONC  STAT10          All OK...continue STATUS execution
2779 F1DF6 880          ?P#   =eNMBX          Is error "No mailbox"?
2780 F1DF9 FE          GOYES ErrorX          No...error exit
2781 F1DFB 647F       GOTO   Fnrtn-         Yes...return -1, restore PC, exit
2782          *-
2783          *-
2784          sStanb EQU 7
2785          sLA    EQU 6
2786          sCA    EQU 5
2787          sTA    EQU 4
2788          sSRQR  EQU 3
2789          sEar   EQU 2
2790          sRemot EQU 1
2791          sLLout EQU 0
2792          *
2793 F1DFF 08          STAT10 CLRST          Initially clear all status bits
2794 F1E01 F2          CSL    A
2795 F1E03 F2          CSL    A          C[4:2] is the loop status now
2796 F1E05 C6          C=C+C A          Bit 11: Local Lockout
2797 F1E07 550        GONC  STAT21          Clear
2798 F1E0A 850        ST=1  sLLout          Set Local Lockout bit
2799 F1E0D C6          STAT21 C=C+C A          Bit 10: Remote
2800 F1E0F 550        GONC  STAT22          Clear
2801 F1E12 851        ST=1  sRemot          Set Remote bit
2802 F1E15 C6          STAT22 C=C+C A          Bit 9: Manual mode (ignored)
2803 F1E17 C6          C=C+C A          Bit 8: Data available (ignored)
2804 F1E19 C6          C=C+C A          Bit 7: Controller Standby
2805 F1E1B 550        GONC  STAT23          Clear
2806 F1E1E 857        ST=1  sStanb          Set Controller Standby bit
2807 F1E21 C6          STAT23 C=C+C A          Bit 6: EAR enabled
2808 F1E23 550        GONC  STAT24          Clear
2809 F1E26 852        ST=1  sEar          Set EAR enabled bit
2810 F1E29 C6          STAT24 C=C+C A          Bit 5: Configured (ignored)
2811 F1E2B C6          C=C+C A          Bit 4: Interrupt pending(ignored)
2812 F1E2D C6          C=C+C A          Bit 3: System Controller(ignored)
2813 F1E2F C6          C=C+C A          Bit 2: Talker Active
2814 F1E31 550        GONC  STAT25          Clear
2815 F1E34 854        ST=1  sTA          Set Talker Active bit
2816 F1E37 C6          STAT25 C=C+C A          Bit 1: Listener
2817 F1E39 550        GONC  STAT26          Clear
2818 F1E3C 856        ST=1  sLA          Set Listener bit
2819 F1E3F C6          STAT26 C=C+C A          Bit 0: Controller Active
2820 F1E41 550        GONC  STAT27          Clear
2821 F1E44 855        ST=1  sCA          Set Controller Active bit
2822 F1E47 0B          STAT27 CSTEX          C[B] is now the byte for STATUS
2823 F1E49 DA          A=C    A          Put STATUS into A[B]

```

```

2824 F1E4B 8E00      GOSUBL =GETHSS      Get handshake nibble from mailbox
                   00
2825 F1E51 860      ?ST=0 =hsLPRQ      SRQ received on loop?
2826 F1E54 A0       GOYES STAT30       No...leave the bit clear
2827 F1E56 3180     LC(2) 2^sSRQR      Yes...set the SRQR bit
2828 F1E5A 0EFE     A=A!C A
2829 F1E5E 602F     STAT30 GOTO FCNRT1 Restore PC, convert to float&exit
2830 *****
2831 *****
2832 **
2833 ** Name:      BINAND - Execute the BINAND function
2834 ** Name:      BINIOR - Execute the BINIOR function
2835 ** Name:      BINEOR - Execute the BINEOR function
2836 ** Name:      BINCMP - Execute the BINCMP function
2837 ** Name:      BIT - Execute the BIT function
2838 **
2839 ** Category:  FNEXEC
2840 **
2841 ** Purpose:
2842 **   Binary functions:
2843 **   BINAND: Return the binary AND of two numbers
2844 **   BINIOR: Return the binary inclusive OR of two numbers
2845 **   BINEOR: Return the binary exclusive OR of two numbers
2846 **   BINCMP: Return the binary complement of a number
2847 **   BIT: Return the value of a specific bit in a number
2848 **
2849 ** Entry:
2850 **   P=0
2851 **   D1 points to the top of the stack
2852 **   Two values on top of the stack (only one for BINCMP)
2853 **
2854 ** Exit:
2855 **   P=0
2856 **   Returns through FNRTN4
2857 **
2858 ** Calls:      POP2DH,POP1N(BINCMP),FLOAT!,<FNRTN4>,<ERRORX>
2859 **
2860 ** Uses.....
2861 **   Inclusive: A,B,C,D,D1,P,RO
2862 **
2863 ** Stk lvls:   3 (POP2DH)
2864 **
2865 ** History:
2866 **
2867 **   Date      Programmer      Modification
2868 **   -----      -
2869 **   03/01/83    NZ      Changed to always return non-
2870 **           negative value
2871 **   02/28/83    NZ      Changed FLIRTN to do processing
2872 **           here
2873 **   02/08/83    SC      Wrote routines
2874 **
2875 *****
2876 *****
2877 F1E62 8822      NIBHEX 8822

```

```

2878 F1E66 7D80 =BINAND GOSUB POP2DH      Pop 2 values
2879 F1E6A 0EF6      A=A&C  A
2880 F1E6E      FLTRTN
2881          *
2882          * Following instruction is not needed any more (overlooked on
2883          * 3/1/83 change)
2884          *
2885 F1E6E D3          D=0  A          If D[A]=0, then sign is positive
2886          *
2887 F1E70 AF2          C=0  W
2888 F1E73 D6          C=A  A
2889 F1E75 8E00      GOSUBL =FLOAT!      Convert to floating decimal
          00
2890 F1E7B 8D00 Fnrtn4 GOVLNG =FNRTN4
          000
2891          *****
2892 F1E82 8822          NIBHEX 8822
2893 F1E86 7D60 =BINIOR GOSUB POP2DH      Pop 2 numbers
2894 F1E8A 0EFE          A=A!C  A          Do an inclusive OR on them
2895 F1E8E 6DFD          GOTO  FLTRTN      Finish up
2896          *****
2897 F1E92 8822          NIBHEX 8822
2898 F1E96 7D50 =BINEOR GOSUB POP2DH      Pop 2 numbers
2899          *
2900          * A EOR C = (A and (not C)) or ((not A) and C)
2901          *
2902 F1E9A D8          B=A  A          Save A in B
2903 F1E9C FE          C=-C-1 A          C = not C
2904 F1E9E 0EF6          A=A&C  A          A = (A and (not C))
2905 F1EA2 DC          ABEX  A          B = (A and (not C)), restore A
2906 F1EA4 FC          A=-A-1 A          A = not A
2907 F1EA6 DB          C=D  A          Restore C from D (POP2DH)
2908 F1EA8 0EF6          A=A&C  A          A = ((not A) and C)
2909 F1EAC 0EF8          A=A!B  A          A = A EOR C
2910 F1EB0 6DBF          GOTO  FLTRTN      Finish up
2911          *****
2912 F1EB4 811          NIBHEX 811
2913 F1EB7 7CC8 =BINCMP GOSUB Pop1n          Pop 1 number
2914 F1EBB 474          GOC  badtyp      (complex...error)
2915 F1EBE 7B60      GOSUB fLTDH          Convert to HEX
2916 F1EC2 564          GONC  badinp      (range error)
2917 F1EC5 FC          A=-A-1 A          Do 1's complement
2918 F1EC7 66AF Fltrtn GOTO  FLTRTN      Finish up
2919          *****
2920 F1ECB 8822          NIBHEX 8822
2921 F1ECF 7420 =BIT  GOSUB POP2DH
2922          *
2923          * C[A] is the value to check
2924          * A[A] is the bit position to check in value
2925          *
2926 F1ED3 D1          B=0  A
2927 F1ED5 E5          B=B+1 A          Use B[A] as the mask register
2928 F1ED7 CC      BIT10 A=A-1 A          Decrement bit count
2929 F1ED9 4D0          GOC  BIT20          Done making the mask
2930 F1EDC C5          B=B+B  A          Double the mask

```

```

2931 F1EDE 58F          GONC  BIT10          Go unless bit # too big
2932                *
2933                * If here, bit # was too big
2934                *
2935 F1EE1 20           P=      =eRANGE
2936 F1EE3 640F        GOTO   ErrorX
2937                *_
2938                *_
2939 F1EE7 0EF5 BIT20  C=C&B  A          Check if bit in that spot is set
2940 F1EEB D0          A=0    A
2941 F1EED 8AA        ?C=0   A
2942 F1EFO 7D         GOYES  Fltrtn          Return zero if C[A]=0
2943 F1EF2 E4         A=A+1  A
2944 F1EF4 52D        GONC   Fltrtn          Go always
2945                *****
2946                *****
2947                **
2948                ** Name:          POP2DH - Pop 2 numeric items, convert to HEX
2949                **
2950                ** Category:      LOCAL
2951                **
2952                ** Purpose:
2953                **     Pop two numbers off the stack and convert them to hex
2954                **
2955                ** Entry:
2956                **     P=0
2957                **     D1 points to the top of the stack
2958                **     Two numbers on the top of the stack
2959                **
2960                ** Exit:
2961                **     A[A] is the first number on the stack
2962                **     C[A] and D[A] are the second number on the stack
2963                **     Exits through ERRORX with eNUMR if complex number,
2964                **     eRANGE if not in [0...2^20-1]
2965                **     Carry clear
2966                **
2967                ** Calls:          POP2N,FLTDH,<ERRORX>
2968                **
2969                ** Uses.....
2970                **     Inclusive:  A,B,C,D,D1,P
2971                **
2972                ** Stk lvls:      2 (POP2N)
2973                **
2974                ** History:
2975                **
2976                **     Date          Programmer          Modification
2977                **     -----          -
2978                **     03/01/83      NZ              Added check for FLTDH error
2979                **     02/09/83      SC              Wrote routine
2980                **
2981                *****
2982                *****
2983 F1EF7 8F00 POP2DH  GOSBVL =POP2N          Pop 2 numbers
2984                000
2984 F1EFE 04          SETHEX

```

```
2985 F1F00 5D0      GONC  POP2D1      Go if no complex values
2986                *
2987 F1F03 20      badtyp P=      =eNNUMR      Error...not numeric
2988 F1F05 62EE    POP2ER GOTO     ErrorX
2989                *
2990                *
2991 F1F09 20      badinp P=      =eRANGE      Out of range error
2992 F1F0B 59F     GONC  POP2ER      Go always
2993                *
2994                *
2995                *
2996                * C[W] is the first number on stack
2997                * A[W] is the second number on stack
2998                *
2999 F1F0E AFF     POP2D1 CDEX  W      D=first number
3000 F1F11 7810      GOSUB fLTDH      Convert second number to HEX
3001 F1F15 53F      GONC  badinp      Out of range or negative
3002 F1F18 AFE      ACEX  W
3003 F1F1B AFF      CDEX  W      D=second number, C=first number
3004 F1F1E AFE      ACEX  W      A=first number
3005 F1F21 7800      GOSUB fLTDH      Convert first number to HEX
3006 F1F25 53E      GONC  badinp      Out of range or negative
3007 F1F28 AFB      C=D  W      C,D=second number,A=first number
3008 F1F2B 03      RTNCC
3009                *
3010                *
3011 F1F2D 8D00    =fLTDH GOVLNG =fLTDH
      000
3012 F1F34                END
```


#Timeo	Ext		-	1413				
ASGN00	Abs	989678	#F19EE	-	1880	1864	1888	
ASGN04	Abs	989689	#F19F9	-	1885	1876		
ASGN05	Abs	989751	#F1A37	-	1920	1911		
ASGN10	Abs	989765	#F1A45	-	1925	1928		
ASGN15	Abs	989817	#F1A79	-	1962	1954		
ASGN20	Abs	989848	#F1A98	-	1981	2022		
ASGN25	Abs	989855	#F1A9F	-	1983	2017		
ASGN30	Abs	989859	#F1AA3	-	1986	1982		
ASGN40	Abs	989893	#F1AC5	-	1998	1987		
ASGN45	Abs	989921	#F1AE1	-	2004	2000		
ASGN50	Abs	989923	#F1AE3	-	2008	2002		
ASGNER	Abs	989970	#F1B12	-	2026	1990	1992	1994 2020
=ASGNIO	Abs	989645	#F19CD	-	1850			
ASGNd	Ext			-	1848			
ASGNda	Abs	989992	#F1B28	-	2035	1880	2029	
ASGNeR	Abs	989972	#F1B14	-	2027	1955		
ASGNp	Ext			-	1849			
ASLC2	Ext			-	2009			
ASLC4	Ext			-	914			
ASLC5	Ext			-	1625			
ASRC2	Ext			-	1998			
ASRC4	Ext			-	826	907	1017	
ASRC5	Ext			-	1630			
BAKCHR	Ext			-	2003			
BF2DSP	Ext			-	1612	1666		
=BINAND	Abs	990822	#F1E66	-	2878			
=BINCMP	Abs	990903	#F1EB7	-	2913			
=BINEOR	Abs	990870	#F1E96	-	2898			
=BINIOR	Abs	990854	#F1E86	-	2893			
=BIT	Abs	990927	#F1ECF	-	2921			
BIT10	Abs	990935	#F1ED7	-	2928	2931		
BIT20	Abs	990951	#F1EE7	-	2939	2929		
BLANKC	Ext			-	1592			
BSERR	Ext			-	1912			
CHKASN	Ext			-	78			
CHKMAS	Ext			-	593	1035		
CKLOP#	Ext			-	1106	1776		
CKmode	Ext			-	1254			
=CLEAR	Abs	988549	#F1585	-	1227			
CLEAR+	Abs	988616	#F15C8	-	1254	1245		
CLEAR.	Abs	988607	#F15BF	-	1248	1233		
CLEAR1	Abs	988659	#F15F3	-	1268	1260		
CLEAR2	Abs	988683	#F160B	-	1280	1272		
CLEAR3	Abs	988729	#F1639	-	1302	1300		
CLEAR4	Abs	988736	#F1640	-	1304	1294		
CLEARc	Abs	988556	#F158C	-	1228	1111	1148	1185
CLEARd	Ext			-	1225			
CLEARl	Abs	988578	#F15A2	-	1235	1107		
CLEARp	Ext			-	1226			
CLEARs	Abs	988742	#F1646	-	1308	1266	1302	
CSLC12	Ext			-	2281			
CSLC2	Ext			-	847			
CSLC3	Ext			-	694			
CSLC4	Ext			-	1329			

FLTDH	Ext		-	3011			
FLTRTN	Abs	990830	#F1E6E	- 2880	2895	2910	2918
FNDCH-	Ext			- 1237			
FNDCHK	Ext			- 2720			
FNRTN1	Ext			- 2610			
FNRTN4	Ext			- 2890			
FORMAT	Ext			- 1040			
FUNCDO	Ext			- 116	125	162	
FUNCRO	Ext			- 1619	1665		
Fltrtn	Abs	990919	#F1EC7	- 2918	2942	2944	
Fndchk	Abs	990688	#F1DE0	- 2720	1483	2702	
Fnrtn-	Abs	990576	#F1D70	- 2600	2781		
Fnrtn.	Abs	990603	#F1D8B	- 2609	2601		
Fnrtn1	Abs	990607	#F1D8F	- 2610	2131		
Fnrtn4	Abs	990843	#F1E7B	- 2890	2355		
GADRRM	Ext			- 2436			
GDIRST	Ext			- 598			
GETDID	Ext			- 331	429	506	734 1252
GETDIR	Ext			- 883			
GETDIX	Ext			- 2483			
GETDR"	Ext			- 604	802		
GETDR+	Ext			- 670			
GETHEX	Ext			- 1006			
GETHSS	Ext			- 2824			
GETID+	Ext			- 2091			
GETLPe	Abs	990694	#F1DE6	- 2723	2704		
=GETLPs	Abs	990634	#F1DAA	- 2699	2583	2651	2774
GETMBX	Ext			- 215	1295		
GETPIL	Ext			- 970			
GETSTR	Ext			- 1854			
=GETZER	Abs	988147	#F13F3	- 895	820	828	
GHEXB+	Ext			- 2705			
GLOOP#	Ext			- 1391			
GT2BYT	Ext			- 903			
GTYPE	Ext			- 2346			
Gt2byt	Abs	988162	#F1402	- 903	808	896	898
HTOD	Ext			- 1589	2260	2270	
I/OALL	Ext			- 1910			
I/ODAL	Ext			- 2037			
=I/oda1	Abs	989999	#F1B2F	- 2037			
IDIV	Ext			- 1466			
INITLP	Abs	988282	#F147A	- 988	990		
INITX0	Abs	988296	#F1488	- 998	982		
INITX1	Abs	988392	#F14E8	- 1033	992		
INITX2	Abs	988423	#F1507	- 1048			
INITXE	Abs	988425	#F1509	- 1049	1007	1034	1036 1041
INITXF	Abs	988332	#F14AC	- 1007	971	1011	
=INITXQ	Abs	988246	#F1456	- 966			
INITd	Ext			- 964			
INITp	Ext			- 965			
I0p	Ext			- 1563			
IS-DSP	Ext			- 409	457		
IS-PRT	Ext			- 73	425		
LCL10	Abs	988486	#F1546	- 1110	1101		
LEXPIL	Ext			- 1096			

PDIR30	Abs	987803	#F129B	-	668	643	655			
PDIR90	Abs	987821	#F12AD	-	678	617	627			
PDIR92	Abs	987842	#F12C2	-	686	679				
PDIR95	Abs	987855	#F12CF	-	693	685				
PDIRBF	Abs	987907	#F1303	-	716	647	691			
PILCNF	Ext			-	419	1805				
POP1N	Ext			-	1497					
POP2D1	Abs	990990	#F1FOE	-	2999	2985				
POP2DH	Abs	990967	#F1EF7	-	2983	2878	2893	2898	2921	
POP2ER	Abs	990981	#F1FO5	-	2988	2992				
POP2N	Ext			-	2983					
=PRASCI	Abs	987263	#F107F	-	211	170				
PRASER	Abs	987310	#F10AE	-	232	224				
PRASEX	Abs	987297	#F10A1	-	225	233				
=PREND	Abs	987319	#F10B7	-	272	210				
PREND1	Abs	987354	#F10DA	-	289	286				
PRENDE	Abs	987360	#F10E0	-	294	283				
=PREXT	Abs	987095	#F0FD7	-	99	94				
PRINT*	Ext			-	356					
=PRNT00	Abs	987499	#F116B	-	426	415				
PRNT45	Abs	987551	#F119F	-	452	438				
PRNT50	Abs	987478	#F1156	-	420	459				
PRNTER	Abs	987625	#F11E9	-	519	443	445	508		
=PRNTIS	Abs	987492	#F1164	-	425					
PRNTSd	Ext			-	406	423				
PRNTSp	Ext			-	407	424				
=PRTIS	Abs	987041	#F0FA1	-	72					
PRTIS"	Abs	987176	#F1028	-	138	136				
=PRTIS+	Abs	987054	#F0FAE	-	74					
PRTIS,	Abs	987166	#F101E	-	134	132				
PRTIS-	Abs	987097	#F0FD9	-	102	93				
PRTISO	Abs	987114	#F0FER	-	116	139	152			
PRTIS1	Abs	987126	#F0FF6	-	119	84				
PRTIS2	Abs	987136	#F1000	-	125	79	89			
PRTIS4	Abs	987223	#F1057	-	162	154	161			
PRTIS5	Abs	987243	#F106B	-	168	167	170			
PRTIS@	Abs	987201	#F1041	-	151	146				
=PRTISc	Abs	987034	#F0F9A	-	68	1270				
PRTISe	Abs	987060	#F0FB4	-	76	69				
PRTS00	Abs	987205	#F1045	-	152	148				
PRTS01	Abs	987208	#F1048	-	153	144				
PT2BYT	Ext			-	848					
PUTC	Ext			-	1310					
PUTDR"	Ext			-	728					
PUTDR#	Ext			-	855					
PUTE	Ext			-	1492					
PUTGF-	Ext			-	2587					
PhyEOD	Abs	0	#00000	-	611	612	618	678		
Pop1n	Abs	989063	#F1787	-	1497	1501	2432	2703	2913	
Putc	Abs	988751	#F164F	-	1310	1487				
Putd	Ext			-	725					
R&CV10	Abs	990583	#F1D77	-	2604	2599				
R&CVER	Abs	990527	#F1D3F	-	2579	2584	2588	2652		
R&CVEu	Abs	990520	#F1D38	-	2576	2590				
RD&CVT	Abs	990548	#F1D54	-	2587	2655				

=READDC	Abs	990617	#F1D99	-	2651				
=READIN	Abs	990534	#F1D46	-	2583				
READRG	Ext			-	2203				
=REMOTE	Abs	988528	#F1570	-	1184				
REMOTd	Ext			-	1182				
REMOTp	Ext			-	1183				
=REST10	Abs	989573	#F1985	-	1782	1882			
REST1A	Ext			-	1019				
REST2C	Ext			-	1015	1432	1460		
RESTD0	Ext			-	433				
RESTD1	Ext			-	1012				
=RESTIO	Abs	989567	#F197F	-	1776				
RESTd	Ext			-	1774				
RESTp	Ext			-	1775				
REVPOP	Ext			-	2463				
Rester	Abs	989631	#F19BF	-	1809	1804			
SAVE1A	Ext			-	1005				
SAVE2C	Ext			-	1336				
SAVED0	Ext			-	427				
SAVED1	Ext			-	1001				
SAVEIT	Ext			-	1319				
SEEKA	Ext			-	703				
SPOL05	Abs	990121	#F1BA9	-	2194	2206			
SPOL10	Abs	990125	#F1BAD	-	2197	2190			
=SPOLL	Abs	990109	#F1B9D	-	2184				
STAN10	Abs	988883	#F16D3	-	1407	1396			
STAN20	Abs	988907	#F16EB	-	1422	1399			
STAN30	Abs	989002	#F174A	-	1473	1471			
STAN40	Abs	989012	#F1754	-	1477	1404	1415	1444	
=STANBY	Abs	988847	#F16AF	-	1391				
STANDd	Ext			-	1389				
STANDp	Ext			-	1390				
STANeR	Abs	988961	#F1721	-	1454	1484	1488	1493	
STANer	Abs	988903	#F16E7	-	1419	1431	1454		
STANra	Abs	988901	#F16E5	-	1418	1476			
STANsb	Abs	989069	#F178D	-	1500	1430	1453		
STANsr	Abs	989116	#F17BC	-	1520	1512	1514	1516	
START	Ext			-	138	1033	2501		
START-	Ext			-	1803	1953			
STAT10	Abs	990719	#F1DFF	-	2793	2778			
STAT21	Abs	990733	#F1E0D	-	2799	2797			
STAT22	Abs	990741	#F1E15	-	2802	2800			
STAT23	Abs	990753	#F1E21	-	2807	2805			
STAT24	Abs	990761	#F1E29	-	2810	2808			
STAT25	Abs	990775	#F1E37	-	2816	2814			
STAT26	Abs	990783	#F1E3F	-	2819	2817			
STAT27	Abs	990791	#F1E47	-	2822	2820			
STAT30	Abs	990814	#F1E5E	-	2829	2826			
=STATUS	Abs	990703	#F1DEF	-	2774				
STMTD0	Ext			-	1257	1343	1611		
STMTR0	Ext			-	340	1339			
STMTR1	Ext			-	280	333			
SWAPO1	Ext			-	434				
Save2c	Abs	988801	#F1681	-	1336	976	1003	1429	1440
SaveIt	Abs	6	#00006	-	65	129	137	153	

Save1t	Abs	988769	#F1661	-	1319	288	336	452	1288				
SetBP	Ext			-	718								
TRESD0	Ext			-	1350								
TRESD1	Ext			-	110								
=TRIGER	Abs	988507	#F155B	-	1146								
TRIGd	Ext			-	1144								
TRIGp	Ext			-	1145								
TSAVD0	Ext			-	1347								
TSAVD1	Ext			-	72	1869	2469						
TSTAT	Ext			-	1313								
TSWAD1	Ext			-	1973	2008	2012						
Timeout	Ext			-	1411								
Tresd0	Abs	988831	#F169F	-	1350	225	337	977	1972	2130	2354	2609	
Tresd1	Abs	987108	#F0FE4	-	110	119	165	2493					
Tsavd0	Abs	988825	#F1699	-	1347	213	1868	2431	2700				
Tstat	Abs	988757	#F1655	-	1313	710	857						
UCRANG	Ext			-	1986	1993							
ULYL	Ext			-	147	707							
UNLPUT	Ext			-	1264								
UTLEND	Ext			-	293								
WRITIT	Ext			-	223								
WRTASC	Ext			-	1596	1637							
Write1	Ext			-	727								
XchgT	Ext			-	705	712							
YTML	Ext			-	2197								
bPILAI	Ext			-	1565	1909	2036						
=bSERR	Abs	989744	#F1A30	-	1912								
badinp	Abs	990985	#F1F09	-	2991	2916	3001	3006					
badtyp	Abs	990979	#F1F03	-	2987	2914							
cATCH+	Ext			-	2001								
eABORT	Ext			-	1276								
eDSPEC	Ext			-	444	2026	2508						
eDTYPE	Ext			-	1048								
eNMBX	Ext			-	2779								
eNNUMR	Ext			-	2723	2987							
eNOASN	Ext			-	1557								
eNOFND	Ext			-	2515								
ePARSE	Ext			-	1558								
ePIL	Ext			-	2512	2578							
eRANGE	Ext			-	899	912	1009	1418	1520	2713	2935	2991	
eUNEXP	Ext			-	2577								
eXPEXC	Ext			-	1500								
=fLTDH	Abs	991021	#F1F2D	-	3011	1513	2915	3000	3005				
hsLPRQ	Ext			-	2825								
l/OFND	Ext			-	1566								
mCMDf	Ext			-	1308								
mREADC	Ext			-	2653								
mREADI	Ext			-	2585								
mSETIC	Ext			-	1485								
mSST	Ext			-	2202								
mSTO@5	Ext			-	1490								
=nXTSTM	Abs	989056	#F1780	-	1494	892	1674	1734					
pDIAGL	Ext			-	2589								
sCA	Abs	5	#00005	-	2786	2821							
sEar	Abs	2	#00002	-	2789	2809							

sLA	Abs	6 #00006	-	2785	2818	
sLLout	Abs	0 #00000	-	2791	2798	
sReadd	Ext		-	1797	1952	
sRemot	Abs	1 #00001	-	2790	2801	
sSRQR	Abs	3 #00003	-	2788	2827	
sSTK	Ext		-	1863	2423	
sStanb	Abs	7 #00007	-	2784	2806	
sTA	Abs	4 #00004	-	2787	2815	
tCOMMA	Ext		-	979	1231	1442
tLOCKO	Ext		-	1097		
tOFF	Ext		-	1394		
tON	Ext		-	1397		
tXWORD	Ext		-	1095	1709	

Input Parameters

Source file name is NZ&BAS::MS

Listing file name is NZ/BAS:TI:ML::-1

Object file name is NZ%BAS:TI:MS::-1

Initial flag settings are
111111
0123456789012345

Errors

None

Saturn Assembler News

```

1      *      SSS   CCC   &   EEEEE N  N  TTTT
2      *      S   S  C   C   & &   E   N  N  T
3      *      S   C   & &   E   NN N  T
4      *      SSS   C   &   EEEEE N  N  T
5      *      S   S  C   & & &   E   N  NN T
6      *      S   S  C   C   & &   E   N  N  T
7      *      SSS   CCC   && &   EEEEE N  N  T
8      *

```

```

9      TITLE  ENTER Execution <840113.1057>
10 F1F34    ABS  #F1F34          TIXHP6 address (fixed)

```

```

11      *
12      Array  EQU  1
13      String EQU  2
14      Cmplex EQU  3
15      Endfrm EQU  3
16      MltItm EQU  4
17      Memerr  EQU  4
18      BytCnt  EQU  5
19      KorH    EQU  5
20      Sign    EQU  6
21      Trash   EQU  6
22      ChrTrp  EQU  7

```

```

23      *****
24      *****

```

```

25      **
26      ** Name:          hENTER - Poll handler for the pENTER poll
27      **
28      ** Category:     POLL
29      **
30      ** Type:          POLL
31      **
32      ** Purpose:
33      **   To read data from HP-IL and put it on math stack
34      **
35      ** Entry:
36      **   B[A] = Poll number.
37      **   HEX mode.
38      **   P=0.
39      **   MTHSTK=FORSTK (Math stack is collapsed to FORSTK)
40      **
41      **   R1[A]=HP-IL address (device's location relative to the
42      **             controller)
43      **
44      **   S5 (BytCnt):
45      **     1:Read a specified number of characters
46      **       A[A] is the number of characters to read
47      **     0:Terminate by END frame or terminating char match
48      **       A[B] is the terminating character
49      **
50      **   S6 (Trash):
51      **     1:Ignore the data which is read
52      **     0:Save the data which is read on the stack
53      **
54      **   S7 (ChrTrp):
55      **     1:Detect a special character in incoming data

```

```

56      **          R2[B] is the character to be detected
57      **          If R2[3:2]=00, ignore the character;
58      **          otherwise replace the character with R2[3:2]
59      **          0:No special character processing
60      **
61      **          If system flag -23 is set:
62      **          Terminate by ETO, terminating character is ignored
63      **
64      **          If S5 (BytCnt)=0, S6 (Trash)=0, and S-R0-3[0]>2 (the
65      **          destination is a string), then S-R1-1[3:0] and R3[A]
66      **          are the maximum number of chars to read before
67      **          interrupting the conversation with an NRD.
68      **          R3[S] must not be "F". (R3[4]=0)
69      **
70      **          If S5 (BytCnt)=1 or S6 (Trash)=1, then flag -23 has
71      **          no effect other than to terminate on an ETO instead
72      **          of the terminator character.
73      **
74      **          If { S-R0-3[0]<=2 (not string dest) and S5 (BytCnt)=0 }
75      **          or { in device mode (not controller) },
76      **          then flag -23 has no effect (it is ignored).
77      **
78      **
79      ** Exit:
80      **   HEX mode.
81      **   XM=0.
82      **   Carry clear:
83      **     RVMEME points to the last character read
84      **     FORSTK points to first char read + 2
85      **     Number of chars read = ((FORSTK) - (RVMEME))/2
86      **     S4 (Memerr)=0
87      **   Carry set:
88      **     S4 (Memerr)=1: Insufficient memory (Need to load eMEM)
89      **     S4 (Memerr)=0: C[3:0] is the error code
90      **
91      ** Calls:      D1=AVE, RDST01, <ERROR>, <AVE=D1>
92      **
93      ** Uses:
94      **   Inclusive: A-D, D0, D1, P, R1, R2, ST[5:0]
95      **
96      ** Stk Lvl:   5 (RDST01)
97      **
98      ** History:
99      **
100     **      Date      Programmer      Modification
101     **      -----      -
102     **      12/13/83      NZ          Updated documentation
103     **      07/26/83      SC          Wrote routine
104     **
105     ** *****
106     ** *****
107 F1F34 11A =hENTER C=R2          Get special char (for ChrTrp=1)
108 F1F37 D5          B=C      A          Place in B[B], B[3:2]
109 F1F39 7317        GOSUB   D1hstk      Set D1 to the top of the math stack
110 F1F3D 70C3        GOSUB   RDST01      Read the characters...

```

```

111 F1F41 580          GONC  pENTR1      ...No error (leave RVMEME at stack)
112 F1F44 8C00       GOLONG =ERROR      Error (set up C[3:0])
      00

113          *-
114          *-
115 F1F4A 6072 pENTR1 GOTO  aVE=D1      Carry clear, RVMEME updated
116          *****
117          *****
118          **
119          ** Name:      ENTER - Execute the ENTER statement
120          **
121          ** Category:  STEEXEC
122          **
123          ** Purpose:
124          **      Execute the ENTER statement to read data from the loop
125          **
126          ** Entry:
127          **      D0 points to the device specifier
128          **      P=0
129          **
130          ** Exit:
131          **      Through either NXTSTM or BSERR
132          **
133          ** Calls:      GETDID,DEVADR,SAVEIT,TRESDO,CHKEOL,NXTDST,RED-LF,
134          **              STRPcr,CS=TYP,STRHED,REV$,D1MSTK,GETNUM,STOSUB,
135          **              FSTK-7,AVE=D1,RESTDO,NXTDS+,<NXTSTM>,<USING>,
136          **              <ERRORX>,<getEOL>
137          **
138          ** Uses.....
139          ** Inclusive: A,B,C,D,RO-R4,D0,D1,P,STMTxx,ST[11:0],FUNCxx,
140          **              All RAM EXPEXC is permitted to use
141          **
142          ** Stk lvls:   7 (GETDID)(STOSUB)
143          **
144          ** History:
145          **
146          **      Date      Programmer      Modification
147          **      -----      -
148          **      12/20/83      NZ          Packed 3 places to get room for
149          **                      bug fix in GETNUM (locations are
150          **                      marked with a "+" in col. 29)
151          **      12/15/83      NZ          Added documentation
152          **      04/01/82      SC          Wrote routine
153          **
154          *****
155          *****
156 F1F4E 0000          REL(5) =OUTPd
      0
157 F1F53 0000          REL(5) =ENTERp
      0
158 F1F58 8E00 =ENTER  GOSUBL =GETDID      Get Device specifier
      00
159 F1F5E 431          GOC   ENTREX      Error...P,C[0] are error code
160          *
161          * D0 points to the mailbox, FUNCDO contains the PC value

```

```

162          *
163 F1F61 96F          ?D#0  B      Is the address non-zero?
164 F1F64 D2          GOYES  GETD10  Yes...valid address
165 F1F66 2F          P=    15      No...check for LOOP (not NULL)
166 F1F68 300        LC(1) =DsLoop
167 F1F6B 943        ?C=D  S      Is this "LOOP"?
168 F1F6E 02          GOYES  GETD09  Yes...accept it
169 F1F70 20          P=    =eDSPEC  No...must be "NULL"
170 F1F72 8C00 ENTREX GOLONG =ERRORX Error exit for P, C[0]=error code
      00

171          *_-
172          *_-
173 F1F78 49F RTNCHK  GOC      ENTREX  If carry, detected an error
174          *
175          * Delete the buffer (if any) created by SAVEIT before finishing
176          *
177 F1F7B 7342 ENTdel  GOSUB  DEVADR  Set D1 to the device specifier
178 F1F7F AF2          C=0   W      Replace it with zero (no device)
179 F1F82 8E00        GOSUBL =SAVEIT  SAVEIT deletes any old buffer
      00
180 F1F88 8C00 ENTRTN GOLONG =nXTSTM  Finished!
      00

181          *_-
182          *_-
183 F1F8E AC2  GETD09  C=0   S      This is LOOP...don't make a buffer
184 F1F91 7D22 GETD10  GOSUB  DEVADR  Set (MTHSTK) = (FORSTK) - 7
185 F1F95 8E00        GOSUBL =SAVEIT  Save device specifier on MTHSTK
      00
186 F1F9B 8E00        GOSUBL =TRESDO  Restore PC (saved by GETDID)
      00
187 F1FA1 161        DO=DO+ 2      Skip the t@ used to terminate spec
188 F1FA4 14A        A=DATO B
189 F1FA7 3100        LC(2) =tUSING
190 F1FAB 966        ?A#C  B      Is this ENTER ... USING?
191 F1FAE 51          GOYES  ENT120  No...continue with ENTER
192 F1FB0 1F00        D1=(5) =MLFFLG Yes...zero MLFFLG, device to prevent
      000
193 F1FB7 D2          C=0   A      .CKINFO from doing anything bad when
194 F1FB9 14D        DAT1=C B      .USING calls it
195 F1FBC 8D00        GOVLNG =USING
      000

196          *_-
197          *_-
198 F1FC3 8F00 ENT120  GOSBVL =CHKEOL  Are there any variables specified?
      000
199 F1FCA 460        GOC      ENT130  Yes...read and store
200          *
201          * ENTER statement has no destination variable:
202          * just skip to end of line and return.
203          *
204 F1FCD 6517        GOTO   getEOL
205          *_-
206          *_-
207 F1FD1 7C52 ENT130  GOSUB  NXTDST  Set up next destination and loop
208 F1FD5 55A        GONC   ENTdel  Reached end of line...done

```

```

209 F1FD8 7803 ENT150 GOSUB RED-LF      Read until <Lf>
210 F1FDC 580      GONC  ENT155      Good read...continue
211 F1FDF 8C8F      GOLONG REDCer     Error during read...exit with error
      80
212      *-
213      *-
214 F1FE5 845      ENT155 ST=0  KorH      This is not USING format "K" or "H"
215 F1FE8 844      ENT160 ST=0  MltItm     Not multiple items per data line
216 F1FEB 94C      ?A#0  S          Is flag -23 set?
217 F1FEE B0      GOYES ENT180     Yes...keep all characters
218      *
219 F1FF0 873      ?ST=1 Endfrm     Was the last byte an END frame?
220 F1FF3 60      GOYES ENT180     If so, don't strip off <CR>
221      *
222 F1FF5 7F36     GOSUB STRPcr     Strip off trailing <cr> if present
223      *
224 F1FF9 78F1 ENT180 GOSUB CS=TYP     Returns carry set if numeric type
225 F1FFD 4A4      GOC   ENT220     Numeric variable...process it
226      *
227      * Destination is a string variable: make sure not to exceed the
228      * maximum string length.
229      *
230 F2000 864      ?ST=0 MltItm     Has another item been processed?
231 F2003 C1      GOYES ENT190     No...continue
232      *
233      * A numeric item has been processed already (strings use up the
234      * entire line which has been read). Processing a numeric item
235      * reverses the string on the stack, so we have to reverse it
236      * again to get back to original order.
237      *
238 F2005 7046     GOSUB strhed     Put a header on to reverse the data
239 F2009 8E00     GOSUBL =rEV$     Reverse the string
      00
240 F200F 17F      D1=D1+ 16       Skip the header (16 nibbles)
241 F2012 137      CD1EX           Save D1 in C[A]
242 F2015 79A1     GOSUB DEVADR     Set AVMEME back to FORSTK - 7
243 F2019 135      D1=C           Restore D1
244 F201C 171      D1=D1+ 2       Skip the <Cr> that GETNUM added
245      *
246      * D1 points to the end of the string (lowest address)
247      *
248 F201F 133      ENT190 AD1EX     Save D1 in A[A]
249 F2022 7A26     GOSUB D1mstk     Set D1 to AVMEME (=MTHSTK)
250 F2026 D6      C=A  A          Copy old D1 value to C[A]
251 F2028 133      AD1EX           Restore D1, set A[A] to AVMEME
252 F202B EE      C=A-C  A       C[A] is number of nibbles on stack
253 F202D 7164     GOSUB A=SLEN     Recall maximum string length
254 F2031 C4      A=A+A  A       A[A] is the max length in nibbles
255 F2033 E2      C=C-A  A       Check if the data will fit in string
256 F2035 4A0      GOC   ENT200     Yes...do the assignment
257 F2038 133      AD1EX           No...throw away the excess chars
258 F203B CA      A=A+C  A       (C[A] is the number of extra nibs)
259 F203D 133      AD1EX
260 F2040 7506 ENT200 GOSUB strhed     Put a string header on the data
261 F2044 6410     GOTO  ENT300     Go do the string assignment

```

```

262      *_-
263      *_-
264      *
265      * Destination is a numeric variable: try to get a number out of
266      * the data
267      *
268 F2048 7660 ENT220 GOSUB GETNUM      Get a number, if possible
269 F204C 4B8      GOC      ENT150      No number, MltItm; read another line
270 F204F AF4      ENT250  A=B      W
271 F2052 1CF      D1=D1- 16
272 F2055 1517     DAT1=A  W      Push number value onto the stack
273 F2059 865     ENT300  ?ST=0  KorH    Is this ENTER ... USING "K" or "H"?
274 F205C 60      GOYES  ENT302      No...store and loop back
275 F205E 6B01    GOTO   STOSUB      Yes...store and return to caller
276      *_-
277      *_-
278 F2062 7401    ENT302  GOSUB  STOSUB      Store the number
279 F2066 76E5    GOSUB  D1mstk      Set D1 to (MTHSTK)
280 F206A 7271    GOSUB  FSTK-7      Set D0 to (FORSTK) - 7
281 F206E 136     CDOEX                      C[A] is (FORSTK) - 7
282 F2071 133     AD1EX                      A[A] is (MTHSTK)
283 F2074 8E00    GOSUBL =RESTDO      Restore D0 from STMTD0
      OO
284 F207A 8BE      ?A>=C  A      Any data left in line?
285 F207D 51      GOYES  ENT305      No...get next dest, read a line
286      *
287      * If there is exactly one character left on the stack, it must
288      * be the <Cr> GETNUM added to the string.
289      *
290 F207F CE      C=C-1  A
291 F2081 CE      C=C-1  A      Back up 2 nibbles
292 F2083 8B2     ?A<C   A      Any data left?
293 F2086 01      GOYES  ENT310      Yes...set up next dest, GOTO ENT180
294 F2088 131     D1=A
295 F208B 171     D1=D1+ 2      No...
296 F208E 7921    GOSUB  aVE=D1      ...set D1 to bottom of stack
297 F2092 6E3F    ENT305  GOTO   ENT130  Set AVMEME to bottom of stack
298      *_-
299      *_-
300 F2096 7791    ENT310  GOSUB  NXTDST      Get next destination variable
301 F209A 460      GOC      ENT320      Got another destination...continue
302 F209D 6DDE     GOTO   ENTdel      No more variables...exit
303      *_-
304      *_-
305 F20A1 7D11    ENT320  GOSUB  DEVADR      Set AVMEME to (FORSTK) - 7
306 F20A5 135     D1=C
307 F20A8 854     ST=1    MltItm      Set D1 @ top of stack (from NXTDST)
308 F20AB 845     ST=0    KorH      Set Multi-Item flag
309 F20AE 6A4F     GOTO   ENT180      Not ENTER ... USING "K" or "H"
      Continue processing line

```

```

310          STITLE Convert string into a number
311          *****
312          *****
313          **
314          ** Name:          GETNUM - Convert data on stack into a number
315          **
316          ** Category:     LOCAL
317          **
318          ** Purpose:
319          **   Skip over any non-digit chars and convert the ASCII
320          **   digits into a floating number
321          **
322          ** Entry:
323          **   P=0
324          **   HEXMODE
325          **   D1 points to the lowest-addressed character of the data
326          **   ST[MltItm]=1:
327          **     D1 points to first character of the string
328          **   ST[MltItm]=0:
329          **     D1 points to last character of the string
330          **
331          ** Exit:
332          **   Carry clear:
333          **     B[W] is the floating number value
334          **   Carry set:
335          **     No digit found and ST[MltItm]=1
336          **
337          ** Calls:         STRHED, REV$, AVE=D1, RANGEN, NUMSCN, TSAVD1, BLDCON,
338          **                 NRMCON, TRES D1
339          **
340          ** Uses.....
341          **   Inclusive:  A, B, C, D, R0, R2, D0, D1, P, FUNC D1, ST[6, 3, 2, 1]
342          **
343          ** Stk lvls:     2 (NUMSCN)(STRHED)(REV$)(TSAVD1)(TRES D1)
344          **
345          ** History:
346          **
347          **   Date          Programmer          Modification
348          **   -----          -
349          **   12/20/83      NZ          Packed, installed bug fix for
350          **                                     SR #0039-01070(2). This is the
351          **                                     bug where ENTER of an underflow
352          **                                     or an overflow will destroy some
353          **                                     user flags and traps. This bug
354          **                                     exists in version HPIL:1A.
355          **   12/15/83      NZ          Updated documentation
356          **   03/02/83      SC          Wrote routine
357          **
358          **   *****
359          **   *****
360          F20B2 31D0 GETNUM  LCHEX  OD          Add a <Cr> as the last digit...
361          F20B6 1C1          D1=D1- 2          (if MltItm is set, it will be the
362          F20B9 14D          DAT1=C B          first digit, but will be skipped)
363          *
364          F20BC 7985        GOSUB  strhed      Put a string header on data
  
```



```

365      *
366      * If not the first number of the input string, don't reverse
367      * the string - it already has been reversed the first time thru
368      *
369 F20C0 874      ?ST=1  MltItm      Is this the first time through?
370 F20C3 80      GOYES  GETN10      No...leave it alone (already done)
371 F20C5 8E00    GOSUBL =rEV$      Yes...reverse the string
      00
372 F20CB 171    GETN10  D1=D1+ 2      Skip the first byte of header
373 F20CE AF2      C=0    W
374 F20D1 147      C=DAT1 A      Read string length in nibbles
375 F20D4 81E      CSRB      C[A] is string length in bytes
376 F20D7 D5      B=C    A      B[A] is number of bytes on stack
377 F20D9 17D      D1=D1+ 14     Position to first character
378 F20DC 846      ST=0   Sign     Initialize the sign
379 F20DF CD      GETN20  B=B-1  A      Check if string exhausted yet
380 F20E1 521      GONC   GETN40      No...check the character
381      *
382      * No digits found in the string.
383      * If ST[MltItm]=0, just return zero.
384      * If ST[MltItm]=1, pop the stack and return with carry set
385      *
386 F20E4 864      ?ST=0  MltItm      First number in string?
387 F20E7 80      GOYES  GETN30      Yes...return zero
388 F20E9 7ECO    GOSUB  aVE=D1      No...pop stack, set carry to
389 F20ED 02      RTNSC      indicate need to read more data
390      *
391      *
392 F20EF AF1    GETN30  B=0    W      Set up a floating number zero
393 F20F2 03      RTNCC
394      *
395      *
396 F20F4 14B    GETN40  A=DAT1 B      Read the next character
397 F20F7 8E00    GOSUBL =RANGEN      Is it in [0,9]?
      00
398 F20FD 502      GONC   GETN60      Yes...continue
399 F2100 31E2      LCASC  \. \      No
400 F2104 962      ?A=C   B      Is is a decimal point?
401 F2107 71      GOYES  GETN60      Yes...consider it a digit
402 F2109 856      ST=1   Sign     No...set sign initially negative
403 F210C 31D2      LCASC  \- \
404 F2110 962      ?A=C   B      Is it a minus sign?
405 F2113 50      GOYES  GETN50      Yes...leave sign negative
406 F2115 846      ST=0   Sign     No...set sign back to positive
407 F2118 171    GETN50  D1=D1+ 2      Position to next character
408 F211B 53C      GONC   GETN20      Go always
409      *
410      *
411 F211E AF1    GETN60  B=0    W      Initialize the number
412 F2121 841      ST=0   1      Clear these two statuses for
413 F2124 842      ST=0   2      NUMSCN (if not zero, then error)
414 F2127 118      C=R0      Save R0 value...
415 F212A 10A      R2=C      ...in R2
416 F212D 8F00    GOSBVL =NUMSCN      Scan the string for a number
      000

```

```
417 F2134 04      SETHEX          (NUMSCN leaves DEC mode)
418 F2136 8E00    GOSUBL =TSAVD1  Save D1 to save from BLDCON/NRMCON
                   00
419 F213C 8F00    GOSBVL =BLDCON  Convert NUMSCN output to tokenized
                   000
420 F2143 8F00    GOSBVL =NRMCON  Convert tokenized to floating num
                   000
421 F214A 8E00    GOSUBL =TRES D1  Restore D1 from FUNC D1
                   00
422 F2150 11A     C=R2           Restore R0 from R2
423 F2153 108     RO=C
424 F2156 AF8     B=A           W      [S] is garbage here
425 F2159 AC1     B=0           S      Set the sign positive initially
426 F215C 866     ?ST=0        Sign   Is the sign positive?
427 F215F 90      GOYES GETN80  Yes...done
428 F2161 05      SETDEC        No...
429 F2163 A4D     B=B-1        S      Set sign negative
430 F2166 04      SETHEX
431 F2168 03      GETN80 RTNCC   Return, got a good string
```

```

432          STITLE Store item into variable
433          *****
434          *****
435          **
436          ** Name:          STOSUB - Subroutine to store into a variable
437          **
438          ** Category:     LOCAL
439          **
440          ** Purpose:
441          **   Assign the value on the stack to the variable location
442          **   indicated by Statement scratch RAM
443          **
444          ** Entry:
445          **   P=0
446          **   STMTR0 and STMTR1 set up as by DEST
447          **   D1 points to top of stack
448          **   RO[A] is the saved D1 value
449          **
450          ** Exit:
451          **   P=0
452          **   The item has been popped off the stack
453          **   AVMEME is updated to new top of stack
454          **   D1 restored from RO[A]
455          **
456          ** Calls:         AVE=D1,CSLC5,CSRC5,STORE,D1MSTK,POPMTH,<ENTST3>
457          **
458          ** Uses.....
459          **   Inclusive:  A,B,C,D,RO[15:5],R1,R2,R3[15:5],R4,D0,D1,P,
460          **                 RESREG,ST[11:8,5,3,0]
461          **
462          ** Stk lvls:     6 (STORE)
463          **
464          ** History:
465          **
466          **   Date          Programmer          Modification
467          **   -----          -
468          **   12/02/83      NZ          Added documentation
469          **   04/01/82      SC          Wrote routine
470          **
471          *****
472          *****
473 F216A 7D40 STOSUB GOSUB aVE=D1          Set stack pointer to D1 value
474          *
475          * Need to save RO[A] and R3[A] from STORE...use R4[14:10] for
476          * R3[A], R4[9:5] for RO[A]
477          *
478 F216E 110          A=RO
479 F2171 11B          C=R3
480 F2174 8E00          GOSUBL =CSLC5          R3[A] now in C[9:5]
481          00
482 F217A D6          C=A A
483 F217C 8E00          GOSUBL =CSLC5          RO[A] in C[9:5], R3[A] in C[14:10]
484          00
485 F2182 10C          R4=C          Put it all in R4
486 F2185 1537          A=DAT1 W          Recall the value from the stack
  
```

```

485 F2189 8F00          GOSBVL =STORE          Store it
      000
486                    *
487                    * Now restore R0[A] and R3[A] from R4
488                    *
489 F2190 11C          C=R4
490 F2193 8E00          GOSUBL =CSRC5
      00
491 F2199 108          RO=C
492 F219C 8E00          GOSUBL =CSRC5
      00
493 F21A2 10B          R3=C
494                    *
495                    * R0 and R3 are now restored...pop the item off the stack
496                    *
497 F21A5 77A4 popstk  GOSUB  D1nstk          First set D1 to top of stack
498 F21A9 8F00          GOSBVL =POPMTH          Pop the item
      000
499 F21B0 7700          GOSUB  aVE=D1          Set RVMEME to new top of stack
500 F21B4 AF4           A=B      W             Copy B to A for popstk entry
501 F21B7 6717          GOTO   ENTST3          Finish it up
502                    *-
503                    *-
504 F21BB 8D00 =aVE=D1 GOVLNG =AVE=D1
      000
  
```

```

505          STITLE Utility routines
506          *****
507          *****
508          **
509          ** Name:          DEVADR - Collapse MTHSTK, D1 to FORSTK - 7
510          **
511          ** Category:    LOCAL
512          **
513          ** Purpose:
514          **          Collapse MTHSTK to FORSTK - 7, leave D1 at (MTHSTK)
515          **
516          ** Entry:
517          **          None
518          **
519          ** Exit:
520          **          Carry clear
521          **          MTHSTK at (FORSTK) - 7
522          **          D1 at (MTHSTK)
523          **
524          ** Calls:       None
525          **
526          ** Uses.....
527          ** Inclusive:  A[A],D1
528          **
529          ** Stk lvls:   0
530          **
531          ** History:
532          **
533          **      Date      Programmer      Modification
534          **      -----      -
535          **      12/15/83      NZ          Added documentation
536          **      04/01/82      SC          Wrote routine
537          **
538          *****
539          *****
540 F21C2 1F00 DEVADR D1=(5) =FORSTK
           000
541 F21C9 143          A=DAT1 A          A[A] is FORSTK pointer
542 F21CC 1C4          D1=D1- 5          D1 points to MTHSTK
543          *
544          * SET (MTHSTK) = (FORSTK) - 7
545          *
546 F21CF 133          AD1EX          D1 is now (FORSTK)
547 F21D2 1C6          D1=D1- 7          D1 is (FORSTK) - 7
548 F21D5 133          AD1EX          A[A] is (FORSTK)-7, D1 is MTHSTK
549 F21D8 141          DAT1=A A          Write out (FORSTK)-7 to MTHSTK
550 F21DB 133          AD1EX          D1 is (FORSTK)-7
551 F21DE 03          RTNCC
552          *****
553          *****
554          **
555          ** Name:          FSTK-7 - Set D0 to (FORSTK) - 7 and read 5 nibs
556          **
557          ** Category:    LOCAL
558          **

```

```

559      ** Purpose:
560      **       Set D0 to (FORSTK) - 7
561      **
562      ** Entry:
563      **       None
564      **
565      ** Exit:
566      **       D0 points to (FORSTK) - 7
567      **       C[A] is the data at D0
568      **       Carry clear
569      **
570      ** Calls:      None
571      **
572      ** Uses.....
573      ** Inclusive: C[A],D0
574      **
575      ** Stk lvls:  0
576      **
577      ** History:
578      **
579      **       Date      Programmer      Modification
580      **       -----      -
581      **       12/15/83      NZ          Added documentation
582      **       04/01/82      SC          Wrote routine
583      **
584      ****
585      ****
586 F21E0 1B00 FSTK-7  D0=(5) =FORSTK
           000
587 F21E7 146      C=DATO A
588 F21EA 134      DO=C
589 F21ED 186      DO=DO- 7          DO is at (FORSTK)-7
590 F21F0 146      C=DATO A          C[A] is (D0)
591 F21F3 01      RTN           Carry is clear from DO=DO-7 above
592      ****
593      ****
594      **
595      ** Name:      CS=TYP - Check if the destination is numeric
596      **
597      ** Category:  LOCAL
598      **
599      ** Purpose:
600      **       Check if the destination variable is of type numeric
601      **       or not
602      **
603      ** Entry:
604      **       S-R0-3 contains the variable type
605      **
606      ** Exit:
607      **       Carry set if numeric, else clear
608      **
609      ** Calls:      None
610      **
611      ** Uses.....
612      ** Inclusive: C[S],C[A]

```

```

613      **
614      ** Stk lvls:  0
615      **
616      ** History:
617      **
618      **      Date      Programmer      Modification
619      **      -----      -
620      **      12/15/83      NZ      Added documentation
621      **      04/01/82      SC      Wrote routine
622      **
623      ****
624      ****
625 F21F5 136 CS=TYP CDOEX      Save DO in C[A]
626 F21F8 1B00 DO=(5) =S-R0-3
        000
627 F21FF 1564 C=DATO S
628 F2203 136 CDOEX      Restore DO from C[A]
629 F2206 A4E C=C-1 S
630 F2209 400 RTNC      C[S] was 0
631 F220C A4E C=C-1 S
632 F220F 400 RTNC      C[S] was 1
633 F2212 A4E C=C-1 S
634 F2215 01 RTN      C[S] was 2 if carry set, else >2
635      ****
636      ****
637      **
638      ** Name:      AS=FTY - Read and clear image type flag (CHN#SV)
639      **
640      ** Category:  LOCAL
641      **
642      ** Purpose:
643      **      Read contents of CHN#SV into A[S] and clear CHN#SV
644      **
645      ** Entry:
646      **      None
647      **
648      ** Exit:
649      **      Carry unchanged from entry
650      **      A[S] is the old contents of CHN#SV
651      **
652      ** Calls:      None
653      **
654      ** Uses.....
655      **      Inclusive: A[S],C[S]
656      **
657      ** Stk lvls:  0
658      **
659      ** History:
660      **
661      **      Date      Programmer      Modification
662      **      -----      -
663      **      12/15/83      NZ      Added documentation
664      **      04/01/82      SC      Wrote routine
665      **
666      ****
  
```

```
667                    *****  
668 F2217 1B00 AS=FTY D0=(5) =CHN#SV  
                      000  
669 F221E 1524            A=DATO S            Read the old value into A[S]  
670 F2222 AC2            C=0    S  
671 F2225 1544            DATO=C S            Clear CHN#SV (write a zero)  
672 F2229 01             RTN                Return, carry unchanged
```



```

673          STITLE Get next dest. variable
674          *****
675          *****
676          **
677          ** Name:      NXTDST - Get the next destination variable
678          **
679          ** Purpose:
680          **   Get next variable from variable list.
681          **   The variable will be created if not yet exist.
682          **
683          ** Entry:
684          **   D0 is the PC
685          **   P=0
686          **
687          ** Exit:
688          **   D0 is the PC
689          **   Carry clear:
690          **     Reached end of variable list
691          **   Carry set:
692          **     Variable on top of stack
693          **     C,D1 point to top of stack (variable has been popped)
694          **     AVMEME=D1
695          **     S2=1 if string variable
696          **     (S-R1-1[3:0]=Maximum string length)
697          **
698          **   Error exit if the variable is an array or complex number
699          **   Error exit if insufficient memory to create new variable
700          **   Error exit if encounter any error on the loop
701          **
702          ** Calls:      RESTDO,CHKEOL,MFLG=0,EXPEXC,NXTVA-,DIMST+,STKVCT,
703          **              D1MSTK,POPMTN,AVE=D1,D1FSTK,CHKASN,START
704          **
705          ** Uses:
706          **   Inclusive: A,B,C,D,R0-R4,D0,D1,STMTDO,STMTR0,STMTR1,FUNCxx,
707          **              ST[11:0],all RAM EXPEXC is permitted to use
708          **
709          ** Stk Lvl:   5 (EXPEXC)
710          **
711          ** History:
712          **
713          **   Date      Programmer      Modification
714          **   -----      -
715          **   12/16/83    NZ          Updated documentation
716          **                   SC          Wrote routine
717          **
718          *****
719          *****
720 F222B 0          CON(1) =FIXSPC      6 nibbles available here
721 F222C          BSS      6-1
722          *_-
723          *_-
724 F2231 8F00 =NXTDST GOSBVL =CHKEOL      Check if EOL yet
725          000
726 F2238 500      RTNNC          Yes...return with carry clear
727          *
  
```

727	F223B	161		DO=DO+ 2	
728	F223E	7D80		GOSUB Mflg=0	Clear MLFFLG so can tell if UDF used
729	F2242	8E00		GOSUBL =eXPEXC	Evaluate the variable
		00			
730	F2248	8F00	NXTDS-	GOSBVL =NXTVA-	Create it, if needed, and set it up
		000			
731	F224F	8F00		GOSBVL =D1MST+	Set D1 to top of stack,clear ST
		000			
732	F2256	8F00		GOSBVL =STKVCT	Set appropriate status bits
		000			
733			*		
734			*	Do not allow an array or a complex number as the destination	
735			*		
736	F225D	873		?ST=1 Cmplx	Is it complex?
737	F2260	70		GOYES BADTYP	Yes...Type error
738	F2262	861		?ST=0 Array	Is it array?
739	F2265	91		GOYES NXTD10	No...continue
740	F2267	8D00	BADTYP	GOVLNG =RDATTY	Yes...Data Type error
		000			
741			*_		
742			*_		
743	F226E	0		CON(1) =FIXSPC	16 nibbles available here
744	F226F			BSS 16-1	
745			*_		
746			*_		
747	F227E	7EC3	NXTD10	GOSUB D1mstk	Reset D1 to top of stack
748	F2282	8F00		GOSBVL =POPMTH	Pop off the variable value
		000			
749	F2289	7E2F		GOSUB aVE=D1	Set AVMEME=D1
750	F228D	7856		GOSUB D1fstk	Set D1 to (FORSTK)
751	F2291	1C6		D1=D1- 7	Move to (FORSTK)-7 (Device addr)
752	F2294	15F6		C=DAT1 7	Read device address & info
753	F2298	1B00		DO=(5) =MLFFLG	Check if a UDF has been called
		000			
754	F229F	14A		A=DAT0 B	
755	F22A2	908		?A=0 P	User-defined function?
756	F22A5	E1		GOYES NXTD20	No...continue
757	F22A7	32FF		LCHEX FFF	Yes...set device address to search
		F			
758	F22AC	8E00		GOSUBL =CHKASN	Figure out how to find the device
		00			
759	F22B2	D7		D=C A	
760	F22B4	8E00		GOSUBL =START	Find the device
		00			
761	F22BA	407		GOC ENTRex	Error setting up the device address
762	F22BD	DB		C=D A	
763	F22BF	1553		DAT1=C X	Write out the (new) device address
764			*		
765	F22C3	7983	NXTD20	GOSUB D1mstk	Position back to top of stack
766	F22C7	137		CD1EX	Set C[A]=D1 = top of stack
767	F22CA	135		D1=C	
768	F22CD	02		RTNSC	Return with carry set...good var
769			*_		
770			*_		
771	F22CF	8F00	Mflg=0	GOSBVL =SVTRC	Save pointer for TRACE

000
772 F22D6 8D00
000

GOVLNG =MFLG=0

Clear multi-UDF flag

```
773          STITLE Read characters from loop
774          *****
775          *****
776          **
777          ** Name:      RED-LF - Read characters from the loop until <Lf>
778          ** Name:      SKP-LF - Read & discard characters from the loop
779          ** Name:      REDCOO - Read characters from the loop until <Lf>
780          ** Name:      REDCHR - Read characters from the loop
781          ** Name:      RDSTO1 - Read characters from the loop to stack
782          **
783          ** Category:   LOCAL
784          **
785          ** Purpose:
786          **      Read data from the loop onto the stack
787          **
788          ** Entry:
789          **      REDCHR,REDCOO,RED-LF,SKP-LF only:
790          **      The 7 nibble device specifier is stored on the bottom
791          **      (highest address) of the math stack.
792          **      RDSTO1 only:
793          **      R1[6:0] is the 7-nibble device specifier
794          **
795          **      (All entries)
796          **
797          **      P=0,HEXMODE
798          **      D1 points to current top of math stack. Data read will
799          **      be stored on top of stack (last character placed at
800          **      lowest address)
801          **
802          **      Available memory on stack will be checked.
803          **
804          **      S5 (BytCnt):
805          **          1:Read a specified number of characters
806          **          R[A] is the number of characters to read
807          **          0:Terminate by END frame or terminating char match
808          **          R[B] is the terminating character
809          **
810          **      S6 (Trash):
811          **          1:Ignore the data which is read
812          **          0:Save the data which is read on the stack
813          **
814          **      S7 (ChrTrp):
815          **          1:Detect a special character in incoming data
816          **          B[B] is the character to be detected
817          **          If B[3:2]=00, ignore the character;
818          **          otherwise replace the character with B[3:2]
819          **          0:No special character processing
820          **
821          **      If system flag -23 is set:
822          **          Terminate by ET0, terminating character is ignored
823          **
824          **      If S5 (BytCnt)=0, S6 (Trash)=0, and S-R0-3[0]>2 (the
825          **      destination is a string), then S-R1-1[3:0] and R3[A]
826          **      are the maximum number of chars to read before
827          **      interrupting the conversation with an NRD.
```

```

828      **          R3[S] must not be "F".
829      **          (R3 is for HPIL:1A only, S-R1-1 for all others)
830      **
831      **          If S5 (BytCnt)=1 or S6 (Trash)=1, then flag -23 has
832      **          no effect other than to terminate on an ETO instead
833      **          of the terminator character.
834      **
835      **          If { S5 (BytCnt)=0 and S-R0-3[0]<=2 (not string dest) }
836      **          OR { device mode (not controller) },
837      **          then flag -23 has no effect (it is ignored).
838      **
839      **
840      ** Exit:
841      **          HEX mode.
842      **          XM=0.
843      **          Carry clear:
844      **          D1 points to the last character read
845      **          Number of chars read=(FORSTK)-D1
846      **          S4 (Memerr)=0
847      **          A[S] contains the state of flag -23 (A[S]=0:flag clear)
848      **          Carry set:
849      **          S4 (Memerr)=1: Insufficient memory (Need to load eMEM)
850      **          S4 (Memerr)=0: P,C[0] is the error code
851      **
852      ** Calls:      FSTK-7,SFLAG?,STGART,CHKSTK,GETDev,CLMODE,CS=TYP,
853      **             PUTC,SETTRM,PUTEFC,YTML,PUTE,GETX,FRAME-,CLMDUT
854      **
855      ** Uses:
856      ** Inclusive: A,B[15:14,A],C,D[15:13,5:0],R1,R2,DO,D1,P,ST[7:0]
857      **
858      ** Stk lvls:  4 (START)
859      **
860      ** History:
861      **
862      **      Date      Programmer      Modification
863      **      -----      -
864      **      01/09/83      NZ          Rewrote character read loop to
865      **                                     be faster and shorter
866      **      12/19/83      NZ          Updated documentation
867      **                                     SC          Wrote routine
868      **
869      ** *****
870      ** *****
871 F22DD 856 SKP-LF ST=1 Trash      Read and trash data until <Lf>
872 F22E0 6600      GOTO REDCOO
873      **
874      **
875 F22E4 846 RED-LF ST=0 Trash      Keep all data that is read
876 F22E7 845 REDCOO ST=0 BytCnt    Read and save until <Lf>
877 F22EA 847      ST=0 ChrTrp    Don't do special char matching
878 F22ED 1B00      DO=(5) =TERCHR
879      000
879 F22F4 14A      A=DATO B      Read the terminator char (<Lf>?)
880 F22F7 119      =REDCHR C=R1 (Preserve the upper nibs of R1)
881 F22FA 72EE      GOSUB FSTK-7 Get device address from stack...
  
```

```

882 F22FE 109          R1=C          ...and save it in R1
883 F2301 AC0 RDST01 A=0      S          Clear flag -23 indicator nibble
884 F2304 102          R2=A          Save character count in R2[A]
885                  *
886                  * Save system flag(-23) in R2[S]
887                  *
888 F2307 3100         LC(2) =f1E0T
889 F230B 8E00         GOSUBL =sFLAG?      Check if flag -23 is set
                        00
890 F2311 5B0          GONC   RDST05       Not set...leave R2[S]=0
891 F2314 112          A=R2          Flag -23 is set...set R2[S]
892 F2317 B44          A=A+1   S
893 F231A 102          R2=A          Save back in R2
894 F231D 119 RDST05 C=R1          Recall device address from R1
895 F2320 D7           D=C      A
896 F2322 8E00         GOSUBL =START       Set up the mailbox, D0
                        00
897 F2328 560          GONC   RDST10       No error...continue
898 F232B 664C ENTReX  GOTO   ENTREX      Error...exit
899                  *
900                  *
901 F232F 73F1 RDST10 GOSUB  CHKSTK      Set R1[A] to # bytes available
902 F2333 DC           ABEX   A          Swap # bytes to B[A], B[3:0] to A
903 F2335 122          AR2EX
904 F2338 7DB5         GOSUB  getdev       Check if in device mode
905 F233C 462          GOC    RDST15       Yes...continue
906 F233F 7B81         GOSUB  CLMODE       No...clear all terminate modes
907 F2343 47E          GOC    ENTReX      (Error)
908 F2346 948          ?A=0   S          Is flag -23 clear?
909 F2349 A1           GOYES  RDST15       Yes...continue
910 F234B 875          ?ST=1  BytCnt      No...is this by count?
911 F234E 14           GOYES  RDST25       Yes...continue
912 F2350 876          ?ST=1  Trash       Not by count...keep data?
913 F2353 83           GOYES  RDST20       No...set count to "FFFFF"
914                  *
915                  * Keep data which is read, flag -23 is set, not by count
916                  *
917 F2355 7C9E         GOSUB  CS=TYP       Check if numeric destination
918 F2359 413          GOC    RDST20       Yes...set byte count to "FFFFF"
919                  *
920                  * System flag -23 is set, destination is a string variable,
921                  * read until EOT received or the string is full.
922                  *
923 F235C 7231         GOSUB  A=SLEN       Set A[A] to maximum string length
924                  * Use the max string length as count
925 F2360 855          ST=1   BytCnt      (Go to counting mode)
926                  *
927 F2363 875 RDST15 ?ST=1  BytCnt      Is this a read by count?
928 F2366 92           GOYES  RDST25       Yes...set it up
929                  *
930                  * Terminate by character matching; always terminate by an END
931                  * frame. Flag -23 should be ignored for this case.
932                  *
933 F2368 AC0          A=0     S          Clear flag -23 indicator nibble
934 F236B 811         BSLC

```

```

935 F236E 811          BSLC
936 F2371 AE8          B=A   B           Save the terminator char in B[15:14]
937 F2374 815          BSRC
938 F2377 815          BSRC
939 F237A 3300         LC(4) (=MSETM)+12 Set mode to terminate by END frame
      00
940 F2380 7C51         GOSUB putc
941 F2384 46A          GOC   ENTRex      Error
942 F2387 7181         GOSUB SETTRM      Set terminate by character match
943 F238B D0   RDST20  A=0   A           Set byte count to "FFFF"
944 F238D CC           A=A-1 A
945 *
946 F238F 96B   RDST25 ?D=0  B           Is the device LOOP?
947 F2392 80       GOYES  RDST30      Yes...leave addressing as it is
948 *
949 * All non-controller devices will have D[B]=0!
950 *
951 F2394 8E00         GOSUBL =YTML      No...address the device as talker
      00
952 F239A 8A8   RDST30 ?A=0   A           Is the byte count zero?
953 F239D E0       GOYES  RDST35      Yes...goto RDST75 (out of range)
954 F239F D6       C=A   A           No...start conversation
955 F23A1 8E00         GOSUBL =hCPY5s   Load either SDA or Set frame count
      00
956 F23A7 7C41         GOSUB pute       Send data, count=A[A]
957 *
958 * Start of main data read loop
959 *
960 F23AB 8A8   RDST35 ?A=0   A           Is the count to zero?
961 F23AE F7       GOYES  RDST75      Yes...exit
962 F23B0 8E00         GOSUBL =GETX     No...read next message
      00
963 F23B6 435         GOC   RDST65      Not data...check frame
964 F23B9 CC   RDST40  A=A-1  A           Decrement count
965 F23BB 876         ?ST=1 Trash      Is this data to keep?
966 F23BE E3       GOYES  RDST55      No...process next byte
967 F23C0 867         ?ST=0 ChrTrp     Is this special char trapping?
968 F23C3 42       GOYES  RDST50      No...store it
969 *
970 * Special character processing
971 *
972 F23C5 122         AR2EX           Save count in R2, get chars
973 F23C8 966         ?A#C   B           Is this the special character?
974 F23CB 61         GOYES  RDST45      No...restore A, R2; continue
975 F23CD 814         ASRC           Yes...see what to do
976 F23D0 814         ASRC
977 F23D3 AE6       C=A   B           Copy the replace char/delete flag
978 F23D6 810         ASLC
979 F23D9 810         ASLC
980 F23DC 96E         ?C#O   B           Test char to set carry if replace
981 F23DF 20       GOYES  RDST45      Carry SET to replace,CLEAR to delete
982 F23E1 122   RDST45  AR2EX           Restore A, R2
983 F23E4 521         GONC  RDST52      This was delete...ignore it
984 F23E7 874   RDST50  ?ST=1 Memerr     Has stack collision occurred?
985 F23EA 21       GOYES  RDST55      Yes...do next char

```

```

986 F23EC CD          B=B-1 A          No...check if room for this char
987 F23EE 451        GOC   RDST60      No room...set memerr
988 F23F1 1C1        D1=D1- 2         Room...decrement stack pointer
989 F23F4 14D        DAT1=C B         Write out the character
990 F23F7 BF6  RDST52 CSR   W          Shift to the next character, if any
991 F23FA F6         CSR   A
992 F23FC 0D  RDST55 P=P-1
993 F23FE 5AB        GONC  RDST40      See if any characters left
994 F2401 49A        GOC   RDST35      Yes...process next char
995                *_
996                *_
997 F2404 854  RDST60 ST=1  Memerr
998 F2407 44F        GOC   RDST55      Go always
999                *_
1000               *_
1001 F240A          RDST65
1002                *
1003                * GETX returned in an error condition:
1004                * If an ETO was received and flag -23 is clear, send SDA again
1005                * If an ETO was received and flag -23 is set, finished
1006                * If matched terminating character, finished
1007                *
1008 F240A 890        ?P=   =eABORT      Is this an abort?
1009 F240D 62         GOYES RDST80      Yes...exit immediately
1010 F240F 8E00       GOSUBL =FRAME-     No...check the frame
1011                00
1011 F2415 880        ?P#   =pEOT        Is this an EOT?
1012 F2418 B0         GOYES RDST70      No...check more
1013                *
1014                * EOT received: check if flag -23 is set (to terminate on EOT).
1015                * If it is not set, send an SDA to continue the conversation.
1016                *
1017 F241A 94C        ?A#0  S           Is flag -23 set?
1018 F241D 01         GOYES RDST75      Yes...exit
1019 F241F 6A7F  RDS30. GOTO  RDST30      No...send SDA again
1020                *_
1021                *_
1022 F2423 880  RDST70 ?P#   =pTERM      Is it terminator character match?
1023 F2426 71         GOYES RDST85      No...unexpected frame
1024                *
1025                * Terminating char was detected.
1026                * If we are in byte count mode, just keep reading until the
1027                * byte count reaches zero.
1028                *
1029 F2428 875        ?ST=1 BytCnt     Is this a read by byte count?
1030 F242B 4F         GOYES RDS30.      Yes...keep reading
1031 F242D 20  RDST75 P=    0          No...set P=0, exit
1032 F242F 6330       GOTO  RDST90
1033                *_
1034                *_
1035 F2433 D3  RDST80 D=0   A          Don't send UNT
1036 F2435 7180       GOSUB CLMDUT      Try to clean up the mailbox
1037 F2439 20         P=    =eABORT     (Ignore any error from CLMDUT)
1038 F243B 02         RTNSC
1039                *_

```



```

1080          STITLE Utility routines
1081          *****
1082          *****
1083          **
1084          ** Name:          A=SLEN - Set A[A] to the string length
1085          **
1086          ** Category:    LOCAL
1087          **
1088          ** Purpose:
1089          **           Read the string length from S-R1-1 into A[A]
1090          **
1091          ** Entry:
1092          **           None
1093          **
1094          ** Exit:
1095          **           A[A] is string length (a[4]=0)
1096          **
1097          ** Calls:       None
1098          **
1099          ** Uses.....
1100          ** Inclusive:  A[A]
1101          **
1102          ** Stk lvls:   1 (internal push)
1103          **
1104          ** History:
1105          **
1106          **           Date          Programmer          Modification
1107          **           -----          -
1108          **           01/12/84      NZ              Wrote routine
1109          **
1110          *****
1111          *****
1112 F2492 06  A=SLEN  RSTK=C          Save C[A] on RSTK
1113 F2494 137          CD1EX          Save D1 in C[A]
1114 F2497 1F00      D1=(5) =S-R1-1
1115          000
1115 F249E D0          A=0   A          Clear A[4]
1116 F24A0 15B3      A=DAT1 4      Read string length
1117 F24A4 137          CD1EX          Restore D1
1118 F24A7 07          C=RSTK        Restore C[A]
1119 F24A9 01          RTN          Return (carry unchanged)
1120          *-
1121          *-
1122 F24AB 0          CON(1) =FIXSPC      15 nibbles available here
1123 F24AC          BSS 15-1
1124          *****
1125          *****
1126          **
1127          ** Name:          CLMDUT - Clear terminator modes, send UNT
1128          ** Name:          CLMODE - Clear terminator modes
1129          **
1130          ** Category:    LOCAL
1131          **
1132          ** Purpose:
1133          **           Clean up any special terminator modes set up by ENTER,
  
```

```

1134      **      set up default modes:
1135      **      Controller: No terminator modes enabled
1136      **      Device: Terminate on <Lf> or END frame
1137      **
1138      ** Entry:
1139      **      DO points to the mailbox
1140      **      Bit 2 (=Device) of LOOPST indicates whether device or
1141      **      controller
1142      **
1143      ** Exit:
1144      **      Carry clear:
1145      **      P=0
1146      **      Carry set:
1147      **      Error (P, C[0] are the error code)
1148      **
1149      ** Calls:      GETDev,UNT,PUTC
1150      **
1151      ** Uses.....
1152      ** Inclusive: C[W],P,ST[3:0]
1153      **
1154      ** Stk lvls:   1 (GETDev:-1 level saved in C[R])(UNT)(PUTC)
1155      **
1156      ** History:
1157      **
1158      **      Date      Programmer      Modification
1159      **      -----      -
1160      **      12/19/83      NZ      Added documentation
1161      **      04/01/82      SC      Wrote routine
1162      **
1163      ** *****
1164      ** *****
1165 F24BA 07 CLMDUT C=RSTK      Save 1 RSTK level used by GETDev
1166 F24BC 7934      GOSUB getdev      Check if we are in device mode
1167 F24C0 06      RSTK=C      Restore the RSTK level
1168 F24C2 4A3      GOC TER/LF      If in device mode, set frame count=0
1169      *
1170      * Controller
1171      *
1172 F24C5 96B      ?D=0 B      Is the device LOOP?
1173 F24C8 60      GOYES CLMODE      Yes...don't send an UNT
1174 F24CA 7810      GOSUB UNT      No...send an UNT
1175 F24CE 20 =CLMODE P= 0
1176 F24D0 3300      LC(4) =MSETTM      Clear terminate on character match
1177      00
1177 F24D6 7600      GOSUB putc
1178 F24DA 3300      LC(4) (=MSETTM)+8      Clear terminate on END frame
1179      00
1179 F24E0 8C00 putc      GOLONG =PUTC
1180      00
1180      *-
1181      *-
1182 F24E6 20 =UNT P= 0      Send the UNT frame
1183 F24E8 3300      LC(4) =mUNT
1184      00
1184 F24EE 61FF      GOTO putc
  
```

```

1185      *-
1186      *-
1187      *
1188      * C[A] is the frame count
1189      *
1190 F24F2 25  putefc P= 5
1191 F24F4 300 LC(1) =mSFC@5      Load "SET FRAME COUNT" opcode
1192 F24F7 8C00 pute      GOLONG =PUTE
         00

1193      ****
1194      ****
1195      **
1196      ** Name:      TER/LF - Set up to terminate conversation on <Lf>
1197      ** Name:      SETTRM - Set up to terminate on character in A[B]
1198      **
1199      ** Category:    LOCAL
1200      **
1201      ** Purpose:
1202      **      Enable terminate on character match mode, with the
1203      **      character to match set to <Lf>
1204      **
1205      ** Entry:
1206      **      DO points to the mailbox
1207      **      SETTRM only: A[B] is the terminating character
1208      **
1209      ** Exit:
1210      **      Carry clear:
1211      **      P=0, frame count is zero, terminate on <Lf>
1212      **      Carry set:
1213      **      P, C[0] are the error code
1214      **
1215      ** Calls:      PUTEFC,PUTC
1216      **
1217      ** Uses:
1218      **      Inclusive: A[A],C[A],P,ST[3:0] (A[A] only for TER/LF)
1219      **
1220      ** Stk lvls: 1 (PUTEFC)(PUTC)
1221      **
1222      ** History:
1223      **
1224      **      Date      Programmer      Modification
1225      **      -----      -----      -----
1226      **      12/19/83      NZ      Updated documentation
1227      **                    SC      Wrote routine
1228      **
1229      ****
1230      ****
1231 F24FD D2 =TER/LF C=0    A      Set frame count to zero
1232 F24FF 7FEF      GOSUB    putefc
1233 F2503 400      RTNC
1234 F2506 31A0      LCHEX    OA      Set up for <Lf> terminator
1235 F250A DA      A=C      A
1236 F250C 3300 SETTRM LC(4) (=mSETTM)+1    Enable terminator character match
         00
1237 F2512 7ACF      GOSUB    putc
  
```

1238 F2516 400
1239 F2519 3300
00
1240 F251F RE6
1241 F2522 6DBF

RTNC
LC(4) =HSETTC
C=R B
GOTO putc

Set terminator character to A[B]

```

1242                    STITLE Check # bytes mem available
1243                    *****
1244                    *****
1245                    **
1246                    ** Name:            CHKSTK - Check how many bytes available on stack
1247                    **
1248                    ** Category:    LOCAL
1249                    **
1250                    ** Purpose:
1251                    **        Check if the math stack has at least 16 bytes available
1252                    **        and return the actual number of bytes available
1253                    **
1254                    ** Entry:
1255                    **        D1 points to the top of the math stack
1256                    **        S6 (Trash)=0: Do the computation
1257                    **        S6 (Trash)=1: Don't bother with computation...don't care
1258                    **
1259                    ** Exit:
1260                    **        Carry clear:
1261                    **            OK (enough room for at least 16 bytes)
1262                    **            R1[A] is number of bytes past 16 that are available
1263                    **            S4 (Memerr)=0
1264                    **        Carry set:
1265                    **            S4 (Memerr)=1
1266                    **
1267                    ** Calls:        D1=AVS
1268                    **
1269                    ** Uses:
1270                    **        Inclusive: R[W],C[W],R1[A],ST[4]
1271                    **
1272                    ** Stk Lvl:    1 (D1=AVS)
1273                    **
1274                    ** History:
1275                    **
1276                    **        Date            Programmer                    Modification
1277                    **        -----            -----                    -----
1278                    **        12/19/83            NZ                    Updated documentation
1279                    **                            SC                    Wrote routine
1280                    **
1281                    *****
1282                    *****
1283 F2526 854    CHKSTK   ST=1   Memerr        Assume there is no room left
1284 F2529 876                ?ST=1   Trash        Check memory available?
1285 F252C 03                GOYES   CKST10        No...don't care (exit)
1286 F252E 1CF                D1=D1- 16        Yes...compute available memory,
1287 F2531 1CF                D1=D1- 16                    leaving a 16 byte leeway
1288 F2534 AF2                C=0     W                    (Clear nibble 5 for CSR)
1289 F2537 137                CD1EX                    Get stack pointer into C[A]
1290 F253A 8E00                GOSUBL =D1=AVS
                  00
1291 F2540 143                A=DAT1 A                    Read RVMEMS into A[A]
1292 F2543 135                D1=C                    Restore D1 (-32)
1293 F2546 17F                D1=D1+ 16
1294 F2549 17F                D1=D1+ 16                    Now D1 is restored to entry cond'n
1295 F254C E2                C=C-A    A                    Compute available memory size
  
```

1296	F254E	400		RTNC		(If carry, less than 16 bytes)
1297	F2551	81E		CSRB		Convert count to bytes
1298	F2554	111		A=R1		Preserve upper nibbles of R1
1299	F2557	DA		A=C	A	
1300	F2559	101		R1=A		Write the count to R1[A]
1301	F255C	844	CKST10	ST=0	Memerr	If here, no error
1302	F255F	03		RTNCC		

```
1303          STITLE ENTER USING execution
1304          *****
1305          * List of external calls and modules:
1306          *
1307          *   AVE=D1  n/f           Set AvMemEnd = D1.
1308          *
1309          *   COUNTC MB&USG        Count #symbols in C(A),
1310          *                          for #input chars.
1311          *
1312          *   DCRMNT MB&USG        Decrement symbol multiplier
1313          *                          (e.g., "5D")
1314          *
1315          *   ENDIMG  MB&USG        Reached end of IMAGE string:
1316          *                          test for more input fields.
1317          *
1318          *   NXTEXP  MB&USG        Fetch next expression. Stores
1319          *                          some registers first, then
1320          *                          calls EXPEXC.
1321          *
1322          *   RCVOFS  MB&USG        Recover offset: read offset
1323          *                          from RAM, compute original
1324          *                          address.
1325          *
1326          *   TstEnd  MB&USG        Test input list for EOL, @ or "!".
1327          *
1328          *   USloop  MB&USG        Computes address for looping back
1329          *                          to multiplier (e.g., "5D").
1330          *
1331          *****
```



```

1332          EJECT
1333          *****
1334          *
1335          * Status bits:
1336          *
1337          sCOUNT EQU   BytCnt      For ENTSTR: "Count input chars"
1338          sTRASH  EQU   Trash       For ENTSTR: "Read but trash chars"
1339          sIGNOR  EQU   ChrTrp      For ENTSTR: "Ignore special char"
1340          *
1341          *****
1342          *****
1343          *
1344          *
1345          *--- Image tokens for building expanded IMAGE.
1346          ** 1) Tokens not identifying the end of a numeric field.
1347          ** 1a) Tokens not used in backwards search.
1348          * uSTRPT      String pointer
1349          * uMULT       |D| Multiplier
1350          * uLOOPB      Loop on byte
1351          * uLOOPS      Loop on string (12 nibs)
1352          * uIMXCH      Strange execution character.
1353          *
1354          ** 1b) Tokens used in backwards search.
1355          * uOPNNM      Open loop without multiplier
1356          * uJMP{ }     Jump over parenthesis loop pointer (9 nibs)
1357          * uJMPst      Jump over string pointer (14 nibs)
1358          * uJMPdl      Jump over unfilled delimiter (8nibs)
1359          * uIMbck      Poll for backward search handler
1360          * uIMsta      IMAGE string start (|Dx|-see IMentr)
1361          * uOPNM-      Open loop with mult, decremented
1362          * uOPNWM      |EO| Open loop with multiplier (ends in O!)
1363          *
1364          *+++++
1365          *+ EndNum      Any value >= this identifies the +
1366          *+ end of a numeric field (used +
1367          *+ in execution). +
1368          *+++++
1369          *
1370          ** 2) Tokens identifying the end of a numeric field.
1371          ** 2a) Tokens not used in backwards search.
1372          * uCPLXC      Complex field closed
1373          * uLOOPP      Loop on parentheses (variable #bytes)
1374          * uIMend      |FO| IMAGE string end
1375          *
1376          ** 2b) Tokens used in backwards search.
1377          * uRESTP      Restart parse
1378          * uDELIM      Delimiter
1379          ** Tokens delimiting an output/input field.
1380          * uHKB^      H,K,B or ^ field
1381          * uALit      "A" literal field
1382          * uNUMNn      |F8| Numeric, no float chars, no sign*
1383          * uNUMNs      |F9| Numeric, no float chars, u/sign*
1384          * uNUMFn      |FA| Numeric, u/float chars, no sign*
1385          * uNUMFs      |FB| Numeric, u/float chars, u/sign*
1386          * uNUMEn      |FC| Numeric; u/Exponent, no sign*
  
```

```
1387 * uNUMEs |FD| Numeric, u/Exponent, u/sign*
1388 *
1389 * *Note: these numeric delimiters have values that
1390 * determine the status bit setting in USING execute.
1391 *
1392 *****
1393 *****
1394 *
1395 * Register usage:
1396 * The following registers are used in the ENTER USING
1397 * execution routines, and must be saved during calls to
1398 * external routines, such as ENTSTR, STOSUB, EXPEXC
1399 * and SKP-LF:
1400 * RO[A] = address of execution symbol
1401 * R3[A] = program counter
1402 * S8, S9, S10, S11
1403 *
1404 *****
```

```

1405                EJECT
1406                *****
1407                *****
1408                **
1409                ** Name:      ENTUSG - Execute the ENTER USING statement
1410                **
1411                ** Category:  STExec
1412                **
1413                ** Purpose:
1414                **      Execute ENTER USING statement.
1415                **
1416                ** Entry:
1417                **      This is a poll handler in response to the pIMXQT poll.
1418                **      The only necessary conditions are:
1419                **      RO[9-5]= address to begin execution of IMAGE tokens
1420                **      RAM set up at AvMemEnd as specified in MB&USG.
1421                **
1422                ** Exit:
1423                **      Through ENDING in mainframe (does NOT return from POLL)
1424                **
1425                ** Calls:      DO=PCa, CSRC5, AS=FTY, MEMBER, FINDA, <ENUFND>,
1426                **      <CHRCNT>, <ENT"X">, <ENTstr>, <ENTmt>, <ENTlpb>,
1427                **      <ENT"C">, <ENT"P">, <ENT"H">, <ENT"K">, <ENTlps>,
1428                **      <ENTlpp>, <ENTrst>, <ENDend>, <ENTdln>, <END"B">,
1429                **      <ENT"/">, <ENT"R">, <IMerr>
1430                **
1431                ** Uses:      A-D, RO-R4, DO, D1, STMTDx, FUNCxx, ST[11:0], all
1432                **      RAM that EXPEXC is permitted to use
1433                **
1434                ** Stk lvls:   5 (<ENUFND>)
1435                **
1436                ** NOTE:
1437                **      ENTUSG is the driving routine to execute the IMAGE
1438                **      tokens.  Each token has its own execution routine.
1439                **
1440                ** Detail:
1441                **      Call MEMBER and FINDA to execute each token.
1442                **
1443                ** History:
1444                **
1445                **      Date          Programmer          Modification
1446                **      -----          -
1447                **      01/10/84      NZ              Updated documentation
1448                **      01/06/83      MB              Wrote routines.
1449                **
1450                *****
1451                *****
1452 F2561 8F00 =ENTUSG GOSBVL =DO=PCa
1453                000
1453 F2568 161          DO=DO+ 2          Step over the line length
1454 F256B AFA          A=C      W          Set A[15:6]=C[15:6] for test
1455 F256E 3500        LC(6) =tENTER
1456                0000
1456 F2576 15A5        A=DATO 6          Read current instruction
1457 F257A 972        ?A=C      W          Is this ENTER USING?
    
```

1458	F257D	40		GOYES	ENTU00		Yes...process it
1459	F257F	00			RTNSXM		No...return carry clear, XM=1
1460			*-				
1461			*-				
1462	F2581	118		ENTU00	C=R0		R0[9-5]=execute address.
1463	F2584	8E00			GOSUBL =CSRC5		Execute address to C[A].
		00					
1464	F258A	135			D1=C		To D1.
1465	F258D	171			D1=D1+ 2		Undo next D1=D1-2.
1466	F2590	738C		ENTU05	GOSUB	AS=FTY	Zero input flag
1467			*				
1468	F2594	D1		ENTU07	B=0	A	B[A]= counter for input chars.
1469	F2596	1C1		ENTU09	D1=D1- 2		Execute next token.
1470	F2599	14B			A=DAT1	B	
1471			*				
1472	F259C	3100			LC(2) =uHKB^		Check if end of field.
1473	F25A0	9E2			?A<C	B	End field token match?
1474	F25A3	60		GOYES	ENTU20		No...check tokens.
1475	F25A5	68B0		GOTO	ENUFLD		Yes...match end field.
1476			*-				
1477			*-				
1478	F25A9			ENTU20			
1479			*				
1480			*	LCASC	\.MS*AZDE\		Following 9 lines do this.
1481			*				
1482	F25A9	3F		NIBHEX	3F		Next 8 tokens count input chars.
1483	F25AB	54		CON(2)	\E\		Input 5 chars (exponent).
1484	F25AD	44		CON(2)	\D\		Input digit
1485	F25AF	A5		CON(2)	\Z\		Input digit
1486	F25B1	14		CON(2)	\A\		Input ASCII char.
1487	F25B3	A2		CON(2)	*\		Input digit
1488	F25B5	35		CON(2)	\S\		Input digit
1489	F25B7	D4		CON(2)	\M\		Input digit
1490	F25B9	E2		CON(2)	\.\		Input digit or "."
1491			*				
1492	F25BB	2F		P=	15		
1493	F25BD	8F00		GOSBVL	=MEMBER		Check if token in A[B] matches
		000					
1494	F25C4	460		GDC	ENTU30		No...check for other tokens.
1495	F25C7	6B31		GOTO	CHRCNT		Yes...take care of count.
1496			*-				
1497			*-				
1498	F25CB	8F00		ENTU30	GOSBVL =FINDA		Execute next token.
		000					
1499			*				
1500	F25D2	85		CON(2)	\X\		Skip input char.
1501	F25D4	891		REL(3)	ENT"X"		
1502			*				
1503	F25D7	00		CON(2)	=uSTRPT		Pointer to imbedded literal.
1504	F25D9	681		REL(3)	ENTstr		(Skip chars)
1505			*				
1506	F25DC	00		CON(2)	=uMULT		Multiplier.
1507	F25DE	2A1		REL(3)	ENTnlt		
1508			*				
1509	F25E1	00		CON(2)	=uLOOPB		Loop on byte.

1510	F25E3 7A1	REL(3) ENTlpb	
1511	*		
1512	F25E6 34	CON(2) \C\	Input char or ignore ",".
1513	F25E8 F31	REL(3) ENT"C"	
1514	*		
1515	F25EB 05	CON(2) \P\	Input char or ignore ".".
1516	F25ED C31	REL(3) ENT"P"	
1517	*		
1518	F25F0 84	CON(2) \H\	Input compact form (European).
1519	F25F2 FE1	REL(3) ENT"H"	
1520	*		
1521	F25F5 B4	CON(2) \K\	Input compact form.
1522	F25F7 CF1	REL(3) ENT"K"	
1523	*		
1524	F25FA 00	CON(2) =uLOOPS	Loop on string.
1525	F25FC 091	REL(3) ENTlps	
1526	*		
1527	F25FF 00	CON(2) =uLOOPP	Loop on parentheses.
1528	F2601 D81	REL(3) ENTlpp	
1529	*		
1530	F2604 00	CON(2) =uRESTP	Restart parse.
1531	F2606 491	REL(3) ENTrst	
1532	*		
1533	F2609 00	CON(2) =uIMend	IMAGE end.
1534	F260B 0E0	REL(3) ENTend	
1535	*		
1536	F260E 00	CON(2) =uDELIM	Unfilled delimiter.
1537	F2610 640	REL(3) ENTdlm	
1538	*		
1539	F2613 24	CON(2) \B\	Input byte form.
1540	F2615 3A1	REL(3) ENT"B"	
1541	*		
1542	F2618 F2	CON(2) \/\	Read record to EOL.
1543	F261A B81	REL(3) ENT"/"	
1544	*		
1545	F261D 25	CON(2) \R\	Digit or convert "," to "."
1546	F261F E01	REL(3) ENT"R"	
1547	*		
1548	F2622 E5	CON(2) \^\	Skip over one variable
1549	F2624 C6F	REL(3) ENTU05	
1550	*		
1551	F2627 00	CON(2) =uCPLXC	Complex execute
1552	F2629 800	REL(3) =CPLXER	(Error exit)
1553	*		
1554	*	These IMAGE symbols are skipped for input:	
1555	*		
1556	*	@	(Form Feed)
1557	*	uIMXCH	(Unrecognized IMAGE char)
1558	*		
1559	F262C 00	CON(2) 0	Others skip to next token.
1560	F262E 5B2	GONC ENTa09	Go always.
1561	*-		
1562	*-		
1563	F2631 8D00	CPLXER GOVLNG =IMerr	
	000		

```

1564 *****
1565 *****
1566 **
1567 ** Name:          STRPcr - Strip trailing <Cr>, if any
1568 **
1569 ** Category:     LOCAL
1570 **
1571 ** Purpose:
1572 **       Remove the last character from the string if it is a <Cr>
1573 **
1574 ** Entry:
1575 **       P=0
1576 **       D1 points to the top of the stack (lowest address)
1577 **
1578 ** Exit:
1579 **       D1 adjusted if last character was a <Cr>
1580 **       Carry set if no <Cr>, carry clear if removed <Cr>
1581 **
1582 ** Calls:        None
1583 **
1584 ** Uses.....
1585 ** Inclusive:   A[B],C[B],D1
1586 **
1587 ** Stk lvls:    0
1588 **
1589 ** History:
1590 **
1591 **       Date      Programmer      Modification
1592 **       -----      -
1593 **       12/02/83      NZ          Added documentation
1594 **       04/01/82      SC          Wrote routine
1595 **
1596 *****
1597 *****
1598 F2638 31D0 STRPcr  LCHEx  OD          See if the last char is a <Cr>
1599 F263C 14B          A=DAT1 B
1600 F263F 966          ?A#C  B          Is it a <Cr>?
1601 F2642 00          RTNYES          No...return
1602 F2644 171          D1=D1+ 2        Yes...strip it
1603 F2647 03          RTNCC
1604          *~
1605          *~
1606 F2649 8D00 strhed  GOVLNG =STRHED
          000
1607          *~
1608          *~
1609 F2650 8C00 D1nstk  GOLONG =D1@RVE
          00
  
```

```

1610                    EJECT
1611                    *****
1612                    *****
1613                    **
1614                    ** Name:        ENUFLD - Clean up old field, set up new field
1615                    ** Name:        ENTdlm - Clean up old field (reached delimiter)
1616                    **
1617                    ** Category:    LOCAL
1618                    **
1619                    ** Purpose:
1620                    **        "A new ENTER field has been encountered in the IMAGE"
1621                    **        Clean up the old one and prepare for the new.
1622                    **
1623                    ** Entry:
1624                    **        P=0
1625                    **        D1 is the current execute pointer
1626                    **        B[A] is number of input characters (in DECIMAL)
1627                    **        STMTD1 contains current stack pointer
1628                    **        The 7 nibble device specifier is on the bottom of MTHSTK
1629                    **
1630                    ** Exit:
1631                    **        P=0
1632                    **        D1 is the execute pointer for next item
1633                    **        STMTD1 contains current stack pointer
1634                    **        Device specifier unchanged on MTHSTK
1635                    **
1636                    ** Calls:
1637                    **        ENTdlm:    STORFL
1638                    **        ENUFLD:    STORFL,AS=FTY,IstEnd,Mflg=0,NXTEXP,NXTDS-,SAVED1,
1639                    **                    RCVDFS,SKP-LF,<ENTU07>,<RTNCHK>
1640                    **
1641                    ** Uses:        A,B,C,D,RO-R4,DO,D1,P,ST[11:0],STMTxx,FUNCxx,
1642                    **                    All RAM EXPEXC is permitted to use
1643                    **
1644                    ** Stk lvls:    7 (STORFL)
1645                    **
1646                    ** Algorithm:
1647                    **        Clean up old field:
1648                    **            Read in pending chars and store in dest (STORFL)
1649                    **            If unfilled delimiter (ENTdlm), then back to ENTUSG.
1650                    **            Else (ENUFLD) a new input field is required;
1651                    **            Prepare for new field:
1652                    **            Save status bits in RAM.
1653                    **            Save offset to IMAGE execution in RAM.
1654                    **            Check if any more input items:
1655                    **            If not, then exit to NXTSTM.
1656                    **            Call EXPEXC. (and DEST via NXTVA-)
1657                    **            Restore status bits.
1658                    **            Recover offset to IMAGE execution address.
1659                    **            Back to ENTUSG.
1660                    **
1661                    ** History:
1662                    **
1663                    **        Date        Programmer                    Modification
1664                    **        -----        -----                    -----

```

```

1665      ** 01/11/84      NZ      Updated documentation
1666      ** 01/06/83      MB      Wrote routines.
1667      **
1668      *****
1669      *****
1670 F2656      ENTdlm      New delimiter, but no enter field.
1671 F2656 76E1      GOSUB  STORFL  Input pending chars, store in dest.
1672 F265A 6B3F      ENTa09  GOTO   ENTU09  Next execution symbol.
1673      *_-
1674      *_-
1675 F265E      ENUFLD      New enter field.
1676 F265E 7ED1      GOSUB  STORFL  Store previous field.
1677      *
1678      * Save the IMAGE type to CHN#SV (type is in C[S] now)
1679      * 3 - H or K IMAGE
1680      * 2 - String IMAGE
1681      * 1 - Numeric IMAGE
1682      *
1683 F2662 71BB      GOSUB  AS=FTY  Position DO to CHN#SV
1684 F2666 14B      A=DAT1 B
1685 F2669 3100     LC(2) =uHKB^
1686 F266D B46      C=C+1 S      C[S] = 1
1687      *
1688 F2670 962      ?A=C B      H or K IMAGE? (C[B] = uHKB^)
1689 F2673 31      GOYES HorK  Yes...set type = 3
1690 F2675 E6      C=C+1 A      (C[B] = uALit)
1691 F2677 962      ?A=C B      String IMAGE?
1692 F267A F0      GOYES StrImg Yes...set type = 2
1693 F267C 5F0      GONC  NumImg Go always...set type = 1
1694      *_-
1695      *_-
1696 F267F 8D00  Tstend  GOVLNG =TstEnd
      000
1697      *_-
1698      *_-
1699 F2686 B46      HorK  C=C+1 S
1700 F2689 B46      StrImg C=C+1 S
1701 F268C 1544  NumImg DATO=C S      Save the IMAGE type in CHN#SV
1702      *
1703 F2690 7BEF      GOSUB  Tstend  Test for end of ENTER stmt.
1704 F2694 564      GONC  EndENT  Yes, end of ENTER stmt.
1705 F2697 133      AD1EX      Save D1 in A[A] (stack pointer).
1706 F269A 713C      GOSUB  Mflg=0  Clear multi-UDF flag, set TRACE ptr.
1707 F269E 131      D1=A      Restore D1 from A[A].
1708 F26A1 8F00  GOSBVL =NXTEXP  Get next expression.
      000
1709      *
1710 F26A8 7C9B      GOSUB  NXTDS-  Set up next destination variable.
1711      *
1712      * Get saved PC back from STMTDO and save AVMEME in STMTDO
1713      *
1714 F26AC 1B00      DO=(5) =STMTDO
      000
1715 F26B3 142      A=DATO A      A[A] = saved PC
1716 F26B6 103      R3=A      Save PC in R3
  
```



```
1717 F26B9 144      DATO=C A          C[A] = AVMEME from NXTDS-
1718                *
1719 F26BC 8E00      GOSUBL =SAVED1    Save stack pointer in STMTD1
                00
1720                *
1721 F26C2 174      D1=D1+ 5          Set D1 to status storage.
1722 F26C5 147      C=DAT1 A          Read status bits.
1723 F26C8 0A       ST=C              Restore status bits.
1724 F26CA 8F00      GOSBVL =RCVOFS    Recover offset to xqt address.
                000
1725 F26D1 135      D1=C              Position D1 to xqt address.
1726 F26D4 1C7      D1=D1- 8          Skip (unused) field digit counters.
1727 F26D7 6CBE     GOTO ENTUO7       Next execution symbol.
1728                *
1729                *
1730 F26DB          EndENT           End ENTER statement.
1731                *
1732                * The following test must be such that the jump to "exit" has
1733                * carry CLEAR, as RTNCHK checks carry to see if an error has
1734                * occurred.
1735                *
1736 F26DB 966      ?A#C B           Is it an 'W'?
1737 F26DE 50      GOYES getEOL      No...just read and skip to EOL
1738 F26E0 560      GONC  exit        Go always...just exit
1739                *
1740                *
1741 F26E3 76FB getEOL GOSUB SKP-LF      Skip characters to EOL.
1742 F26E7 6098 exit  GOTO RTNCHK      To next statement.
```



```
1798 *****
1799 F26EB ENTend End of IMAGE string.
1800 F26EB 7151 GOSUB STORFL Read pending chars, store in dest.
1801 F26EF 7C8F GOSUB Tstend Test end of ENTER stnt.
1802 F26F3 57E GONC EndENT Yes, end of stnt.
1803 F26F6 8F00 GOSBVL =ENDING Test valid flds, D1=start of IMAGE.
      000
1804 F26FD 135 D1=C
1805 F2700 560 GONC ENTb09 Go always...recycle IMAGE string.
```

```
1806          EJECT
1807          *****
1808          *****
1809          **
1810          ** Name:          CHRCNT - Count the number of chars to be input
1811          **
1812          ** Category:     LOCAL
1813          **
1814          ** Purpose:
1815          **          Count the number of chars to be input from loop.
1816          **
1817          ** Entry:
1818          **          P=0
1819          **          D1 is the current execute pointer
1820          **          B[A] is number of input characters (in DECIMAL)
1821          **          STMTD1 contains current stack pointer
1822          **          The 7 nibble device specifier is on the bottom of MTHSTK
1823          **
1824          ** Exit:
1825          **          P=0
1826          **          B[A] is the resultant count
1827          **          D1 is the execute pointer for next item
1828          **          STMTD1 contains current stack pointer
1829          **          Device specifier unchanged on MTHSTK
1830          **
1831          ** Calls:         COUNT
1832          **
1833          ** Uses:
1834          **          Inclusive: A[A],B[A],C[A],D[A],P,D1
1835          **
1836          ** Stk lvls:     3 (COUNT)
1837          **
1838          ** Note:
1839          **          The E symbol generates a tokenized field
1840          **          which looks like this: "ESZZZ". So it will
1841          **          always generate 5 digit counts.
1842          **
1843          ** Algorithm:
1844          **          Call COUNTC, which does:
1845          **          If accompanying multiplier (CNTMLT),
1846          **          then set C[A]= multiplier, restore counter.
1847          **          ELSE, set C[A]= 00001.
1848          **          Add C to B (Dec mode).
1849          **          If accompanying multiplier,
1850          **          then restore the count (at D1 + 4) to value
1851          **          Exit to ENTU09.
1852          **
1853          ** History:
1854          **
1855          **          Date          Programmer          Modification
1856          **          -----          -
1857          **          01/11/84          NZ              Updated documentation
1858          **          01/06/83          MB              Wrote routines.
1859          **
1860          *****
```

```
1861                    *****
1862 F2703 7400 CHRCNT GOSUB COUNT      Count multiplier, if there.
1863 F2707 6E8E ENTb09 GOTO ENTU09      Process next execution symbol.
1864                    *-
1865                    *-
1866 F270B 8F00 COUNT GOSBVL =COUNTC      Process the count
                  000
1867 F2712 04            SETHEX
1868 F2714 890           ?P= 0            Was a count specified?
1869 F2717 00            RTNYES          No...just return
1870 F2719 20            P= 0
1871 F271B 173           D1=D1+ 4
1872 F271E 15D3          DAT1=C 4            Restore the count field to initial.
1873 F2722 1C3           D1=D1- 4
1874 F2725 01            RTN
```

```

1875          EJECT
1876          *****
1877          *****
1878          **
1879          ** Name:      ENT"C" - Execute the "C" symbol
1880          ** Name:      ENT"P" - Execute the "P" symbol
1881          ** Name:      ENT"R" - Execute the "R" symbol
1882          **
1883          ** Category:   LOCAL
1884          **
1885          ** Purpose:
1886          **      Execute the "C", "P", and "R" symbols.
1887          **
1888          ** Entry:
1889          **      P=0
1890          **      D1 is the current execute pointer
1891          **      B[A] is number of input characters (in DECIMAL)
1892          **      STMTD1 contains current stack pointer
1893          **      The 7 nibble device specifier is on the bottom of MTHSTK
1894          **
1895          ** Exit:
1896          **      P=0
1897          **      D1 is the execute pointer for next item
1898          **      STMTD1 contains current stack pointer
1899          **      Device specifier unchanged on MTHSTK
1900          **      Exit to ENTU09.
1901          **
1902          ** Calls:      CSRC5,CNTSTR,CSLC5,ENTSTr
1903          **
1904          ** Uses.....
1905          **      Inclusive: A,B,C,D[15:13,5:0],R0-R2,D0,D1,P,ST[7:0],STMTD1
1906          **
1907          ** Stk lvls:   6 (CNTSTR)(ENTSTr)
1908          **
1909          ** Algorithm:
1910          **      For "C": load 002C (0 byte and ",") into C reg.
1911          **      For "P": load 002E (0 byte and ".") into C reg.
1912          **      For "R": load 2E2C (". " and ",") into C reg.
1913          **      Save in R1[15:12].
1914          **      Input all pending chars.
1915          **      Put R1[15:12] in B[3:0].
1916          **      Input one char, ignoring or replacing as specified.
1917          **      Exit to ENTUSG.
1918          **
1919          ** History:
1920          **      Date      Programmer      Modification
1921          **      -----      -
1922          **      01/11/84      NZ          Updated documentation
1923          **      01/06/83      MB          Wrote routines.
1924          **
1925          *****
1926          *****
1927 F2727 2C  ENT"C"  P=    12          Loads ", " into C[B], 00 in C[3:2].
1928 F2729 0D  ENT"P"  P=P-1          (For ENT"P", P is 0, gives P=14).
1929 F272B 0D          P=P-1          Loads ". " into C[B], 00 in C[3:2].
  
```

1930	F272D	39C2	ENT"R"	LCHEX	002C002E2C	C[B]= Character to ignore.
		E200				
		C200				
1931	F2739	8E00		GOSUBL	=CSRC5	
		00				
1932	F273F	109		R1=C		Store character info in R1[15:12].
1933	F2742	7151		GOSUB	CNTSTR	Input pending chars.
1934	F2746	119		C=R1		Char to ignore from R1[15:12]...
1935	F2749	8E00		GOSUBL	=CSLC5	
		00				
1936	F274F	D5		B=C	A	...to B[3:0].
1937	F2751	D0		A=0	A	
1938	F2753	E4		A=A+1	A	Input one char.
1939	F2755	857		ST=1	sIGNOR	"Ignore char."
1940	F2758	7B41		GOSUB	ENTSTr	Go read the character.
1941	F275C	5AA		GONC	ENTb09	Go always (next execution symbol).

```

1942          EJECT
1943          *****
1944          *****
1945          **
1946          ** Name:      ENTstr - Execute the uSTRPT token (string IMAGE)
1947          ** Name:      ENT"X" - Execute the "X" token (skip character)
1948          **
1949          ** Category:   LOCAL
1950          **
1951          ** Purpose:    ENTstr: Execute uSTRPT token.
1952          **              ENT"X": Execute "X" symbol.
1953          **
1954          ** Entry:
1955          **      P=0
1956          **      D1 is the current execute pointer
1957          **      B[A] is number of input characters (in DECIMAL)
1958          **      STMTD1 contains current stack pointer
1959          **      The 7 nibble device specifier is on the bottom of MTHSTK
1960          **
1961          ** Exit:
1962          **      P=0
1963          **      D1 is the execute pointer for next item
1964          **      STMTD1 contains current stack pointer
1965          **      Device specifier unchanged on MTHSTK
1966          **      Exits to ENTU09.
1967          **
1968          ** Calls:      CNTSTR,COUNT,CNTST1
1969          **
1970          ** Uses.....
1971          ** Inclusive:  A,B,C,D[15:13,5:0],R0-R2,D0,D1,P,STMTD1,ST[7:0]
1972          **
1973          ** Stk lvls:   6 (CNTSTR)(CNTST1)
1974          **
1975          ** Algorithm:
1976          **      ENTstr:  Input pending chars.
1977          **              Read in length of literal = #chars to trash
1978          **              Goto ENTX07.
1979          **      ENT"X":  Input pending chars.
1980          **              If accompanied by multiplier, read multiplier
1981          **                  into C[A]. Else, set C[A]=1.
1982          **      ENTX07 Read in specified #chars and trash.
1983          **              Exit to ENTU09.
1984          **
1985          ** History:
1986          **      Date      Programmer      Modification
1987          **      -----      -
1988          **      01/11/84      NZ          Updated documentation
1989          **      01/06/83      MB          Wrote routines.
1990          **      *****
1991          **      *****
1992          F275F  ENTstr      IMAGE Literal.
1993          F275F 7431      GOSUB CNTSTR      Input necessary chars.
1994          F2763 1C9      D1=D1- 10         To literal length.
1995          F2766 147      C=DAT1 A          Literal length= #chars to trash.
1996          F2769 5A0      GONC ENTX07      Go always...read and trash chars.
  
```


1997		*_				
1998		*_				
1999	F276C	7721	ENT"X"	GOSUB	CNTSTR	Input necessary chars.
2000	F2770	779F		GOSUB	COUNT	Count multiplier, if there.
2001	F2774	D5	ENTX07	B=C	A	Put count into B[A].
2002	F2776	856		ST=1	sTRASH	"Read but trash chars."
2003	F2779	7D11		GOSUB	CNTST1	Input chars.
2004	F277D	598	ENTc09	GONC	ENTb09	Go always...execute next symbol.

```

2005          EJECT
2006          *****
2007          *****
2008          **
2009          ** Name:          ENTMLT - Execute the uMULT token.
2010          **
2011          ** Category:     LOCAL
2012          **
2013          ** Purpose:
2014          **           Execute the uMULT token.
2015          **
2016          ** Entry:
2017          **           P=0
2018          **           D1 is the current execute pointer
2019          **           B[A] is number of input characters (in DECIMAL)
2020          **           STMTD1 contains current stack pointer
2021          **           The 7 nibble device specifier is on the bottom of MTHSTK
2022          **
2023          ** Exit:
2024          **           P=0
2025          **           D1 is the execute pointer for next item
2026          **           STMTD1 contains current stack pointer
2027          **           Device specifier unchanged on MTHSTK
2028          **
2029          ** Calls:         DCRMNT
2030          **
2031          ** Uses.....
2032          ** Inclusive: A[B],C[A],D1
2033          **
2034          ** Stk lvls:     1 (DCRMNT)
2035          **
2036          ** Algorithm:
2037          **           Move D1 to multiplier reserve, check if open
2038          **           parentheses loop (uOPNWM).
2039          **           If it is, change uOPNWM to uOPNM-.
2040          **           Move D1 to mulitplier counter, decrement.
2041          **           If no carry, exit to ENTUSG.
2042          **           If carry, restore counter to reserve value,
2043          **           set D1= value saved in D(A), exit to ENTUSG.
2044          **
2045          ** History:
2046          **           Date          Programmer          Modification
2047          **           -----          -
2048          **           01/11/84          NZ              Updated documentation.
2049          **           01/06/83          MB              Wrote routines.
2050          **
2051          *****
2052          *****
2053 F2780 8F00 ENTmlt GOSBVL =DCRMNT          Decrement multiplier.
           000
2054 F2787 55F          GONC  ENTc09          Go always...next execution symbol.
  
```

```

2055          EJECT
2056          *****
2057          *****
2058          **
2059          ** Name:      ENTlpb - Execute the uLOOPB token
2060          ** Name:      ENTlps - Execute the uLOOPS token
2061          ** Name:      ENTlpp - Execute the uLOOPP token
2062          **
2063          ** Category:  LOCAL
2064          **
2065          ** Purpose:
2066          **      Execute the three loop tokens.
2067          **
2068          ** Entry:
2069          **      P=0
2070          **      D1 is the current execute pointer
2071          **      B[A] is number of input characters (in DECIMAL)
2072          **      STMTD1 contains current stack pointer
2073          **      The 7 nibble device specifier is on the bottom of MTHSTK
2074          **
2075          ** Exit:
2076          **      P=0
2077          **      D1 is the execute pointer for next item
2078          **      STMTD1 contains current stack pointer
2079          **      Device specifier unchanged on MTHSTK
2080          **
2081          ** Calls:      USloop
2082          **
2083          ** Uses:.....
2084          **      Inclusive: A[S],C[A],D[A],D1,P
2085          **
2086          ** Stk lvls:   1 (USloop)
2087          **
2088          ** Algorithm:
2089          **      For uLOOPB: Set P=3
2090          **      For uLOOPS: Set P=15
2091          **      Move D1 back to multiplier counter (C+P+1)
2092          **      ENlop3 Save original D1 in D (execution address
2093          **              in case multiplier decrements past 0.)
2094          **      Jump to ENm105 to decremnt counter, etc.
2095          **              (exits to ENTUSG).
2096          **      For uLOOPP: Move D1 to offset for open paren.
2097          **              Recover offset (point to open paren).
2098          **              Goto ENlop3.
2099          **
2100          ** History:
2101          **      Date      Programmer      Modification
2102          **      -----      -
2103          **      01/06/83   M. Banwarth   Wrote routines.
2104          **
2105          *****
2106          *****
2107 F278A 24  ENTlpb  P=    4              (For P=3: back up D1 4 nibs)
2108 F278C 0D  ENTlps  P=P-1            (P=15: back up D1 16 nibs)
2109 F278E 8F00 ENTlpp  GOSBVL =USloop        Back up D1 to multiplier.
  
```

000
2110 F2795 20
2111 F2797 55E

P= 0
GONC ENTc09

Go always...next execution char.

```

2112          EJECT
2113          *****
2114          *****
2115          **
2116          ** Name:      ENTrst - Execute the uRESTP token
2117          **
2118          ** Category:   LOCAL
2119          **
2120          ** Purpose:
2121          **      Execute the uRESTP token.
2122          **
2123          ** Entry:
2124          **      P=0
2125          **      D1 is the current execute pointer
2126          **      B[A] is number of input characters (in DECIMAL)
2127          **      STMTD1 contains current stack pointer
2128          **      The 7 nibble device specifier is on the bottom of MTHSTK
2129          **
2130          ** Exit:
2131          **      P=0
2132          **      D1 is the execute pointer for next item
2133          **      STMTD1 contains current stack pointer
2134          **      Device specifier unchanged on MTHSTK
2135          **
2136          ** Uses.....
2137          **      Inclusive: A,B,C,D,R1,R2,R3[15:5],R4,D0,D1,P,RESREG,FUNCD1,
2138          **                  ST[11:8,6,5,3:0]
2139          **
2140          ** Stk lvls:   7 (STORFL)
2141          **
2142          ** Algorithm:
2143          **      Store D1 (address of uRESTP token) in R0(9-5)
2144          **      for use back in MB&USG module. Return from
2145          **      poll with carry cleared, XM=0.
2146          **
2147          ** History:
2148          **      Date      Programmer      Modification
2149          **      -----      -
2150          **      01/11/84      NZ          Updated documentation
2151          **      01/06/83      MB          Wrote routines.
2152          **
2153          *****
2154          *****
2155 F279A          ENTrst          Restart parse.
2156 F279A 72A0          GOSUB STORFL
2157 F279E 8D00          GOVLNG =USGrst          End poll handler.
000
  
```

```

2158          EJECT
2159          *****
2160          *****
2161          **
2162          ** Name:      ENT"/" - Execute the "/" token
2163          **
2164          ** Category:  LOCAL
2165          **
2166          ** Purpose:   Execute "/" symbol.
2167          **
2168          ** Entry:
2169          **     P=0
2170          **     D1 is the current execute pointer
2171          **     B[A] is number of input characters (in DECIMAL)
2172          **     STMTD1 contains current stack pointer
2173          **     The 7 nibble device specifier is on the bottom of MTHSTK
2174          **
2175          ** Exit:
2176          **     P=0
2177          **     STMTD1 contains current stack pointer
2178          **     Device specifier unchanged on MTHSTK
2179          **
2180          ** Calls:     STORFL,SKP-LF
2181          **
2182          ** Uses:.....
2183          ** Inclusive: A,B,C,D,R1,R2,R3[15:5],R4,D0,P,RESREG,FUNCD1,
2184          **              ST[11:0]
2185          **
2186          ** Stk lvls:  7 (STORFL)
2187          **
2188          ** Algorithm:
2189          **     Calls SKIP to skip to EOL of input record.
2190          **
2191          ** History:
2192          **     Date      Programmer      Modification
2193          **     -----      -
2194          **     01/11/84      NZ          Updated documentation
2195          **     01/06/83      MB          Wrote routines.
2196          **
2197          *****
2198          *****
2199 F27A5      ENT"/"          Skip to EOL.
2200 F27A5 7790      GOSUB STORFL          Store pending item.
2201 F27A9 703B      GOSUB SKP-LF         Skip to end of line.
2202 F27AD 560       GONC  ENT/03         Go if no error.
2203 F27B0 6A7B      GOTO  ENTRex        Error exit
2204          * _
2205          * _
2206 F27B4 6FDD ENT/03 GOTO  ENTU07      Next execution symbol.
  
```

```

2207          EJECT
2208          *****
2209          *****
2210          **
2211          ** Name:          ENT"B" - Execute the "B" token
2212          **
2213          ** Category:     LOCAL
2214          **
2215          ** Purpose:
2216          **     Execute the "B" symbol.
2217          **
2218          ** Entry:
2219          **     P=0
2220          **     D1 is the current execute pointer
2221          **     B[A] is number of input characters (in DECIMAL)
2222          **     STMTD1 contains current stack pointer
2223          **     The 7 nibble device specifier is on the bottom of MTHSTK
2224          **
2225          ** Exit:
2226          **     P=0
2227          **     D1 is the execute pointer for next item
2228          **     STMTD1 contains current stack pointer
2229          **     Device specifier unchanged on MTHSTK
2230          **
2231          ** Calls:         CNTSTR,STOBIN
2232          **
2233          ** Uses.....
2234          ** Inclusive:    A,B,C,D,RO[15:5],R1,R2,R3[15:5],R4,D0,D1,P,
2235          **                RESREG,STMTD1,ST[11:0]
2236          **
2237          ** Stk lvls:     6 (CNTSTR)(<STOBIN>)
2238          **
2239          ** Algorithm:
2240          **     Set B[A]=1 (counter for #chars to input)
2241          **     Read one char (CNTSTR)
2242          **     Exit to ENTU09.
2243          **
2244          ** History:
2245          **     Date      Programmer      Modification
2246          **     -----      -
2247          **     01/12/84    NZ          Updated documentation
2248          **     01/06/83    MB          Wrote routines.
2249          **
2250          *****
2251          *****
2252 F27B8      ENT"B"          B field in IMAGE.
2253 F27B8 E5          B=B+1  A          Input one char. (B[A]=0 already)
2254 F27BA 79D0        GOSUB  CNTSTR      Read the character.
2255 F27BE 146         C=DAT0 A          Read stack pointer (from STMTD1).
2256 F27C1 7400        GOSUB  STOBIN      Convert and store the binary number.
2257 F27C5 6ACD      ENTu05  GOTO  ENTU05  Next token.
2258          * _
2259          * _
2260 F27C9 135        STOBIN  D1=C          Set D1 to top of stack.
2261 F27CC D0          A=0    A
    
```

2262 F27CE 14B	A=DAT1 B	Read the character.
2263 F27D1 8F00 000	GOSBVL =HDFLT	Convert to floating number.
2264 F27D8 04	SETHX	
2265 F27DA 1CD	D1=D1- 14	
2266 F27DD 61B0	GOTO STODE1	Write value to stack, store it.


```
2322 *****
2323 *****
2324 F27E1 701A ENT"H" GOSUB CS=TYP      Check if the destination is string
2325 F27E5 33C2      LCASC \.,\      Set up to replace "," with "."
      E2
2326 F27EB D5        B=C      A
2327 F27ED 857      ST=1    sIGNOR
2328 F27F0 450      GOC      ENTFFM      Numeric destination...DO change ","
2329 *
2330 F27F3 847 ENT"K" ST=0    sIGNOR      Don't change commas to "."
2331 F27F6 1B00 ENTFFM DO=(5) =TERCHR      Read terminating char
      000
2332 F27FD 14A      A=DATO B      A[A] is the terminating character.
2333 F2800 845      ST=0    sCOUNT      Don't count chars.
2334 F2803 846      ST=0    sTRASH      Do keep chars.
2335 F2806 70A0     GOSUB ENTST2      Read the characters.
2336 F280A 146      C=DATO A      Recall stack pointer from STMTD1.
2337 F280D 135      D1=C
2338 F2810 855      ST=1    KorH      This is either "K" or "H".
2339 F2813 8EFC     GOSUBL ENT160      Do the assignment
      7F
2340 F2819 733E     GOSUB D1mstk      Set D1 to AVMEME.
2341 F281D 7E5E     GOSUB Tstend      Reached end of statement?
2342 F2821 460      GOC      H&Kcnt      No...set up for next item.
2343 F2824 62CE     GOTO    exit      Yes...exit from ENTER USING.
2344 *
2345 *
2346 F2828 1B00 H&Kcnt DO=(5) =STMTDO      Restore AVMEME to its old value
      000
2347 F282F 146      C=DATO A      (value was saved by STORFL)
2348 F2832 137      CD1EX
2349 F2835 7289     GOSUB aVE=D1
2350 *
2351 F2839 7290     GOSUB ENTST3      Restore D1 to execute address
2352 F283D 578      GONC    ENTu05      Go always (process next item).
```

```

2353          EJECT
2354          *****
2355          *****
2356          **
2357          ** Name:          STORFL - Read pending chars, store in destination
2358          **
2359          ** Category:     LOCAL
2360          **
2361          ** Purpose:
2362          **           Read pending input chars, store in dest.
2363          **
2364          ** Entry:
2365          **           P=0
2366          **           D1 is the current execute pointer
2367          **           B[A] is number of input characters (in DECIMAL)
2368          **           STMTD1 contains current stack pointer
2369          **           The 7 nibble device specifier is on the bottom of MTHSTK
2370          **
2371          ** Exit:
2372          **           P=0
2373          **           D1 is the execute pointer for next item
2374          **           STMTD1 contains current stack pointer
2375          **           Device specifier unchanged on MTHSTK
2376          **           B[A]=0
2377          **
2378          ** Calls:         CNTSTR,AS=FTY,CS=TYP,STRHED,GETNUM,POPSTK,D1@AVE,
2379          **                 <STOSUB>
2380          **
2381          ** Uses.....
2382          ** Inclusive:  A,B,C<D,R0,R1,R2,R3[15:5],R4,D0,D1,P,ST[11:0],
2383          **                 FUNC01,RESREG
2384          **
2385          ** Stk lvls:     6 (CNTSTR)(<STOSUB>)
2386          **
2387          ** Algorithm:
2388          **           Input pending chars (CNTSTR).
2389          **           If inputting field, store stacked chars in
2390          **           variable destination.
2391          **           Return.
2392          **
2393          ** History:
2394          **           Date          Programmer          Modification
2395          **           -----          -
2396          **           01/12/84        NZ              Updated documentation
2397          **           01/06/83        MB              Wrote routines.
2398          **
2399          *****
2400          *****
2401 F2840      STORFL          Store field in expr dest.
2402 F2840 7350      GOSUB CNTSTR      Input remaining chars.
2403 F2844 7FC9      GOSUB AS=FTY      Get IMAGE field type to A[S]
2404 F2848 A4C       A=A-1 S        Inputting field?
2405 F284B 400      RTNC           No. Trashing chars.
2406          *
2407 F284E 1B00      DO=(5) =STMTD1
  
```

```

000
2408 F2855 146      C=DATO A
2409 F2858 135      D1=C              Restore D1 to the top of the stack.
2410 F285B 7699     GOSUB CS=TYP      Get destination variable type.
2411 F285F 441      GOC   STONUM      Numeric variable goto STONUM
2412                *
2413                * IMAGE type must not be numeric, as variable is not numeric
2414                *
2415 F2862 A4C      A=A-1 S           Is the IMAGE type numeric?
2416 F2865 4A0      GOC   badtyp      Yes..."Data Type" error
2417                *
2418 F2868 7DDD     GOSUB strhed      Generates header for string
2419 F286C 6620     GOTO  STODES      Store the string
2420                *
2421                *
2422 F2870 66F9     badtyp GOTO  BADTYP  "Data Type" error
2423                *
2424                *
2425 F2874 844     STONUM ST=0 MltItm  Var is numeric...check IMAGE type
2426 F2877 A4C      A=A-1 S
2427 F287A A4C      A=A-1 S           Is the IMAGE type string?
2428 F287D 42F      GOC   badtyp      Yes..."Data Type" error
2429                *
2430 F2880 7E28     GOSUB GETNUM      Parse the number string from stack
2431 F2884 7D19     GOSUB popstk      Pop the item off the stack into A
2432 F2888 74CD     GOSUB D1mstk      Set D1 to AVMEME
2433 F288C 1CF      D1=D1- 16         Back up for numeric field
2434 F288F 1517     STODE1 DAT1=A W    Write out the item to the stack
2435 F2893 6608     STODES GOTO  STOSUB Do the assignment to the variable

```

```

2436          EJECT
2437          *****
2438          *****
2439          **
2440          ** Name:      CNTSTR - Read characters onto stack by count
2441          ** Name:      CNTST1 - Read characters by count, obey sTRASH
2442          **
2443          ** Category:  LOCAL
2444          **
2445          ** Purpose:
2446          **           Read characters onto stack, save stack pointer in STMTD1
2447          **
2448          ** Entry:
2449          **           B[A] is the number of characters to read
2450          **           STMTD1 is the current stack pointer
2451          **
2452          ** Exit:
2453          **           Carry clear
2454          **           D0 points to STMTD1
2455          **           STMTD1 contains the new stack pointer
2456          **           If an error is detected, takes a direct error exit
2457          **
2458          ** Calls:      DTOH,RESTD1,REDCHR
2459          **
2460          ** Uses.....
2461          ** Inclusive:  A,B,C,D[15:13,5:0],R0-R2,D0,D1,P,STMTD1,ST[7:0]
2462          **
2463          ** Stk lvls:   5 (REDCHR)
2464          **
2465          ** Algorithm:
2466          **           CNTSTR:Set sTRASH=0 (Don't trash characters)
2467          **           CNTST1:Set sIGNOR=0 (Don't ignore any characters)
2468          **           Copy #chars from B[A] to A[A]
2469          **           Convert #chars from decimal to hex, put into A[A]
2470          **           ENTSTr:Set sCOUNT=1 (Do enter characters by count)
2471          **           Save execute pointer in R0
2472          **           If count <> 0,
2473          **             then read characters from loop (REDCHR),
2474          **               save stack pointer in STMTD1
2475          **           Zero B[A] (count)
2476          **           Restore execute pointer
2477          **           Return.
2478          **
2479          ** History:
2480          **
2481          **      Date      Programmer      Modification
2482          **      -----      -
2483          **      12/19/83      NZ          Added documentation
2484          **                      SC          Wrote routine
2485          **
2486          *****
2487          *****
2488 F2897 846 CNTSTR ST=0 sTRASH Don't trash.
2489 F289A 847 CNTST1 ST=0 sIGNOR No special char to ignore.
2490 F289D D4          A=B   A          # input chars.
  
```

2491	F289F	8E00		GOSUBL =DTON	Result in C[A]
		00			
2492	F28A5	DA		A=C A	
2493	F28A7	855	ENTSTr	ST=1 sCOUNT	Count input chars.
2494	F28AA	137	ENTST2	CD1EX	Save D1 (=xqt addr) in R0.
2495	F28AD	108		R0=C	
2496	F28B0	8E00		GOSUBL =RESTD1	Restore stack pointer from STMTD1.
		00			
2497	F28B6	8A8		?A=0 A	Is the input count zero?
2498	F28B9	61		GOYES ENTST3	Yes...skip the read phase.
2499	F28BB	783A		GOSUB REDCHR	No...input chars.
2500	F28BF	491		GOC REDCer	
2501	F28C2	1B00		DO=(5) =STMTD1	Write the stack pointer to STMTD1.
		000			
2502	F28C9	137		CD1EX	
2503	F28CC	144		DATO=C A	
2504	F28CF	D1	ENTST3	B=0 A	Zero counter to start again.
2505	F28D1	118		C=R0	Restore D1 (=xqt addr).
2506	F28D4	135		D1=C	
2507	F28D7	03		RTNCC	
2508			*-		
2509			*-		
2510	F28D9	874	REDCer	?ST=1 Memerr	Insufficient memory?
2511	F28DC	60		GOYES MEMerr	Yes...go to MEMERR
2512	F28DE	6C4A		GOTO ENTRex	No...set up the error, exit
2513			*-		
2514			*-		
2515	F28E2	8D00	MEMerr	GOVLNG =MEMERR	Say "Insufficient memory"
		000			
2516			*-		
2517			*-		
2518	F28E9	8D00	D1fatk	GOVLNG =D1FSTK	
		000			
2519			*-		
2520			*-		
2521	F28F0	AC9	Fndmbb	C=B S	
2522	F28F3	8C00	Fndmbx	GOLONG =FNDMBX	Find the mailbox
		00			
2523			*-		
2524			*-		
2525	F28F9	8C00	=getdev	GOLONG =GETDev	
		00			

```

2526          STITLE
2527          *****
2528          *****
2529          **
2530          ** Name:      CKnode - Check if the mailbox is controller
2531          **
2532          ** Category:  PILUTL
2533          **
2534          ** Purpose:
2535          **   Check if the mailbox is the loop controller.  If it is
2536          **   not, take a direct error exit.
2537          **
2538          ** Entry:
2539          **   D0 points to the selected mailbox
2540          **
2541          ** Exit:
2542          **   Carry clear
2543          **   Direct exit to error routine if not loop controller
2544          **
2545          ** Calls:     GETDev
2546          **
2547          ** Uses:      ST[3:0]
2548          **
2549          ** Stk lvls:  2 (GETDev)
2550          **
2551          ** History:
2552          **
2553          **   Date      Programmer      Modification
2554          **   -----      -
2555          **   12/19/83      NZ          Updated documentation
2556          **                   SC          Wrote routine
2557          **
2558          *****
2559          *****
2560 F28FF 76FF =CKnode GOSUB  getdev      Check if controller
2561 F2903 500          RTNMC          Controller...return, carry clear
2562 F2906 300          LC(1) =eBRDMD      Not controller...error exit
2563 F2909 20          P=          =ePIL
2564 F290B 6F1A        GOTO  ENTReX      "Invalid Mode"
  
```

```

2565          STITLE REQUEST execute
2566          *****
2567          *****
2568          **
2569          ** Name:          REQST - Execute the REQUEST statement
2570          **
2571          ** Category:    STExec
2572          **
2573          ** Purpose:
2574          **   Set up HPIL response to serial poll:
2575          **     If bit 6 if the status byte is set, loop SRQ will be
2576          **     set when the I/O CPU is in device mode.
2577          **     If the I/O CPU is the controller, it will remember the
2578          **     response value for serial poll when it becomes a device.
2579          **
2580          ** Entry:
2581          **   DO is the PC
2582          **
2583          ** Exit:
2584          **   Through NXTSTM if no error, BSERR if error
2585          **
2586          ** Calls:         GLOOPW,GETARG,PUTE,<NXTSTM>
2587          **
2588          ** Uses.....
2589          **   Inclusive: A,B,C,D,R0-R4,DO,D1,P,STMTDO,ST[11:0],FUNCxx,
2590          **               All RAM EXPEXC is permitted to use
2591          **
2592          ** Stk lvls:     7 (GLOOPW)(GETARG)
2593          **
2594          ** History:
2595          **
2596          **   Date          Programmer          Modification
2597          **   -----          -
2598          **   12/20/83      NZ              Packed, changed call to GETARG to
2599          **                                     call GLOOPW first to save a stack
2600          **                                     level
2601          **   12/19/83      NZ              Added documentation
2602          **                                     SC              Wrote routine
2603          **
2604          *****
2605          *****

```

```

2606 F290F 0000          REL(5) =REQSTd
2607 F2914 0000          REL(5) =REQSTp
2608 F2919 7000 =REQST  GOSUB  =GLOOPW      Get loop number
2609 F291D 7620          GOSUB  GETARG      Get argument
2610 F2921 3500          LC(6)  =mSETSL     Set status length=1 byte
2611 F2929 7ACB          GOSUB  pute
2612 F292D 09           C=B      A
2613 F292F F2           CSL      A
2614 F2931 F2           CSL      A
2615 F2933 3100          LC(2)  =mSETST     Load low 2 nibs of SET STATUS msg
2616 F2937 24           P=      4

```


2617 F2939 3100 LC(2) =MSTSR4
 2618 F293D 76BB GOSUB pute Set status value to B[B] value
 2619 F2941 8C54 RQSTRT GOLONG ENTRTM
 6F

```

2620 *****
2621 *****
2622 **
2623 ** Name:        GETARG - Get an argument from memory
2624 **
2625 ** Category:    LOCAL
2626 **
2627 ** Purpose:
2628 **        Get an argument which follows an (optional) loop #
2629 **        (Assumes GLOOP# has been called just before this)
2630 **
2631 ** Entry:
2632 **        All exit conditions of GLOOP#
2633 **        DO is the PC
2634 **
2635 ** Exit:
2636 **        DO points to the mailbox
2637 **        B[B] is the value of the argument
2638 **        Carry clear
2639 **        P=0
2640 **
2641 ** Calls:        SAVEDO,FNDCHK,SWAPDO,GTYPR+,RESTDO
2642 **
2643 ** Uses.....
2644 **    Inclusive: A,B,C,D,RO-R4,DO,D1,P,STMTDO,ST[11:0],FUNCxx,
2645 **                All RAM EXPEXC is permitted to use
2646 **
2647 ** Stk lvls:    6 (GTYPR+)
2648 **
2649 ** History:
2650 **
2651 **        Date        Programmer                    Modification
2652 **        -----        -----                    -----
2653 **        02/22/84        NZ                    Changed GOSUB FNDCHK to GOSUBL
2654 **        12/20/83        NZ                    Installed fix for SR #0039-1075(1)
2655 **                                                            The fix involves moving the call
2656 **                                                            to GLOOP# to the calling routine
2657 **                                                            to save one RSTK level, then calling
2658 **                                                            GETARG
2659 **        12/19/83        NZ                    Added documentation
2660 **                                                            Wrote routine
2661 **
2662 *****
2663 *****
  
```

```

2664 F2947 8E00 GETARG GOSUBL =SAVEDO      Save DO in STMTDO for use later
          00
2665 F294D 8E00        GOSUBL =FNDCHK      Find the mailbox
          00
2666 F2953 4D5        GOC    ErrorX        Error...exit
2667 F2956 8E00        GOSUBL =SWAPDO      Save mailbox addr in STMTDO, get PC
          00
  
```

```

2668 F295C 161          DO=DO+ 2          Skip the leading <tCOMMA>
2669 F295F 8E00        GOSUBL =GTYPR+    Get the status byte
                00
2670 F2965 4B4         GOC   ErrorX      Error...exit
2671 F2968 8C00        GOLONG =RESTDO    Restore mailbox pointer
                00

2672                *-
2673                *-
2674 F296E 7000 ENABfx GOSUB  =GLOOPW    Get loop number
2675 F2972 71DF        GOSUB  GETARG     Get argument
2676 F2976 6C60        GOTO   ENABL1     Continue with enable code
2677                *-
2678                *-
2679 F297A 0           CON(1) =FIXSPC    1 nibble available here
2680 F297B            BSS   1-1
2681                *****
2682                *****
2683                **
2684                ** Name:      CKLOPW - Read and check loop # for range
2685                ** Name:      GETLOP - Check loop # for range, put into C[S]
2686                **
2687                ** Category:  LOCAL
2688                **
2689                ** Purpose:
2690                **   Get loop number from memory, if there.  If not there,
2691                **   return loop # 1.  If there, verify that the loop # is
2692                **   in the range 1 <= 1 <= 3
2693                **
2694                ** Entry:
2695                **   P=0,HEXMODE
2696                **   CKLOPW:DO points to the loop # expression, if any
2697                **   GETLOP:B[A] is the loop # (in HEX)
2698                **
2699                ** Exit:
2700                **   Carry set
2701                **   C[S] is the loop # - 1
2702                **   If an error is detected, takes a direct exit to BSERR
2703                **
2704                ** Uses:
2705                **   CKLOPW:A,B,C,D,RO-R4,DO,D1,P,FUNCxx,ST[11:0],all RAM
2706                **   EXPEXC is permitted to use
2707                **   GETLOP:A[A],C[W]
2708                **
2709                ** Stk lvls:
2710                **   CKLOPW:6 (GTYPR+)
2711                **   GETLOP:0
2712                **
2713                ** History:
2714                **
2715                **   Date      Programmer      Modification
2716                **   -----
2717                **   12/19/83    NZ          Updated documentation
2718                **   03/19/83    NZ          Modified routine
2719                **                   SC          Wrote routine
2720                **

```

```

2722          *****
2723 F297B AC2 =CKLOP# C=0   S
2724 F297E 14A          A=DATO B      Read first token
2725 F2981 A80          A=0   P      (Check if it is Fx hex)
2726 F2984 A0C          A=A-1 P
2727 F2987 B64          A=A+1 B
2728 F298A 400          RTNC          If carry, done (return C[S]=0)
2729 F298D 8E00        GOSUBL =GTYP+  Get byte from @ PC
          00
2730 F2993 4D1          GOC   ErrorX   Error
2731 F2996 D4   =GETLOP A=B   A      Copy loop # to A[A]
2732 F2998 CC          A=A-1 A      Convert to option base zero
2733 F299A 441          GOC   outrng   If carry, too small
2734 F299D D2          C=0   A
2735 F299F 303          LC(1) 3      Set C[A]="00003"
2736 F29A2 8BE          ?A>=C A      Is A[A] too big?
2737 F29A5 A0          GOYES  outrng   Yes... too big
2738 F29A7 A86          C=A   P      No...accept it
2739 F29AA 816          CSRC          Put loop # into C[S]
2740 F29AD 02          RTNSC          Set carry for exit
2741          *-
2742          *-
2743 F29AF 20   outrng  P=   =eRANGE   SAY "ARG. OUT OF RANGE"
2744 F29B1 6EAO  ErrorX GOTO  Errorx     SAY "ARG. OUT OF RANGE"
    
```

```

2745                STITLE ON INTR/ENABLE INTR execute
2746                *****
2747                *****
2748                **
2749                ** Name:          ONINTx - Execute the ON INTR statement
2750                **
2751                ** Category:     STExec
2752                **
2753                ** Purpose:
2754                **           Execute the ON INTR statement
2755                **
2756                ** Entry:
2757                **           DO is the PC
2758                **
2759                ** Exit:
2760                **           Through NXTSTM
2761                **
2762                ** Calls:         None
2763                **
2764                ** Uses.....
2765                ** Inclusive: C[A],DO,D1
2766                **
2767                ** Stk lvls:     0
2768                **
2769                ** History:
2770                **
2771                **      Date          Programmer          Modification
2772                **      -----          -
2773                **      12/19/83         NZ              Added documentation
2774                **                          SC              Wrote routine
2775                **
2776                *****
2777                *****
2778 F29B5 0000          REL(5) =ONINTd
2779                0
2779 F29BA 0000          REL(5) =ONINTp
2780                0
2780 F29BF 86D =ONINTx ?ST=0 13          Is the machine currently running?
2781 F29C2 FO           GOYES ENTTrtn          No...don't do anything
2782 F29C4 1F00         D1=(5) =ONINTR          Yes...save the current address...
2783                000
2783 F29CB 136          CDOEX
2784 F29CE 145          DAT1=C A          ...in the "ONINTR" RAM location
2785 F29D1 6F6F ENTTrtn GOTO RQSTRT          Go to NXTSTM
2786                *****
2787                *****
2788                **
2789                ** Name:          ENABLE - Execute the ENABLE INTR statement
2790                **
2791                ** Category:     STExec
2792                **
2793                ** Purpose:
2794                **           Execute the ENABLE INTR statement
2795                **
2796                ** Entry:
    
```

```

2797      **      DO is the PC
2798      **
2799      ** Exit:
2800      **      Through NXTSTM if OK, BSERR if error
2801      **
2802      ** Calls:      GLOOP#,GETARG,PUTC,<NXTSTM>
2803      **
2804      ** Uses.....
2805      ** Inclusive: A,B,C,D,R0-R4,DO,D1,P,STMTDO,ST[11:0],FUNCxx,
2806      **      All RAM EXPEXC is permitted to use
2807      **
2808      ** Stk lvls:   7 (GLOOP#)(GETARG)
2809      **
2810      ** History:
2811      **
2812      **      Date      Programmer      Modification
2813      **      -----      -
2814      **      12/21/83      NZ      Split call to GETARG into two calls;
2815      **      one to GLOOP#, then to GETARG to
2816      **      fix a stack level bug (see REQST)
2817      **      12/19/83      NZ      Added documentation
2818      **      SC      Wrote routine
2819      **
2820      ** *****
2821      ** *****
2822 F29D5 0000      REL(5) =ENABLd
2823      0
2823 F29DA 0000      REL(5) =ENABLp
2824      0
2824 F29DF 6C8F =ENABLE GOTO  ENABfx      Goto enable fix space
2825      *-
2826 F29E3 3300 ENABL1 LC(4) =nSETIM      Set interrupt mask...
2827      00
2827 F29E9 AE9      C=B      B      ...to the value in B[B]
2828 F29EC 70FA      GOSUB putc
2829 F29F0 60EF      GOTO  ENTrtn      Exit through NXTSTM
  
```

```

2830          STITLE PASS CONTROL execute
2831          *****
2832          *****
2833          **
2834          ** Name:          PASS - Execute the PASS CONTROL statement
2835          **
2836          ** Category:     STEXEC
2837          **
2838          ** Purpose:
2839          **     Execute the PASS CONTROL statement (device specifier
2840          **     is optional)
2841          **
2842          ** Entry:
2843          **     DO is the PC
2844          **
2845          ** Exit:
2846          **     Through NXTSTM if OK, through BSERR if error
2847          **
2848          ** Calls:        GETDID, START, CKmode, UNLPUT, TALK, PUTE, PUTGF
2849          **
2850          ** Uses.....
2851          ** Inclusive:    A,B,C,D,RO-R4,DO,D1,P,STMTD1[3:0],STMR1,ST[11:0],
2852          **                FUNCxx, All RAM EXPEXC is permitted to use
2853          **
2854          ** Stk lvl:     7 (GETDID)
2855          **
2856          ** History:
2857          **
2858          **      Date      Programmer      Modification
2859          **      -----      -
2860          **      12/20/83    NZ          Packed 5 nibbles for future use
2861          **      12/19/83    NZ          Added documentation
2862          **                SC          Wrote routine
2863          **
2864          *****
2865          *****
2866 F29F4 0000          REL(5) =PASSd
2867          0
2867 F29F9 0000          REL(5) =PASSp
2867          0
2868 F29FE 14A =PASS    A=DATO B
2869 F2A01 3100          LC(2) =tCOMMA
2870 F2A05 D3           D=0 A          Preset device to "LOOP"
2871 F2A07 962          ?A=C B        Is there a device specifier?
2872 F2A0A B0           GOYES PASS20  No...use "LOOP"
2873 F2A0C 8E00          GOSUBL =GETDID Yes...get the device specifier
2873          00
2874 F2A12 4F3          GOC Errorx    Error
2875 F2A15 8E00 PASS20 GOSUBL =START Find and set up the loop
2875          00
2876 F2A1B 463          GOC Errorx    Error
2877 F2A1E 7DDE          GOSUB CKmode  Make sure I'm the loop controller
2878 F2A22 96B          ?D=0 B        Is this either "LOOP" or (nothing)?
2879 F2A25 41           GOYES PASS30  Yes...just send TCT
2880 F2A27 8E00          GOSUBL =UNLPUT No...unaddress all listeners

```

```

      00
2881 F2A2D 442      GOC   Errorx      Error
2882 F2A30 8E00    GOSUBL =TALK      Make the device the talker
      00
2883 F2A36 4B1      GOC   Errorx      Error...set up code, goto BSERR
2884 F2A39 3100 PASS30 LC(2) =nTCT@4    Send TCT
2885 F2A3D 8E00    GOSUBL =PUTGF-   Get back response from mailbox
      00
2886 F2A43 4E0      GOC   Errorx      Error
2887 F2A46 890      ?P=   =pACK        Is it an "ACKNOWLEDGE" frame?
2888 F2A49 A6       GOYES CNTR35      Yes...OK
2889 F2A4B 20       P=    0
2890 F2A4D 300      LC(1) =eNORDY     No...Device Not Ready error
2891 F2A50 20       P=    =ePIL
2892 F2A52 6000 Errorx GOTO   =eRRORX
2893          *_
2894          *_
2895 F2A56 8C00 Chksts GOLONG =CHKSTS
      00
2896          *_
2897          *_
2898 F2A5C 3300 SETIMO LC(4) =nSETIM    Set interrupt mask to zero
      00
2899 F2A62 6D7A      GOTO   putc
2900          *_
2901          *_
2902 F2A66 0         CON(1) =FIXSPC    3 nibbles available here
2903 F2A67          BSS   3-1
```

```

2904          STITLE CONTROL ON/OFF execute
2905          *****
2906          *****
2907          **
2908          ** Name:          CONTRL - Execute the CONTROL ON/OFF statements
2909          **
2910          ** Category:     STExec
2911          **
2912          ** Purpose:
2913          **     Execute the CONTROL ON/OFF statements (take or give up
2914          **     control on a loop)
2915          **
2916          ** Entry:
2917          **     DO is the PC
2918          **
2919          ** Exit:
2920          **     Through NXTSTM if no error, through BSERR if error
2921          **
2922          ** Calls:         CKLOPW,FNDMBD,CHKSTS,PUTE,FNDCH-,PUTC,<NXTSTM>,
2923          **                 <REST10>
2924          **
2925          ** Uses.....
2926          **     Inclusive: A,B,C,D,R0-R4,DO,D1,P,STMTDO,ST[11:0],FUNCxx,
2927          **                 All RAM EXPEXC is permitted to use
2928          **
2929          ** Stk lvs:      7 (CKLOPW)
2930          **
2931          ** History:
2932          **
2933          **     Date          Programmer          Modification
2934          **     -----          -
2935          **     12/19/83      NZ          Added documentation
2936          **                   SC          Wrote routine
2937          **
2938          *****
2939          *****
    
```

```

2940 F2A69 0000          REL(5) =CNTRLd
2941 F2A6E 0000          REL(5) =CNTRLp
2942 F2A73 161  =CONTRL DO=DO+ 2          Skip the tON/tOFF token for now
2943 F2A76 710F          GOSUB CKLOPW          Get the loop # from memory
2944 F2A7A 1F00          D1=(5) =PCADDR          (C[S] is the loop #)
2945 F2A81 143          A=DAT1 A
2946 F2A84 131          D1=A          Set D1 to the current PCADDR
2947 F2A87 177          D1=D1+ 2+6          Skip the line length, CONTROL token
2948 F2A8A 14B          A=DAT1 B          Read the tON/tOFF token
2949 F2A8D 3100          LC(2) =tON
2950 F2A91 962          ?A=C B          Is this CONTROL ON?
2951 F2A94 32          GOYES CNTR40          Yes...set the controller flag
2952          *
2953          * CONTROL OFF if here
2954          *
2955 F2A96 8E00          GOSUBL =FNDMBD          Clear DISPLAY OK bits
    
```



```

00
2956 F2A9C 45B      GOC   Errorx      Error
2957 F2A9F 73BF     GOSUB Chksts      Check if reset, get status
2958 F2AA3 4EA      GOC   Errorx      Error
2959 F2AA6 3300     LC(4) =nCLRCA    Clear Controller Active state
00
2960 F2AAC 703A     GOSUB putc
2961 F2AB0 41A      GOC   Errorx
2962 F2AB3 6D8E CNTR35 GOTO  RQSTRT      Goto NXTSTM
2963          *-
2964          *-
2965 F2AB7 AC5      CNTR40 B=C   S           Save mailbox in B[S] for REST10
2966 F2ABA 8E00     GOSUBL =FNDCH-    Find and check the mailbox
00
2967 F2AC0 419      GOC   Errorx
2968 F2AC3 3300     LC(4) =mSETCA    Set Controller Active state
00
2969 F2AC9 731A     GOSUB putc
2970 F2ACD 448      GOC   Errorx
2971 F2AD0 AC9      C=B   S           Restore mailbox # from B[S]
2972 F2AD3 8C00     GOLONG =REST10    Restore IO (readdress, etc)
00
2973          *-
2974          *-
2975 F2AD9 0        CON(1) =FIXSPC    4 nibbles available here
2976 F2ADA          BSS   4-1

```

```

2977          STITLE Zero program poll handler
2978          *****
2979          *****
2980          **
2981          ** Name:          hZERPG - Handler for the ZERO program poll
2982          **
2983          ** Category:     POLL
2984          **
2985          ** Purpose:
2986          **     Handle the ZERO program poll (set interrupt mask=0)
2987          **
2988          ** Entry:
2989          **     None
2990          **
2991          ** Exit:
2992          **     XM=1, carry clear
2993          **
2994          ** Calls:        SAVSTS,FNDMBX,CHKSTS,PUTC,RESSTS
2995          **
2996          ** Uses.....
2997          **     Inclusive: A,B[S],C,DO,P,SNAPBF[37:0]
2998          **
2999          ** Stk lvls:    1 (SAVSTS) (SAVSTS saves the levels in SNAPBF)
3000          **
3001          ** History:
3002          **
3003          **     Date      Programmer      Modification
3004          **     -----      -
3005          **     02/22/84      NZ          Changed call to FNDCHK into two
3006          **
3007          **
3008          **
3009          **     12/19/83      NZ          Added documentation
3010          **
3011          **     SC          Wrote routine
3012          **
3013          **     *****
3014          **     *****
3014 F2ADD 8E00 =hZERPG GOSUBL =SAVSTS      Save 5 RSTK levels & status bits
          00
3015 F2AE3 AC1          B=0 S          Counter for which loop is next
3016 F2AE6 760E ZERP10 GOSUB Fndmbb      Find that mailbox
3017 F2AEA 431          GOC ZERP30      Not found...exit
3018 F2AED 756F          GOSUB Chksts      Check it
3019 F2AF1 460          GOC ZERP20      Error...try next mailbox
3020 F2AF4 746F          GOSUB SETIMO      Set interrupt mask to 0
3021 F2AF8 B45 ZERP20  B=B+1 S          Go to next loop
3022 F2AFB 5AE          GONC ZERP10      Go "always" (if fall through, done)
3023          *-
3024          *-
3025 F2AFE 8E00 ZERP30 GOSUBL =RESSTS      Restore RSTK levels, D[A],ST[11:0]
          00
3026 F2B04 00          RTNSXM          Return, XM=1, Carry clear
3027          *-
3028          *-
3029 F2B06 0          CON(1) =FIXSPC      4 nibbles available here

```

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Zero program poll handler

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3030 F2B07

BSS 4-1

```

3031          STITLE Exception poll handler
3032          *****
3033          *****
3034          **
3035          ** Name:          hEXCPT - Exception poll handler
3036          **
3037          ** Category:    POLL
3038          **
3039          ** Purpose:
3040          **     Handle the exception poll (check for EOL branch due)
3041          **
3042          ** Entry:
3043          **     None
3044          **
3045          ** Exit:
3046          **     If not ON INTR: XM=1, carry clear
3047          **     If ON INTR pending and due: exits through ONTIMR!
3048          **
3049          ** Calls:        FNDMBX,CHKSTS,PUTC,<ONTIMR>
3050          **
3051          ** Uses.....
3052          **     Inclusive: A,B,C,DO,D1,P,ST[11:0] (also what ONTIMR uses)
3053          **
3054          ** Stk lvls:    3 (CHKSTS)
3055          **
3056          ** History:
3057          **
3058          **     Date      Programmer      Modification
3059          **     -----      -
3060          **     02/22/84      NZ          Split call to FNDCHK into two calls
3061          **                                     (FNDMBX,CHKSTS) to fix a bug with
3062          **                                     multiple loops, one in manual mode
3063          **     12/19/83      NZ          Added documentation
3064          **                                     SC          Wrote routine
3065          **
3066          *****
3067          *****
3068 F2B0A AC1 =hEXCPT B=0 S Initialize loop counter to first
3069 F2B0D 7FDD EXPT10 GOSUB FndHbb Find the current mailbox
3070 F2B11 482 GOC RtnSXM If mailbox not found, done
3071 F2B14 7E3F GOSUB Chksts Check it
3072 F2B18 490 GOC EXPT15 Error...go to next one
3073 *
3074 * FNDCHK returns with status in C[X]
3075 *
3076 F2B1B 0B CSTEX
3077 F2B1D 870 ?ST=1 =sINTR Interrupt pending?
3078 F2B20 80 GOYES EXPT20 Yes...see if ON INTR branch defined
3079 F2B22 B45 EXPT15 B=B+1 S No...check next loop
3080 F2B25 57E GONC EXPT10 Go "always" (if fall thru, OK)
3081 *-
3082 *-
3083 *
3084 * Interrupt pending on mailbox, see if ON INTR branch exists
3085 *

```

```

3086 F2B28 1F00 EXPT20 D1=(5) =ONINTR
      000
3087 F2B2F 147      C=DAT1 A
3088 F2B32 8AE      ?C#0 A      Is the ON INTR address zero?
3089 F2B35 B0      GOYES EXPT40      No...see if program running
3090 *
3091 * Interrupt pending, but ONINTR=0, set Except and exit for now
3092 *
3093 F2B37 850 EXPT30 ST=1 =Except
3094 F2B3A 21 RtnSXM P= 1      Clear carry and set XM
3095 F2B3C 0D      P=P-1
3096 F2B3E 00      RTNSXM
3097 *-
3098 *-
3099 *
3100 * Interrupt pending and ONINTR#0, check if program running
3101 *
3102 F2B40 86D EXPT40 ?ST=0 13      Running?
3103 F2B43 4F      GOYES EXPT30      No...set Except and keep waiting
3104 *
3105 * See if the ATTN key pressed
3106 *
3107 F2B45 8E00      GOSUBL =CK=ATn      Check if ATTN key has been pressed
      00
3108 F2B4B 5BE      GONC EXPT30      Yes...wait for next time around
3109 *
3110 * Interrupt pending, ONINTR#0, Running; check if at end of line
3111 *
3112 F2B4E 07      C=RSTK      Current PC is on third RSTK level
3113 F2B50 D5      B=C A      save first RSTK level in B[A]
3114 F2B52 07      C=RSTK      Pop off the second RSTK level
3115 F2B54 DA      A=C A      save it in A[A]
3116 F2B56 07      C=RSTK      Pop off the third RSTK level
3117 F2B58 06      RSTK=C      and push it back on
3118 F2B5A DE      ACEX A      Get the second RSTK level from A[A]
3119 F2B5C 06      RSTK=C      and push it back on
3120 F2B5E DD      BCEX A      Get the first RSTK level from B[A]
3121 F2B60 06      RSTK=C      and put it back on
3122 *
3123 * Now check if the PC is at an EOL
3124 *
3125 F2B62 131      D1=A      Set D1 to the current PC
3126 F2B65 14B      A=DAT1 B
3127 F2B68 3100      LC(2) =LEOL      Check if it points to an EOL
3128 F2B6C 966      ?#C B      Is it at EOL?
3129 F2B6F 8C      GOYES EXPT30      No...set Except, wait for next time
3130 *
3131 * We are going to do an end-of-line branch
3132 *
3133 F2B71 137      CD1EX      Save PC on stack
3134 F2B74 06      RSTK=C
3135 *
3136 F2B76 72EE      GOSUB SETIMO      Set IM=0 to clear interrupt pending
3137 F2B7A 1F00      D1=(5) =ONINTR
      000

```

3138	F2B81	147	C=DAT1 A	Read the ONINTR address again
3139	F2B84	08	CLRST	Clear ON ERROR & ON TIMER flags
3140	F2B86	850	ST=1 =sEXTGS	Set external flag
3141	F2B89	8D00	GOVLNG =ONTIMR	Take the jump
		000		
3142			*-	
3143			*-	
3144	F2B90	0	CON(1) =FIXSPC	8 nibbles available here
3145	F2B91		BSS 8-1	

```
3146          STITLE Key definition poll handler
3147          *****
3148          *****
3149          **
3150          ** Name:          hKYDF - Handler for the keydef poll
3151          **
3152          ** Category:     POLL
3153          **
3154          ** Purpose:
3155          **      Handle the key def poll for HPIL key (#FF)
3156          **
3157          ** Entry:
3158          **      P=0
3159          **      R0[6:5] is the key number
3160          **
3161          ** Exit:
3162          **      If HPIL data and remote then define a colon-def key
3163          **      to execute the statement
3164          **
3165          ** Calls:         ASRC5, FNDMBX, CHKSTS, GETHSS, D1MSTK, CHKSTK, RDST30,
3166          **                  STRPcr, D1=AVE, I/OALL
3167          **
3168          ** Uses.....
3169          **      Inclusive: A (If not handled)
3170          **      Inclusive: A,B,C,D,R0,R1,R2,D0,D1,P (If handled)
3171          **
3172          ** Stk lvls:     4 (RDST30)      (If handled...if not, 1)
3173          **
3174          ** History:
3175          **
3176          **      Date      Programmer      Modification
3177          **      -----      -
3178          **      02/22/84      NZ          Split call to FNDCHK into two calls
3179          **
3180          **
3181          **
3182          **      01/10/84      NZ          Changed size checking to always
3183          **
3184          **
3185          **      12/21/83      NZ          Added code to force valid size
3186          **
3187          **
3188          **      12/19/83      NZ          Added documentation
3189          **      04/01/82      SC          Wrote routine
3190          **
3191          *****
3192          *****
3193 F2B98 110 =hKYDF A=R0          Recall key number...
3194 F2B98 8E00 GOSUBL =ASRC5          ...from A[6:5]
3195          00
3195 F2BA1 864          A=A+1 B
3196 F2BA4 559          GONC RtnSXM          Not HPIL key...don't handle it
3197          *
3198          * Find out which mailbox has data available
3199          *
```

```

3200 F2BA7 AC1      B=0   S      Start from mailbox #1
3201 F2BAA 724D DFKY10 GOSUB Fndmbb Find loop B[S] (Sets Device bit)
3202 F2BAE 464      GOC   NoKYDF  No mailbox has data available
3203 F2BB1 71AE     GOSUB Chksts Check that mailbox
3204 F2BB5 401      GOC   DFKY20 Error...try next one
3205 F2BB8 D5        B=C   A      Save status bits in B[X]
3206 F2BBA 7000     GOSUB =GETHSS Read mailbox's handshake bits
3207 F2BBE 463      GOC   NoKYDF  If abort, exit
3208 F2BC1 870      ?ST=1 =hsRQSR Is this mailbox requesting service?
3209 F2BC4 80       GOYES DFKY30 Yes...see if it has data available
3210                *
3211                * Continue on to next mailbox...this one not requesting service
3212                *
3213 F2BC6 B45 DFKY20 B=B+1 S      Go always
3214 F2BC9 50E      GONC  DFKY10
3215                *
3216                *
3217 F2BCC          DFKY30
3218                *
3219                * Status bits are in B[X]
3220                *
3221 F2BCC D9        C=B   A      Recall status bits
3222 F2BCE 0B        CSTEX
3223 F2BD0 860      ?ST=0 =sDATAV Is data available?
3224 F2BD3 3F       GOYES DFKY20 No...try next mailbox
3225                *
3226                * Read the data from the mailbox and save it on math stack
3227                *
3228 F2BD5 777A     GOSUB D1mstk Set D1 to the top of stack
3229 F2BD9 08       CLRST
3230 F2BDB 7749     GOSUB CHKSTK See if room left on stack for string
3231 F2BDF 2E       P=    14
3232 F2BE1 31A0     LCHEX OR    Put <Lf> in B[15:14] (Term. char)
3233 F2BE5 AF5      B=C   W
3234 F2BE8 D8       B=A   A      Put memory limit into B[A]
3235 F2BEA AF0      A=0   W      Clear count, flag -23 indicator
3236 F2BED CC       A=A-1 A      Set count="FFFFFF"
3237 F2BEF 8E5A     GOSUBL RDST30 Read the data from the loop
      7F
3238 F2BF5 454 NoKYDF GOC   NOKYDF Return no key def if error
3239 F2BF8 7C3A     GOSUB STRPcr Strip off trailing <Cr>, if any
3240 F2BFC 133      AD1EX A[A] is address of top of stack
3241 F2BFF 8E00     GOSUBL =D1=RVE
      00
3242 F2C05 AF2      C=0   W      Clear C[5] for below
3243 F2C08 147      C=DAT1 A     C[A] is bottom of stack
3244 F2C0B E2       C=C-A A     C[A] is string length in nibbles
3245 F2C0D 81E     CSRFB      Convert length to bytes (temp)
3246 F2C10 AF5      B=C   W      Put length into B[A] (for I/OALL)
3247 F2C13 AF2      C=0   W      Truncate string to 255 chars max
3248 F2C16 A6E     C=C-1 B
3249 F2C19 8BD     ?B<=C A     Is the length currently <=255?
3250 F2C1C 40       GOYES DFKY40 Yes...leave it as is
3251 F2C1E D5       B=C   A     No...set it to 255.
3252 F2C20 C5 DFKY40 B=B+B A     Convert back to nibbles

```



```

3253 F2C22 07      C=RSTK      Save 1 level...I/OALL uses three
3254 F2C24 10A     R2=C        RSTK levels if buffer shrinks
3255 F2C27 3200    LC(3) =bSTMXQ Load HPIL stmt execute buffer ID
0
3256 F2C2C 8F00    GOSBVL =I/OALL Allocate the buffer
000
3257 F2C33 11A     C=R2
3258 F2C36 06     RSTK=C      Restore the RSTK level from R2
3259 F2C38 470    GOC   DFKY50 Go if OK
3260      *
3261      * Not enough memory to create the stmt execute buffer
3262      *
3263      * If fail to return a key definition, set SO=0
3264      * XM is zero already
3265      *
3266 F2C3B 840    NOKYDF ST=0 0      No key definition
3267 F2C3E 03     RTNCC      Handled, no error
3268      *-
3269      *-
3270      *
3271      * Save the input string in the buffer
3272      * D0 points to the buffer header
3273      * D1 points to the buffer start
3274      *
3275 F2C40 137    DFKY50 CD1EX      C[A] is the buffer start address
3276 F2C43 162     DO=D0+ 3     DO points to the buffer length
3277 F2C46 142     A=DAT0 A     Read the buffer length
3278 F2C49 1F00    D1=(5) =DEFADR
000
3279 F2C50 81C     ASRB
3280 F2C53 149     DAT1=A B     A[X] is the string length in bytes
3281 F2C56 171     D1=D1+ 2     Write out the length to the buffer
3282 F2C59 BF2     CSL  W      Move to key type
3283 F2C5C 306     LC(1) 6     Put buffer start address in C[5:1]
3284 F2C5F 15D5    DAT1=C 6     Type 6: colon def key
3285 F2C63 79E9    GOSUB D1mstk Write type, buffer start address
3286 F2C67 162     DO=D0+ 3     Set D1 to start of input string
3287      *       Set D0 past the buffer header
3288 F2C6A A6C     DFKY60 A=A-1 B Are all characters written yet?
3289 F2C6D 411     GOC   DFKY70 Yes...exit
3290 F2C70 1C1     D1=D1- 2     No...read next character
3291 F2C73 14F     C=DAT1 B
3292 F2C76 14C     DAT0=C B     Write the character to buffer
3293 F2C79 161     DO=D0+ 2
3294 F2C7C 5DE     GONC   DFKY60 Go always
3295      *-
3296      *-
3297 F2C7F 850    DFKY70 ST=1 0     Do have a key definition
3298 F2C82 03     RTNCC      No error
3299      *-
3300      *-
3301 F2C84 0      CON(1) =FIXSPC 18 nibbles available here
3302 F2C85     BSS  18-1
3303 F2C96     END

```


DsLoop	Ext		-	166					
ENABL1	Abs	993763	#F29E3	-	2826	2676			
=ENABLE	Abs	993759	#F29DF	-	2824				
ENABLD	Ext			-	2822				
ENABLP	Ext			-	2823				
ENABFX	Abs	993644	#F296C	-	2674	2824			
ENDIMG	Ext			-	1803				
ENT"/"	Abs	993189	#F27A5	-	2199	1543			
ENT"B"	Abs	993208	#F27B8	-	2252	1540			
ENT"C"	Abs	993063	#F2727	-	1927	1513			
ENT"H"	Abs	993249	#F27E1	-	2324	1519			
ENT"K"	Abs	993267	#F27F3	-	2330	1522			
ENT"P"	Abs	993065	#F2729	-	1928	1516			
ENT"R"	Abs	993069	#F272D	-	1930	1546			
ENT"X"	Abs	993132	#F276C	-	1999	1501			
ENT/03	Abs	993204	#F27B4	-	2206	2202			
ENT120	Abs	991171	#F1FC3	-	198	191			
ENT130	Abs	991185	#F1FD1	-	207	199	297		
ENT150	Abs	991192	#F1FD8	-	209	269			
ENT155	Abs	991205	#F1FE5	-	214	210			
ENT160	Abs	991208	#F1FE8	-	215	2339			
ENT180	Abs	991225	#F1FF9	-	224	217	220	309	
ENT190	Abs	991263	#F201F	-	248	231			
ENT200	Abs	991296	#F2040	-	260	256			
ENT220	Abs	991304	#F2048	-	268	225			
ENT250	Abs	991311	#F204F	-	270				
ENT300	Abs	991321	#F2059	-	273	261			
ENT302	Abs	991330	#F2062	-	278	274			
ENT305	Abs	991378	#F2092	-	297	285			
ENT310	Abs	991382	#F2096	-	300	293			
ENT320	Abs	991393	#F20A1	-	305	301			
=ENTER	Abs	991064	#F1F58	-	158				
ENTERp	Ext			-	157				
ENTFFM	Abs	993270	#F27F6	-	2331	2328			
ENTREX	Abs	991090	#F1F72	-	170	159	173	898	
ENTRTN	Abs	991112	#F1F88	-	180	2620			
ENTRex	Abs	992043	#F232B	-	898	761	907	941	2203 2512 2564
ENTST2	Abs	993450	#F28AA	-	2494	2335			
ENTST3	Abs	993487	#F28CF	-	2504	501	2351	2498	
ENTSTr	Abs	993447	#F28A7	-	2493	1940			
ENTU00	Abs	992641	#F2581	-	1462	1458			
ENTU05	Abs	992656	#F2590	-	1466	1549	2257		
ENTU07	Abs	992660	#F2594	-	1468	1727	2206		
ENTU09	Abs	992662	#F2596	-	1469	1672	1863		
ENTU20	Abs	992681	#F25A9	-	1478	1474			
ENTU30	Abs	992715	#F25CB	-	1498	1494			
=ENTUSG	Abs	992609	#F2561	-	1452				
ENTX07	Abs	993140	#F2774	-	2001	1996			
ENTa09	Abs	992858	#F265A	-	1672	1560			
ENTb09	Abs	993031	#F2707	-	1863	1805	1941	2004	
ENTc09	Abs	993149	#F277D	-	2004	2054	2111		
ENTdel	Abs	991099	#F1F7B	-	177	208	302		
ENTdlm	Abs	992854	#F2656	-	1670	1537			
ENTend	Abs	993003	#F26EB	-	1799	1534			
ENTlpb	Abs	993162	#F278A	-	2107	1510			

MFLG=0	Ext	-	772						
MLFFLG	Ext	-	192	753					
Memerr	Abs	4 #00004	-	17	984	997	1067	1283	1301 2510
Mflg=0	Abs	991951 #F22CF	-	771	728	1706			
MltItm	Abs	4 #00004	-	16	215	230	307	369	386 2425
NOKYDF	Abs	994374 #F2C46	-	3246	3218				
NRMCON	Ext	-	420						
NUMSCN	Ext	-	416						
NXTD10	Abs	991870 #F227E	-	747	739				
NXTD20	Abs	991939 #F22C3	-	765	756				
NXTDS-	Abs	991816 #F2248	-	730	1710				
=NXTDST	Abs	991793 #F2231	-	724	207	300			
NXTEXP	Ext	-	1708						
NXTVA-	Ext	-	730						
NoKYDF	Abs	994304 #F2C00	-	3218	3180	3183			
NumIng	Abs	992908 #F268C	-	1701	1693				
ONINTR	Ext	-	2782	3068	3122				
ONINTd	Ext	-	2778						
ONINTp	Ext	-	2779						
=ONINTx	Abs	993727 #F29BF	-	2780					
ONTIMR	Ext	-	3126						
OUTPd	Ext	-	156						
=PASS	Abs	993790 #F29FE	-	2868					
PASS10	Abs	993810 #F2A12	-	2877	2871				
PASS20	Abs	993819 #F2A1B	-	2879	2874				
PASS30	Abs	993855 #F2A3F	-	2888	2883				
PASSd	Ext	-	2866						
PASSp	Ext	-	2867						
PCADDR	Ext	-	2942						
POPMTM	Ext	-	498	748					
PUTC	Ext	-	1179						
PUTE	Ext	-	1192						
PUTGF	Ext	-	2890						
RANGEN	Ext	-	397						
RCVOFS	Ext	-	1724						
RDAITY	Ext	-	740						
RDS30.	Abs	992287 #F241F	-	1019	1030				
RDST01	Abs	992001 #F2301	-	883	110				
RDST05	Abs	992029 #F231D	-	894	890				
RDST10	Abs	992047 #F232F	-	901	897				
RDST15	Abs	992099 #F2363	-	927	905	909			
RDST20	Abs	992139 #F238B	-	943	913	918			
RDST25	Abs	992143 #F238F	-	946	911	928			
RDST30	Abs	992154 #F239A	-	952	947	1019			
RDST35	Abs	992171 #F23AB	-	960	953	994	3217		
RDST40	Abs	992185 #F23B9	-	964	993				
RDST45	Abs	992225 #F23E1	-	982	974	981			
RDST50	Abs	992231 #F23E7	-	984	968				
RDST52	Abs	992247 #F23F7	-	990	983				
RDST55	Abs	992252 #F23FC	-	992	966	985	998		
RDST60	Abs	992260 #F2404	-	997	987				
RDST65	Abs	992266 #F240A	-	1001	963				
RDST70	Abs	992291 #F2423	-	1022	1012				
RDST75	Abs	992301 #F242D	-	1031	961	1018			
RDST80	Abs	992307 #F2433	-	1035	1009				

rEV\$	Ext		-	239	371				
sCOUNT	Abs	5 #00005	-	1337	2333	2493			
sDATAV	Ext		-	3199					
sEXTGS	Ext		-	3125					
sFLAG?	Ext		-	889					
sIGNOR	Abs	7 #00007	-	1339	1939	2327	2330	2489	
sINTR	Ext		-	3059					
sTRASH	Abs	6 #00006	-	1338	2002	2334	2488		
strhed	Abs	992841 #F2649	-	1606	238	260	364	2418	
tCOMMA	Ext		-	2869					
tENTER	Ext		-	1455					
tEOL	Ext		-	3111					
tON	Ext		-	2947					
tUSING	Ext		-	189					
uCPLXC	Ext		-	1551					
uDELIM	Ext		-	1536					
uHKB^	Ext		-	1472	1685				
uIMend	Ext		-	1533					
uLOOPB	Ext		-	1509					
uLOOPP	Ext		-	1527					
uLOOPS	Ext		-	1524					
uMULT	Ext		-	1506					
uRESTP	Ext		-	1530					
uSTRPT	Ext		-	1503					

Input Parameters

Source file name is SC&ENT::MS

Listing file name is SC/ENT::ML::-1

Object file name is SC&ENT::MS::-1

Initial flag settings are
111111
0123456789012345

Errors

None

Saturn Assembler News

```

1          TITLE User Utility Routines <830927.1255>
2 F2C96    ABS      #F2C96          TIXHP6 address (fixed)
3          *
4          *      N  N  ZZZZZ  &    U  U  TTTT  L
5          *      N  N      Z  & &  U  U  T    L
6          *      NN N      Z  & &  U  U  T    L
7          *      N  N  N  Z    &    U  U  T    L
8          *      N  NN  Z    & & &  U  U  T    L
9          *      N  N  Z    & &  U  U  T    L
10         *      N  N  ZZZZZ  && &  UUU  T    LLLLL
11         *
12         *****
13         *****
14         **
15         ** Name:          SEND - Execution of the SEND command
16         **
17         ** Category:     STExec
18         **
19         ** Purpose:
20         **       Send frame(s) on the [specified] loop
21         **
22         ** Entry:
23         **       DO points to loop #, if any; if none, DO points to the
24         **       first frame to send
25         **
26         ** Exit:
27         **       Through NXTSTM via ENDST, or through ERRORX
28         **
29         ** Calls:        GLOOP#, START+, GETDev, GFType, FRAMEE, GSTINO, PUTC,
30         **                PUTD, PUTE, SAVEDO, SWAPDO, RESTDO, SAVE2C, REST2C,
31         **                GETERR, <ENDST>
32         **
33         ** Uses.....
34         ** Exclusive:  A,B,C,D,          DO,D1,P
35         ** Inclusive:  A,B,C,D,R0,R1,R2,R3,R4,DO,D1,P,ST[11:0],FUNCxx
36         **
37         ** Stk lvls:    7 (GLOOP#)
38         **
39         ** History:
40         **
41         **      Date      Programmer      Modification
42         **      -----      -
43         **      09/26/83    NZ      Updated documentation
44         **      08/02/83    NZ      Changed to not change frame count
45         **                if device mode
46         **      04/01/83    NZ      Added set frame count=inf
47         **      03/01/83    NZ      Updated documentation
48         **
49         *****
50         *****
51 F2C96 0000      REL(5) =SENDd
52         0
53 F2C9B 0000      REL(5) =SENDp
54         0
55 F2CA0 7B41 =SEND  GOSUB  GLOOP#          Get loop number

```

```

54      *
55      * GLOOP# returns with the loop number in C[S]
56      *
57 F2CA4 7000      GOSUB =SAVED0      Save D0 in STMTD0 RAM
58 F2CA8 D3        D=0  A            Clear D[X]
59 F2CAA 8E00      GOSUBL =START+    Entry point for loop # in C[S]
        00
60 F2CBO 451      GOC   SENDER      Error, P=error #
61      *
62      * Now D0 points to the mailbox, STMTD0 points to input string
63      *
64 F2CB3 7000      GOSUB =getdev     Check if in device mode
65 F2CB7 4E5      GOC   SEND41      Yes...leave frame count as is
66 F2CBA 3500      LC(6) (=nSETFC)+#FFFFFF Set frame count to don't count
        0000
67 F2CC2 7000      GOSUB =Pute
68 F2CC6 6770 SENDER GOTO  SEND40    If carry set, GOTO eRRORX
69      *
70      *
71 F2CCA 7D51 SEND10 GOSUB  GFTYPE    Get Frame TYPE
72      *
73      * D0 points at first character not in A-Z, A[A[S]:0] is frame
74      *
75 F2CCE AF6      C=A   W
76 F2CD1 D0      A=0   A            Clear substitute value
77      *
78      * FRAMEE leaves D0 unchanged, C[X]: frame value, B[B]: mask
79      * FRAMEE also sets P=0!
80      *
81 F2CD3 8E00      GOSUBL =FRAMEE
        00
82 F2CD9 590      GONC   SEND15      If no carry, match!
83      *
84      * If NOT match, this is EOL!
85      *
86 F2CDC 3200      LCHEX  F00      Value is F00 (EOL)
        F
87 F2CE1 D5      B=C   A            Mask in B[B] (00)
88      *
89 F2CE3 F2 SEND15 CSL   A
90 F2CE5 F2      CSL   A
91 F2CE7 AE9      C=B   B            Put mask in C[B], frame in C[4:2]
92 F2CEA 7000      GOSUB =SAVE2C     Save in STMTR1
93 F2CEE 4C4      GOC   SEND5.      If carry (EOL), send it!
94 F2CF1 14A      A=DATO B          Read in next token
95 F2CF4 3100      LC(2) =tCOMMA    Is there an expression?
96 F2CF8 966      ?A#C  B
97 F2CFB 04      GOYES  SEND5.      No...send the frame and continue
98      *
99      * Now need to get the expression (One byte)
100     *
101 F2CFD 161      DO=DO+ 2          Skip the Comma token
102 F2D00 7871 SEND20 GOSUB  GST!NO    Get STring or Number (EXPEXC)
103     *
104     * GST!NO eliminates complex numbers from consideration!

```

```

105      * If number, converts to HEX and returns with # in A[A], carry
106      * clear (If overflow or <0, jumps to error)
107      * If string, returns with D1 pointing to string, D[A] = length
108      * of string (D1 needs to be decremented to next character),
109      * and carry is set.
110      * If complex, jumps to error routine
111      *
112 F2D04 7000      GOSUB  =SWAPD0      Mailbox-->DO, PC-->RAM
113 F2D08 517      GONC   SEND60      Number!
114      *
115      *
116      * String if here!
117      *
118 F2D0B 7000 SEND30 GOSUB  =REST2C      Get back the value of byte, mask
119      *
120      * C[B] is the mask, C[4:2] is the value
121      *
122 F2D0F D1      B=0   A      Clear high nibbles of B[A]
123 F2D11 AE5     B=C   B      Mask into B[B]
124 F2D14 CF      D=D-1 A      Carry if done...
125 F2D16 4A2 SEND41 GOC   SEND41      ...done!
126 F2D19 14B     A=DAT1 B      Now A[B] is the character value
127 F2D1C 1C1     D1=D1- 2      Point to next character...
128 F2D1F 0EF0    A=A&B A      Mask the value...
129 F2D23 F6      CSR   A
130 F2D25 F6      CSR   A      Get value back into C[X]
131      *
132      * This is a hard-wired opcode calculation!!!!!!
133      *
134 F2D27 B56     C=C+1 M      Opcode for send frame!!!
135 F2D2A 0EFA    C=C!A A      OR in the frame value
136 F2D2E 8E00    GOSUBL =PUTC      Send the frame
      00
137 F2D34 56D     GONC   SEND30      Go if no error
138 F2D37 6000 =eRRORX GOTO  =ERRORX
139      *
140      *
141 F2D3B 483 SEND5. GOC   SEND50      Go always
142      *
143      *
144 F2D3E 48F SEND40 GOC   eRRORX
145 F2D41      SEND41
146      *
147      * Done with string handling
148      *
149 F2D41 7000      GOSUB  =SWAPD0      Mailbox-->RAM, PC-->DO
150      *
151      * Check if tCOMMA...if so, continue at SEND20
152      *
153 F2D45 14A     A=DAT0 B
154 F2D48 161     DO=DO+ 2
155 F2D4B 3100    LC(2) =tCOMMA
156 F2D4F 962     ?A=C   B      Is it a comma?
157 F2D52 EA      GOYES  SEND20      Yes...more data
158 F2D54 3100    LC(2) =tCOLON      Frame?

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```

159 F2D58 966      ?RMC  B      Is it a frame type?
160 F2D5B 60      GOYES SEND45  No...DONE!
161 F2D5D 6C6F    GOTO  SEND10  Yes...continue
162                *
163                * If here, then done with processing...
164                *
165 F2D61 7000 SEND45 GOSUB =RESTD0  Restore mailbox pointer
166 F2D65 8E00    GOSUBL =GETERR  Check if detected an HPIL error
167 F2D6B 4BC SEND45 GOC  eRRORX  YES...report it!
168 F2D6E 8C00    GOLONG =ENDST  Next statement after cleanup
169                *
170                *
171 F2D74 D0 SEND50 R=0  A      Fall through to send code
172 F2D76 7000    GOSUB =SWAPD0  (Mailbox-->D0, PC-->RAM)
173                *
174                * Number if here (Value in R[A])
175                *
176 F2D7A 7000 SEND60 GOSUB =REST2C  Restore value of frame
177 F2D7E D1      B=0  A
178 F2D80 D5      B=C  A      B[A] is now the mask
179 F2D82 F6      CSR  A
180 F2D84 F6      CSR  A      C[X] is now the frame value
181 F2D86 0EFO    A=R&B A
182 F2D8A 0E3A    C=C!A X      Now C[X] is the frame to send
183                *
184                * This is a hard-wired opcode calculation!!!!!!!!!!!!!!
185                *
186 F2D8E B56      C=C+1 M      Opcode 1xxx (xxx is frame)
187                *
188                * Next, check if this is MTR or MLR (F04 or F02, respectively)
189                * (OR an EOL...F00 - if so, send EOLSTR)
190                *
191 F2D91 B26      C=C+1 XS
192 F2D94 A2E      C=C-1 XS      If carry, is MxA
193 F2D97 5D0      GONC  SEND70  Not MxA...continue
194 F2D9A 96A      ?C=0 B
195 F2D9D 21      GOYES SEND80  This is EOL!
196                *
197                * This is another hard-wired opcode calculation!!!!!!
198                *
199 F2D9F AA2      C=0  XS
200 F2DA2 B56      C=C+1 M      Opcode 200x, x=4:T, x=2:L
201 F2DA5 8E00 SEND70 GOSUBL =PUTC  Send the frame
202 F2DAB 629F    GOTO  SEND40  Check if all OK, continue
203                *
204                *
205 F2DAF 1F00 SEND80 D1=(5) =EOLLEN
206 F2DB6 15F6    C=DAT1 7      Read in the EOL string, length
207 F2DBA D0      R=0  A
208 F2DBC A8A      R=C  P
209 F2DBF 81C      ASRB      Convert to bytes

```

```

210 F2DC2 BF6      CSR    W      C[5:0] is the string!
211 F2DC5 AF5      B=C    W      Save in B[5:0] for SENDIT
212 F2DC8 ROC     SEND90 A=A-1  P      Check if done
213 F2DCB 461      GOC    SEND95 Done!
214 F2DCE AE9      C=B    B
215 F2DD1 BF5      BSR    W
216 F2DD4 F5       BSR    A      Next character is ready
217 F2DD6 8E00     GOSUBL =PUTD Send the data byte
      00
218 F2DDC 5BE      GONC   SEND90 Loop back if no error
219 F2DDF 4B8      GOC    SENDEr Go always...
220      *~
221      *~
222 F2DE2 D2     SEND95 C=0    A      Clear mask, value (DATA)
223 F2DE4 A6E      C=C-1  B      Mask is "FF", value=0
224 F2DE7 7000     GOSUB  =SAVE2C Save it away for next item!
225 F2DEB 655F     GOTO   SEND41 Continue on
226      *****
227      *****
228      **
229      ** Name:      GLOOP# - Get loop # from RAM (if one present)
230      **
231      ** Category:  EXCUTL
232      **
233      ** Purpose:
234      **      Get loop number from memory
235      **
236      ** Entry:
237      **      D0 points to next token
238      **
239      ** Exit:
240      **      P=0
241      **      D0 points to next item on line
242      **      C[S] is loop # [0-2]
243      **      Carry set if no loop # given
244      **
245      ** Calls:      GTYPRM
246      **
247      ** Uses.....
248      ** Inclusive: A,B,C,D,R0,R1,R2,R3,R4,D0,D1,P,ST[11:0],FUNCxx
249      **
250      ** Stk lvls:   6 (GTYPRM)
251      **
252      ** History:
253      **
254      **      Date      Programmer      Modification
255      **      -----      -
256      **      09/26/83      NZ          Updated documentation
257      **      03/01/83      NZ          Added documentation
258      **
259      *****
260      *****
261 F2DEF 14A     =GLOOP# A=DATO  B
262 F2DF2 20      P=      0
263 F2DF4 3100     LC(2)  =tSEMIC

```

```

264 F2DF8 AC2          C=0   S          Clear loop #...
265 F2DFB 966          ?RMC   B          Is there a loop #?
266 F2DFE 00          RTNYES          No...return
267
268          *
269          * Need to get the loop #
270 F2E00 161          DO=DO+ 2          Skip the leading tSEMIC
271 F2E03 8E00        GOSUBL =GTYPRL          Get type (Sequence #) from RAM
      00
272 F2E09 4D1          GOC    GLOOPE          Error
273 F2E0C 161          DO=DO+ 2          Skip the trailing tSEMIC
274
275          *
276          * Now B[B] is the number
277 F2E0F A6D          B=B-1  B          Decrement by 1...
278 F2E12 421          GOC    GLOOPE          Error!
279 F2E15 3120        LC(2)  2          Max loop #
280 F2E19 9E1          ?B>C   B
281 F2E1C 90          GOYES  GLOOPE          Too big!
282 F2E1E D9          C=B    A
283 F2E20 816          CSRC
284 F2E23 03          RTNCC
285
286          *
287 F2E25 20          GLOOPE P=    =eRANGE
288 F2E27 6000        GLOOPE GOTO  =ERRORX
289
290          *****
291          **
292          ** Name:          GFTYPE - Get frame type from RAM
293          **
294          ** Category:     EXCUTL
295          **
296          ** Purpose:
297          **   Get frame type from RAM, given string of chars
298          **
299          ** Entry:
300          **   DO points to string of chars (<=7)
301          **
302          ** Exit:
303          **   A contains the string (A[S] is WP value)
304          **   Carry SET if error
305          **
306          ** Calls:        CONVUC,RANGEA
307          **
308          ** Uses.....
309          ** Exclusive: A[W],C[W],P,DO
310          ** Inclusive: A[W],C[W],P,DO
311          **
312          ** Stk lvls:    2 (CONVUC)
313          **
314          ** History:
315          **
316          **   Date          Programmer          Modification
317          **   -----          -----          -----

```

```

318          ** 09/26/83      NZ      Updated documentation
319          ** 03/01/83      NZ      Added documentation
320          **
321          ****
322          ****
323 F2E2B AF0 =GFTYPE A=0      W
324 F2E2E AF2          C=0      W      Could be C=0 S
325 F2E31 181          DO=DO- 2
326 F2E34 161 GFTYP1 DO=DO+ 2
327 F2E37 14A          A=DATO B      Read the byte
328 F2E3A 8E00        GOSUBL =CONVUC  Convert to upper case
          00
329 F2E40 5B0          GONC  GFTYP2  Was lower case...OK
330 F2E43 8E00        GOSUBL =RANGEA  Check if in [A-Z]
          00
331 F2E49 4E0          GOC   GFTYP3  No...done
332 F2E4C 814 GFTYP2 ASRC
333 F2E4F 814          ASRC
334 F2E52 B46          C=C+1  S      Shift around into high nibbles
335 F2E55 5ED          GONC  GFTYP1  Increment count of characters
336          *-
337          *-
338 F2E58 AE0 GFTYP3 A=0      B      Clear this entry!
339 F2E5B 94A          ?C=0  S
340 F2E5E 00          RTNYES
341 F2E60 80DF        P=C      15      Carry set if error
342          *
343          * Shift A[W] left circular P*2 times
344          *
345 F2E64 0D          P=P-1
346 F2E66 810 GFTYP4 ASLC
347 F2E69 810          ASLC
348 F2E6C 0D          P=P-1
349 F2E6E 57F        GONC  GFTYP4  Not done yet...keep shifting
350          *
351          * Now A[W] is zeroes, string
352          *
353 F2E71 A46          C=C+C  S      Convert to nibbles...
354 F2E74 A4E          C=C-1  S      ...and to base zero...
355 F2E77 ACA          A=C      S      ...and copy to A[S]
356 F2E7A 03          RTNCC
357          ****
358          ****
359          **
360          ** Name:          GSTIND - Get string or number from RAM
361          **
362          ** Category:     EXECUTL
363          **
364          ** Purpose:
365          **          Get string or number from RAM
366          **          (If complex or out of range, exit to error)
367          **
368          ** Entry:
369          **          DO points to the item
370          **

```



```

371      ** Exit:
372      **      Carry set: String...D1->first byte, D[A]=length(bytes)
373      **      Carry clear: Number...A[A]=Hex value
374      **
375      ** Calls:      EXPEXC,GHEXBT
376      **
377      ** Uses.....
378      ** Exclusive: A, C,D,          D1
379      ** Inclusive: A,B,C,D,R0,R1,R2,R3,R4,D0,D1,P,ST[11:0],FUNCxx
380      **
381      ** Stk lvls:   5 (EXPEXC)
382      **
383      ** History:
384      **
385      **      Date      Programmer      Modification
386      **      -----      -
387      **      09/26/83      NZ          Updated documentation
388      **      03/01/83      NZ          Added documentation
389      **
390      ****
391      ****
392 F2E7C 8E00 =GST!NO GOSUBL =eXPEXC      Expression execute
          00
393      *
394      * Now check if valid number or complex or NAN or .....
395      *
396      * If A[B]=#0F or 8F, than this is a string.
397      * If A[B]=(3 legal digits), than this is a number.
398      *
399 F2E82 AE6          C=A      B
400 F2E85 B06          C=C+1  P
401 F2E88 A66          C=C+C   B
402 F2E8B 96A          ?C=0    B
403 F2E8E C2          GOYES  GST!20      This is a STRING!
404 F2E90 AB6          C=A      X
405 F2E93 05          SETDEC          Check if all BCD digits...
406 F2E95 B36          C=C+1  X
407 F2E98 A3E          C=C-1  X
408 F2E9B 04          SETHEX
409 F2E9D 932          ?A=C    X
410 F2EA0 D0          GOYES  GST!10      This is a NUMBER!
411      *
412      * If here, have SOMETHING else!
413      *
414 F2EA2 20          P=      =eNUMR      Non-numeric data
415 F2EA4 6000 GST!ER  GOTO    =ERRORX
416      *
417      *
418 F2EA8 20          GST!05  P=      =eRANGE
419 F2EAA 49F          GOC     GST!ER      Go always
420      *
421      *
422      *
423      * Number!
424      *

```

```

425 F2EAD 8E00 GST!10 GOSUBL =GHEXBT      Pop stack, Get HEX ByTe
      00
426 F2EB3 44F          GOC      GST!05      Range error
427 F2EB6 D4          A=B      A          GHEXBT returns B[A]=value
428 F2EB8 03          RTNCC          Carry clear for number
429          * _
430          * _
431          *
432          * String!
433          *
434 F2EBA BF4 GST!20 ASR      W
435 F2EBD BF4          ASR      W          Now string length in A[A]
436 F2EC0 AF2          C=0      W          (Length is in nibbles)
437 F2EC3 D6          C=A      A
438 F2EC5 81E          CSRB          Convert to bytes...
439 F2EC8 D7          D=C      A          Copy length to D[A]
440 F2ECA 17D          D1=D1+ 14      Skip string header (-2 for end)
441 F2ECD 137          CD1EX
442 F2ED0 C2          C=A+C      A          "Start" of string in C[A]...
443 F2ED2 135          D1=C          ...and in D1
444 F2ED5 02          RTNSC
445 F2ED7          END          Carry set for string
  
```

CONVUC	Ext		-	328			
ENDST	Ext		-	168			
EOLLEN	Ext		-	205			
ERRORX	Ext		-	138	288	415	
FRAMEE	Ext		-	81			
GETERR	Ext		-	166			
GF TYP1	Abs	994868	#F2E34	-	326	335	
GF TYP2	Abs	994892	#F2E4C	-	332	329	
GF TYP3	Abs	994904	#F2E58	-	338	331	
GF TYP4	Abs	994918	#F2E66	-	346	349	
=GF TYPE	Abs	994859	#F2E2B	-	323	71	
GHEXBT	Ext		-	425			
=GLOOP#	Abs	994799	#F2DEF	-	261	53	
GLOOPE	Abs	994855	#F2E27	-	288	272	
GLOOPE	Abs	994853	#F2E25	-	287	278	281
GST!05	Abs	994984	#F2EA8	-	418	426	
GST!10	Abs	994989	#F2EAD	-	425	410	
GST!20	Abs	995002	#F2EBA	-	434	403	
GST!ER	Abs	994980	#F2EA4	-	415	419	
=GST!ND	Abs	994940	#F2E7C	-	392	102	
GTYP RM	Ext		-	271			
PUTC	Ext		-	136	201		
PUTD	Ext		-	217			
Pute	Ext		-	67			
RANGEA	Ext		-	330			
REST2C	Ext		-	118	176		
RESTD0	Ext		-	165			
SAVE2C	Ext		-	92	224		
SAVED0	Ext		-	57			
=SEND	Abs	994464	#F2CA0	-	53		
SEND10	Abs	994506	#F2CCA	-	71	161	
SEND15	Abs	994531	#F2CE3	-	89	82	
SEND20	Abs	994560	#F2D00	-	102	157	
SEND30	Abs	994571	#F2D0B	-	118	137	
SEND40	Abs	994622	#F2D3E	-	144	68	202
SEND41	Abs	994625	#F2D41	-	145	125	225
SEND45	Abs	994657	#F2D61	-	165	160	
SEND5.	Abs	994619	#F2D3B	-	141	93	97
SEND50	Abs	994676	#F2D74	-	171	141	
SEND60	Abs	994682	#F2D7A	-	176	113	
SEND70	Abs	994725	#F2DA5	-	201	193	
SEND80	Abs	994735	#F2DAF	-	205	195	
SEND90	Abs	994760	#F2DC8	-	212	218	
SEND95	Abs	994786	#F2DE2	-	222	213	
SENDER	Abs	994667	#F2D6B	-	167	219	
SENDd	Ext		-	51			
SENDER	Abs	994502	#F2CC6	-	68	60	
SENDp	Ext		-	52			
SEND41	Abs	994582	#F2D16	-	125	65	
START+	Ext		-	59			
SWAPD0	Ext		-	112	149	172	
eNUMR	Ext		-	414			
eRANGE	Ext		-	287	418		
=eRRORX	Abs	994615	#F2D37	-	138	144	167
eXPEXC	Ext		-	392			

getdev	Ext	-	64	
nSETFC	Ext	-	66	
tCOLON	Ext	-	158	
tCOMMA	Ext	-	95	155
tSEMIC	Ext	-	263	

Input Parameters

Source file name is NZ&UTL::MS

Listing file name is NZ/UTL:TI:ML::-1

Object file name is NZXUTL:TI:MS::-1

Initial flag settings are
111111
0123456789012345

Errors

None

Saturn Assembler News

```
1          *
2          *
3          *      N  N  ZZZZ  &      BBBB  III  FFFFF
4          *      N  N      Z  & &  B  B  I  F
5          *      NN  N      Z  & &  B  B  I  F
6          *      N  N  N  Z      &      BBBB  I  FFFF
7          *      N  NN  Z      & & &  B  B  I  F
8          *      N  N  Z      & &  B  B  I  F
9          *      N  N  ZZZZ  && &  BBBB  III  F
10         *
11         TITLE  Basic interface <840124.1345>
12 F2ED7     ABS   #F2ED7           TIXHP6 address (fixed)
```

```

13          STITLE Cold start handler
14          ****
15          ****
16          **
17          ** Name:          PILCST - HPIL cold start handler routine
18          **
19          ** Category:     POLL
20          **
21          ** Purpose:
22          **   Diamond cold start POLL handler routine
23          **
24          ** Entry:
25          **   P=0, HEXMODE
26          **
27          ** Exit:
28          **   Carry clear, XM=1, P=0
29          **
30          ** Calls:        I/OALL,FNDMBX,GETERR,CHKST+,D1=DSP,D1=DST
31          **
32          ** Uses.....
33          **   Exclusive:   B[W],C[W],          RO,  D1,P
34          **   Inclusive:  A[W],B[W],C[W],D[15:5],RO,DO,D1,P
35          **
36          ** Stk lvls:    2 (FNDMBX)(I/OALL)(CHKST+)(GETERR)
37          **
38          ** Detail:
39          **   Reset all HPIL mailboxes, set up LOOPST and DSPSET,
40          **   set DISPLAY IS DISPLAY, PRINTER IS PRINTER
41          **
42          ** History:
43          **
44          **   Date          Programmer          Modification
45          **   -----          -
46          **   07/26/83      NZ          Added check for Diamond error
47          **                                     after resetting it
48          **   06/30/83      NZ          Added wakeup of Diamond after
49          **                                     RESET (to be sure Manual Mode bit
50          **                                     is clear)
51          **   03/15/83      NZ          Removed check for RAM changed
52          **   02/22/83      NZ          Changed CLEAR of mailboxes into
53          **                                     RESET of mailboxes
54          **   02/11/83      NZ          Added save of D[A] in RO
55          **   12/21/82      NZ          Updated documentation
56          **
57          ****
58          ****
59 F2ED7     =PILCST
60          *
61          * PIL buffer (used by PILCNF to determine if HPIL was present
62          * at the last configuration before current one - if not, then
63          * calls PILCST as a subroutine)
64          *
65 F2ED7     PILCSO
66 F2ED7 D1   B=0    A          Allocate 0 nibs (no info to store)
67 F2ED9 DB   C=D    A
  
```

```

68 F2EDB 108          RO=C          Save D[A] in RO (I/OALL uses D[A])
69 F2EDE 3200        LC(3) =bPILSV
    0
70 F2EE3 8F00        GOSBVL =I/OALL      I/O ALLocate
    000
71 F2EEA 118          C=RO
72 F2EED D7          D=C   A          Restore D[A] from RO
73
74 *
75 * Now reset all HP-IL mailboxes (Up to 16 of them!)
76 F2EEF AF2          C=0   W
77 F2EF2 27          P=    7
78 F2EF4 308          LC(1) 8          Reset the mailbox
79 F2EF7 AF5          B=C   W          Save the message in B[8:0]
80 F2EFA AC9  PILCS3 C=B   S          Find out which mailbox I'm on...
81 F2EFD 8E00        GOSUBL =FNDBMX     ...and see if it's there
    00
82 F2F03 491          GOC   PILCS4      Not there...no more mailboxes
83 F2F06 AF9          C=B   W          Found one...reset it
84 F2F09 15C8         DATO=C 9          Reset the mailbox, clear NRD bit
85 F2F0D 8E00        GOSUBL =GETERR     Wake it up, read the error message
    00
86 *
87 F2F13 7ED2          GOSUB  CHKST+      Set up parameters
88 F2F17 B45          B=B+1 S          Increment to next mailbox
89 F2F1A 5FD          GONC  PILCS3      Go always (carry= >16 mailboxes)
90 *
91 *
92 F2F1D  PILCS4
93 *
94 * Now initialize the IS-TBL
95 *
96 F2F1D 7063          GOSUB  D1=DSP
97 *
98 * Set IS-DSP ="03F1FFF", IS-PRT="02F1FFF", IS-INP="FFFFFFF",
99 * IS-PLT="FFFFFFF"
100 *
101 F2F21 20          P=    0          FNDBMX leaves P#0 when not found
102 F2F23 36FF        LCHEX  03F1FFF
    F1F3
    0
103 F2F2C 15D6         DAT1=C 7          Write IS-DSP entry
104 F2F30 176          D1=D1+ 7
105 F2F33 36FF        LCHEX  02F1FFF
    F1F2
    0
106 F2F3C 15D6         DAT1=C 7          Write IS-PRT entry
107 *
108 * Now enable the loop (LoopOK bit of DSPSET)
109 *
110 F2F40 D2          C=0   A
111 F2F42 1D00        D1=(2) =LOOPST
112 F2F46 15D0        DAT1=C 1          Clear Offed, InptOK
113 F2F4A 7C33        GOSUB  D1=DST     Clear DispOK, set LoopOK
114 *

```



```
115          * Set LoopOK until proven wrong
116          * Set Display to restart and check device ID
117          *
118 F2F4E 307          LC(1) 7          *DispOK, Printr, Wallby, LoopOK
119 F2F51 15D0        DAT1=C 1        Write bits out to RAM
120          *
121          * Set terminating character to LF for ENTER
122          *
123 F2F55 1E00        D1=(4) =TERCHR
124          00
124 F2F5B 31A0        LCHEX 0A
125 F2F5F 14D        DAT1=C B
126          *
127          * Done
128          *
129 F2F62 21          =RTNCCX P=      1
130 F2F64 0D          P=P-1          Clear the carry...
131 F2F66 00          RTNSXM          ...and set XM
```

```

132          STITLE No key wakeup poll handler
133          *****
134          *****
135          **
136          ** Name:          PILWNK - Wakeup, no key poll handler
137          **
138          ** Category:     POLL
139          **
140          ** Purpose:
141          **     Deep sleep wakeup-no key
142          **
143          ** Entry:
144          **     None
145          **
146          ** Exit:
147          **     Carry clear, XM=1, P=0
148          **
149          ** Calls:        None
150          **
151          ** Uses.....
152          **     Inclusive: C[P],D1
153          **
154          ** Stk lvls:    0
155          **
156          ** NOTE: Must not alter D[R] or STATUS
157          **
158          ** History:
159          **
160          **     Date          Programmer          Modification
161          **     -----          -
162          **     12/21/82      NZ              Updated documentation
163          **
164          *****
165          *****
166 F2F68 80E =PILWNK SREQ?          First check if SRQ pending
167 F2F6B 834          ?SR=0
168 F2F6E F1          GOYES PILWNx          Not me (no SRQ)
169          *
170          * Check if this is a Diamond service request...if so, wake up
171          * the HP-71 by simulating the ATTN key (Setting ATNFLG#0)
172          * (Should really set ATNFLG = "F" to say "ATTN pressed once")
173          *
174 F2F70 824          SR=0
175 F2F73 0B          CSTEM
176 F2F75 860          ?ST=0 =sDIAsr
177 F2F78 20          GOYES WNK00
178 F2F7A 0B          WNK00 CSTEM
179 F2F7C 401          GOC PILWNx
180 F2F7F 1F00          D1=(5) =ATNFLG
181          000
181 F2F86 301          LC(1) 1
182 F2F89 1550          DAT1=C P
183          *
184          * Now exit, carry clear, XM set
185          *

```

186 F2F8D 64DF PILWNx GOTO RTNCCX Return, clear carry, set XM

```

187          STITLE Configuration handler
188          *****
189          *****
190          **
191          ** Name:      PILCNF - Configuration poll handler for HPIL
192          ** Name:      PILWKP - Deep-sleep wakeup poll (no processing)
193          **
194          ** Category:  POLL
195          **
196          ** Purpose:
197          **      Configuration entry point - Restore buffers, set DSPCHX
198          **      to address of display routine, etc
199          **
200          ** Entry:
201          **      P=0,HEXMODE
202          **
203          ** Exit:
204          **      Carry clear, XM=1, P=0
205          **
206          ** Calls:     RESTOR,I/ORES,PILCST,D1=DST,D1=DSP,D1=DSX,
207          **              CHKASN,(PILWKS)
208          **
209          ** Uses.....
210          ** Exclusive:  B[A],C[W],          DO,D1,P
211          ** Inclusive: A[W],B[W],C[W],D[15:5],RO,DO,D1,P
212          **
213          ** NOTE: Must NOT alter D[A], Status
214          **
215          ** Stk lvls:  3 (PILCST)(CHKASN)
216          **
217          ** History:
218          **
219          **      Date      Programmer      Modification
220          **      -----      -
221          **      02/25/83      NZ          Moved IS-DSP check and DSPCHX set
222          **                                     later in the code
223          **      02/18/83      NZ          Added check for IS-DSP before
224          **                                     setting DSPCHX
225          **      02/11/83      NZ          Updated documentation (uses D,RO)
226          **      12/21/82      NZ          Updated documentation
227          **
228          *****
229          *****
230 F2F91      =PILCNF
231 F2F91 3200      LC(3) =bPILSV      Check if save buffer is here
232          0
233 F2F96 7190      GOSUB I/ores      Restore it
234 F2F9A 460       GOC   PILCN1      Found it...continue
235          *
236          * Save buffer not found...therefore HPIL was not present at
237          * last configuration poll...need to reset Diamond, set it up
238          *
239 F2F9D 763F      GOSUB PILCST      Go through my coldstart code
240 F2FA1          PILCN1
  
```

```

241      *
242      * Set the display device to be restarted with next character
243      *
244 F2FA1 75E2      GOSUB D1=DST
245 F2FA5 1572      C=DAT1 XS      Read display status...
246 F2FA9 0B       CSTEM
247 F2FAB 840      ST=0 =DispOK   Set the display to be restarted
248 F2FAE 0B       CSTEM
249 F2FB0 1552      DAT1=C XS      ...Write it back out
250      *
251      * Clear the OFFed bit in each device
252      *
253 F2FB4 8E00      GOSUBL =RESTOR
      00
254      *
255      * Now reclaim all I/O buffers I use
256      * Reclaim IS-DSP, IS-PRT, bSTMXQ (shouldn't be needed), bPILAI
257      *
258 F2FBA 1B00      DO=(5) (=IS-DSP)+3  Check if I/O buffer type
      000
259 F2FC1 7850      GOSUB PILWks     Restore IS-DSP if needed
260 F2FC5 166       DO=DO+ 7        Next entry
261 F2FC8 7150      GOSUB PILWks     Restore IS-PRT if needed
262 F2FCC 20        P= 0           (PILWks leaves P#0)
263      *
264 F2FCE 3200      LC(3) =bSTMXQ
      0
265 F2FD3 7450      GOSUB I/ores     Restore HPIL stmt execute buffer
266      *
267 F2FD7 3200      LC(3) =bPILAI
      0
268 F2FDC 7B40      GOSUB I/ores     Restore the ASSIGNIO buffer
269 F2FE0 7D92      GOSUB D1=DSP     Check if a display is assigned
270 F2FE4 15F6      C=DAT1 7        Read it in
271 F2FE8 8E00      GOSUBL =CHKASN   Check if assigned
      00
272 F2FEE 4A2       GOC RTNCCx      Not assigned...leave DSPCHK alone
273 F2FF1 7E92      GOSUB D1=DSX     Display location...
274 F2FF5 147       C=DAT1 A        Read it first...
275 F2FF8 8AE       ?C#0 A
276 F2FFB E1        GOYES RTNCCx     Exit if occupied
277 F2FFD 7500      GOSUB PILxxx     Get address of REL(5) on RSTK...
278      *
279 F3001 0000      REL(5) =BDISPJ   Offset to display entry
      0
280      *
281      *
282 F3006 07        PILxxx C=RSTK     ...pop it off...
283 F3008 D5        B=C A          ...save address in B[A]...
284 F300A 135       D1=C          ...and set DO to offset
285 F300D 147       C=DAT1 A      Read in display offset...
286 F3010 C9        C=B+C A      ...to get address of display jump
287 F3012 7D72      GOSUB D1=DSX   Point back to entry
288 F3016 145       DAT1=C A      Write out display routine address
289      *

```

```
290 F3019      =PILWKP
291 F3019 684F RTNCCx GOTO  RTNCCX
292           *_
293           *_
294 F301D 146  PILWks C=DATO R      Read in ID, type
295 F3020 80D0           P=C   0      P=type
296 F3024 884           ?PW   4      Single I/O buffer?
297 F3027 00           RTNYES      No...return (No buffer)
298           *
299           * I/O buffer...restore it
300           *
301 F3029 F6           CSR   A      ID in C[X] now
302 F302B 8D00 I/ores GOVLNG =I/ORES Restore the I/O buffer
      000
```

```

303          STITLE Power-off poll handler
304          *****
305          *****
306          **
307          ** Name:          PILPOF - Handler for power-off poll
308          **
309          ** Category:     POLL
310          **
311          ** Purpose:
312          **      Power-off code for HPIL:
313          **      -Sets device codes (DISPLAY, PRINTER, KEYBD, PLOTTER)
314          **      to power-off values (to allow restart on next usage)
315          **      -If f1PDWN is clear and the OFFED flag is clear, sends
316          **      power-down message to all Diamonds (up to 16) which
317          **      are not in manual mode and are controller
318          **
319          ** Entry:
320          **      P=0,HEXMODE
321          **
322          ** Exit:
323          **      Carry clear, XM=1
324          **
325          ** Calls:        RESTRT,SFLAG?,FNDMBX,CHKSTS,PUTC+
326          **
327          ** Uses.....
328          ** Exclusive:    B[S],C[W],DO,P,ST[11:0]
329          ** Inclusive:   A[W],B[W],C[W],DO,P,ST[11:0]
330          **
331          ** Stk lvls:    3 (RESTRT)(CHKSTS)
332          **
333          ** History:
334          **
335          **      Date          Programmer          Modification
336          **      -----          -
337          **      03/29/83      NZ          Added check of f1PDWN flag before
338          **                      powering down the loops
339          **      12/21/82      NZ          Updated documentation
340          **
341          *****
342          *****
343 F3032 7750 =PILPOF GOSUB RESTRT          Restart all devices on loop
344          *
345          * Check if loop is OFFED (by OFFI0)
346          *
347 F3036 1A00          DO=(4) =LOOPST
348          00
348 F303C 1562          C=DATO XS
349          *
350          * =Offed is 11
351          *
352 F3040 A26          C=C+C XS          If carry, OFFED
353 F3043 454          GOC PILPO3          If carry (=Offed), exit
354          *
355          * Check if powerdown inhibit flag is set
356          *

```

```
357 F3046 DB          C=D   A          Save D[A] in DO (SFLAG? puts DO
358 F3048 134         DO=C          into D[A] to save DO)
359 F304B 3100        LC(2) =f1PDWN    Check if power down inhibited
360 F304F 8E00        GOSUBL =sFLAG?
      00
361 F3055 433         GOC    PILP03      If carry, just return
362 *
363 * Now shut down all the loops...
364 *
365 F3058 AC1         B=0   S          Initialize loop counter
366 F305B AC9 PILP01 C=B   S
367 F305E 8E00        GOSUBL =FNDBMX
      00
368 F3064 442         GOC    PILP03      No more mailboxes
369 F3067 8E00        GOSUBL =CHKSTS    Check status, RESET
      00
370 F306D 451         GOC    PILP02      In manual mode...leave it alone
371 *
372 * C[X] is the device status from Diamond
373 *
374 F3070 0A          ST=C
375 F3072 860        ?ST=0 =sCONTR    Am I controller?
376 F3075 E0         GOYES PILP02    No...try next loop
377 *
378 * OK to power down this loop
379 *
380 F3077 20          P=    0
381 F3079 3100        LC(2) =mPDLOP    Power down loop
382 F307D 8E00        GOSUBL =PUTC+    Send it
      00
383 *
384 * Don't check carry...even if carry set, continue with the
385 * other loops (if any)
386 *
387 F3083 B45 PILP02 B=B+1 S          Increment loop counter
388 F3086 54D        GONC   PILP01    Go always (if carry, > 16 loops)
389 *
390 * Done with power-off processing
391 *
392 F3089 68DE PILP03 GOTO   RTNCCX    Return, carry clear, XM set
```



```
393          STITLE Restart HPIL to search
394          *****
395          *****
396          **
397          ** Name:      RESTRT - Restart all HPIL devices (readdress)
398          **
399          ** Category:  PILUTL
400          **
401          ** Purpose:
402          **      Restart all device addresses in the HPIL system
403          **      (set to search for address at next access)
404          **
405          ** Entry:
406          **      P=0, HEXMODE
407          **
408          ** Exit:
409          **      P=0
410          **      Carry clear
411          **
412          ** Calls:     RESTRs,CSRC5,CSLC5,FIBOFF
413          **
414          ** Uses.....
415          ** Exclusive: C[W],DO,P
416          ** Inclusive: R[W],C[W],DO,P
417          **
418          ** Stk lvls:  2 (FIBOFF)
419          **
420          ** History:
421          **
422          **      Date      Programmer      Modification
423          **      -----      -
424          **      06/01/83      NZ      Added call to FIBOFF
425          **      12/21/82      NZ      Updated documentation
426          **
427          *****
428          *****
429 F308D      =RESTRT
430 F308D 137      CD1EX
431 F3090 8E00      GOSUBL =CSLC5      Save D1 in C[9:5]
432          00
433 F3096 8F00      GOSBVL =FIBOFF      Restart FIB buffers
434          000
435 F309D 8E00      GOSUBL =CSRC5      Recall D1 to C[A]
436          00
437 F30A3 135      D1=C      Restore D1
438 F30A6 1800      DO=(5) =DSPSET
439          000
440 F30AD 307      LC(1) 7      DispOK=0; Wallby,Printr,LoopOK=1
441 F30B0 15C0      DATO=C 1      Write them out
442          *
443          * Now deassign all devices
444          *
445 F30B4 1A00      DO=(4) =IS-DSP      Point to IS-DSP, set it OFF
446          00
447 F30BA 7800      GOSUB RESTRs      IS-DSP
```

```
443 F30BE 7400      GOSUB  RESTRs      IS-PRT
444 F30C2 7000      GOSUB  RESTRs      IS-INP
445                *
446                * Fall into RESTRs for IS-PLT (exit when done with RESTRs)
447                *
448 F30C6           RESTRs
449                *
450                * DO points to the entry
451                *
452 F30C6 15E6      C=DATO 7
453 F30CA 23        P=      3      Check if C[3]="F"...if so, not me
454 F30CC B06      C=C+1  P      If C[3]="F", then not HPIL/done
455 F30CF 401      GOC    RESTRs4    Not HPIL or assigned to *
456 F30D2 B26      C=C+1  XS      If C[XS]="F", leave this alone
457 F30D5 4A0      GOC    RESTRs4    Increment DO, return
458 F30D8 D2       C=0    A
459 F30DA CE       C=C-1  A
460 F30DC 15C2     DATO=C 3      Write out "FFF"
461 F30E0 166     RESTRs4 DO=DO+ 7    Move to the next entry
462 F30E3 20      P=      0
463 F30E5 03      RTNCC
```

```

464          STITLE Main loop poll handler
465          *****
466          *****
467          **
468          ** Name:      PILMLP - HPIL handler for main loop
469          **
470          ** Category:  POLL
471          **
472          ** Purpose:
473          **   Main loop handler code - if display is not offed,
474          **   set ST[LoopOK] true
475          **
476          ** Entry:
477          **   P=0,HEXMODE
478          **
479          ** Exit:
480          **   Carry clear,XM=1
481          **
482          ** Calls:     D1=DST
483          **
484          ** Uses.....
485          **   Inclusive: C[XS],D1,P
486          **
487          ** Stk lvls:  1 (D1=DST)
488          **
489          ** History:
490          **
491          **   Date      Programmer      Modification
492          **   -----      -
493          **   12/21/82      NZ          Updated documentation
494          **   01/17/83      NZ          Changed Search from 4 to 5 (START
495          **                                     is now using ST[4] also)
496          **
497          *****
498          *****
499 F30E7 1F00 =PILMLP D1=(5) =LOOPST      First check if loop is "OFFED"
      000
500 F30EE 1572          C=DAT1 XS
501 F30F2 0B          CSTEM
502 F30F4 870          ?ST=1 =Offed      Is it offed?
503 F30F7 20          GOYES PILM05      Set carry if yes
504 F30F9 0B          PILM05 CSTEM
505 F30FB 451          GOC PILMRC      If offed, just return
506          *
507          * Not OFFED by OFFIO...set loop OK true here
508          *
509 F30FE 7881          GOSUB D1=DST
510 F3102 1572          C=DAT1 XS
511 F3106 0B          CSTEM
512 F3108 850          ST=1 =LoopOK      Set Loop OK flag true again
513 F310B 0B          CSTEM
514 F310D 1552          DAT1=C XS      Write out the statuses
515 F3111 605E PILMRC GOTO RTNCCX      Return w/carry clear, XM=1
516          *-
517          *-

```

518 F3115 0
519 F3116

CON(1) =FIXSPC
BSS 4-1

4 nibbles available here

```

520          STITLE Service Request Handler
521          *****
522          *****
523          **
524          ** Name:      PILSRQ - HPIL service request handler
525          **
526          ** Category:  POLL
527          **
528          ** Purpose:
529          **     HPIL service request poll handler - determine SRQ
530          **     source, process SRQ
531          **
532          ** Entry:
533          **     P=0,HEXMODE
534          **
535          ** Exit:
536          **     Carry clear,P=0,XM=1
537          **
538          ** Calls:      SAVSTS,FNDMBX,GETHSS,CHKSTS,PUTCN,GETST-,SFLAG?,
539          **              RESSTS
540          **
541          ** Uses.....
542          ** Exclusive:  B[A],C[W],          D1,P
543          ** Inclusive: A[W],B[A],C[W],D[15,5],DO,D1,P,SNAPBF[37:0]
544          **
545          ** Stk lvls:  1 (SAVSTS,RESSTS save all except call to SAVSTS)
546          **
547          ** NOTE: Must NOT use many RSTK levels OR any status bits
548          **
549          ** Algorithm:
550          **     Check if mailbox SRQ...if not, return
551          **     Find which mailbox is requesting service
552          **     Check if interrupt pending...if pending, set exception
553          **     Check if data available and remote mode and "dormant":
554          **     if so, set up HPIL external key
555          **     If not interrupt and not (data available and remote)
556          **     then continue checking with next loop
557          **
558          ** History:
559          **
560          **      Date      Programmer      Modification
561          **      -----      -
562          **      02/22/84      NZ          Added check for carry from CHKSTS
563          **                                     (also changed from CHKSET to CHKSTS
564          **                                     at REQSER to check for manual mode)
565          **      10/20/83      NZ          Implemented ER #39-10744 (if the
566          **                                     first loop requesting service
567          **                                     does not have anything to do, try
568          **                                     any other loops for SRQ)
569          **      12/21/82      NZ          Updated documentation
570          **
571          *****
572          *****
573 F3119 80E =PILSRQ SREQ?      First check this is HPIL
574 F311C 83A ?SR=0

```

```

575 F311F 2F          GOYES  PILMRC      No request pending...exit
576 F3121 824        SR=0
577 F3124 0B         CSTEM
578 F3126 860        ?ST=0  =sMBXsr      Mailbox SRQ?
579 F3129 20         GOYES  PILS00      Set carry if not HPIL
580 F312B 0B         PILS00 CSTEM
581 F312D 43E        GOC    PILMRC      Not HPIL...exit
582                  *
583                  * This is an HPIL SRQ...service it
584                  *
585 F3130 7623        GOSUB  SAVSTS      Save status, 5 levels, D[A]
586 F3134 1F00        D1=(5) =MBOX^
      000
587 F313B 147        C=DAT1 A           Save old MBOX^ value in B[3:1]
588 F313E F2         CSL    A
589 F3140 D5         B=C    A           Mbox value in B[3:1], # in B[0]
590                  *           Set up for mbox #1
591 F3142 816        PILS20 CSRC             Shift mailbox number into C[S]
592 F3145 8E00        GOSUBL =FNDBMX     Look for the mailbox
      00
593 F314B 4D6        GOC    PILS50      Not found...done
594 F314E 7D70        GOSUB  GETHSS      Read handshake nibbles (2)
595 F3152 870        ?ST=1  =hsRQSR     Requesting service?
596 F3155 90         GOYES  REQSER      Yes...see what it is
597 F3157 E5         PILS23 B=B+1  A           No...try next mailbox
598 F3159 D9         C=B    A
599 F315B 56E        GONC   PILS20      Go always (if more than 16, no)
600                  *-
601                  *-
602                  *
603                  * Mailbox requesting service pointed to by D0
604                  *
605 F315E 8E00        REQSER GOSUBL =CHKSTS  Check this loop for reset,man mode
      00
606 F3164 42F        GOC    PILS23      Error...try next one
607 F3167 3300        LC(4)  =mSTSTC     Request status & clear SRQ
      00
608 F316D 8E00        GOSUBL =PUTCN
      00
609 F3173 8E00        GOSUBL =GETST-     Read the mailbox's status
      00
610 F3179 5B0        GONC   REQS10      (OK)
611 F317C 890        ?P=    =eABORT     Error from ATTN key hit?
612 F317F A3         GOYES  PILS50      Yes...exit routine NOW
613 F3181 F6         CSR    A           No...status is in C[3:1]
614 F3183 20         P=     0           (P was =ePIL)
615 F3185 0B         REQS10 CSTEM
616                  *
617                  * Check if there is an interrupt pending
618                  *
619 F3187 860        ?ST=0  =sINTR      Interrupt pending?
620 F318A 80         GOYES  REQS30      No...check if data is available
621 F318C 850        ST=1   =Except     Yes...set exception flag and exit
622 F318F 57C        GONC   PILS23      Go always...check next for remote ke
623                  *-

```

```

624      *-
625 F3192  REQS30
626      *
627      * Check if there is data available
628      *
629 F3192 860      ?ST=0  =sDATAV      Data available?
630 F3195 2C      GOYES  PILS23      No...try next mailbox
631      *
632      * Data is available...check if I/O CPU is in remote mode
633      *
634 F3197 860      ?ST=0  =sRMOTE      Remote mode?
635 F319A DB      GOYES  PILS23      No...ignore the data, try next mbox
636      *
637      * Data available, remote mode...check if the HP-71 is dormant
638      *
639 F319C 3100     LC(2)  =f1DORM
640 F31A0 8E00     GOSUBL =sFLAG?      Check the dormant flag
        00
641 F31A6 50B     GONC   PILS23      Not dormant...try next mailbox
642      *
643      * Data available, remote mode, dormant...generate special key
644      *
645 F31A9 1F00     D1=(5) =KEYPTR
        000
646 F31B0 321F     LCHEX  FF1
        F
647 F31B5 15D2     DAT1=C 3      Set to one key, keycode = "FF"
648      *
649      * Restore MBOX^ value, restore status, RSTK, D[A], and exit
650      *
651 F31B9 D9      PILS50  C=B   A
652 F31BB F6      CSR    A      Get mailbox # back to C[X]
653 F31BD 1F00     D1=(5) =MBOX^
        000
654 F31C4 15D2     DAT1=C 3      Restore the mailbox address
655 F31C8 72C2     GOSUB  RESSTS  Restore status, 5 levels, D[A]
656 F31CC 00      RTNSXM      Exit with carry clear, XM=1
657      *-
658      *-
659 F31CE 0      CON(1) =FIXSPC  1 nibble available here
660 F31CF      BSS    1-1
661      *****
662      *****
663      **
664      ** Name:      GETHSS - Get 2 handshake nibbles from I/O CPU
665      **
666      ** Category:  PILI/O
667      **
668      ** Purpose:
669      **      Read the two handshake nibbles from I/O CPU to the HP-71
670      **      and put into ST[7:0]
671      **
672      ** Entry:
673      **      D0 points to HPIL mailbox
674      **

```

```

675      ** Exit:
676      **      The two handshake nibbles from I/O CPU are in ST[7:0]
677      **      Carry clear
678      **
679      ** Calls:      None
680      **
681      ** Uses:
682      **      Inclusive: ST[7:0]
683      **
684      ** Stk lvls:  0
685      **
686      ** History:
687      **
688      **      Date      Programmer      Modification
689      **      -----      -
690      **      09/29/83      NZ      Updated documentation
691      **      04/01/83      SC      Wrote routine
692      **
693      ****
694      ****
695 F31CF 0B  =GETHSS CSTEM          Save C[X] in ST, put ST in C[X]
696 F31D1 160      DO=DO+ =oINHS
697 F31D4 14E      C=DATO B          Read two nibbles of handshake
698 F31D7 180      DO=DO- =oINHS
699 F31DA 0B      CSTEM          Put back into ST, restore C[X]
700 F31DC 01      RTN          Return, carry clear
  
```



```

694          STITLE Check and set up mailbox
695          *****
696          *****
697          **
698          ** Name:      CHKSET - Check if this mailbox has been reset
699          ** Name:      CHKST+ - Set up this mailbox after reset
700          **
701          ** Category:  LOCAL
702          **
703          ** Purpose:
704          **     Check if this mailbox has been reset...if so, set up
705          **     device ID and accessory ID
706          **
707          ** Entry:
708          **     DO @ mailbox
709          **
710          ** Exit:
711          **     DO pointing to mailbox
712          **     Carry clear:
713          **     All OK (If mailbox had been reset, it has been set up)
714          **     Carry set:
715          **     Error...P, C[0] are error code
716          **
717          ** Calls:      PUTC, PUTE
718          **
719          ** Uses.....
720          ** Exclusive: A[W],C[W],P
721          ** Inclusive: A[W],C[W],P
722          **
723          ** Stk lvls:  1 (PUTC)(PUTE)
724          **
725          ** Detail:
726          **     Check if RESET bit is set...if not, return, carry clear
727          **     Set IDY timeout = 50 mS
728          **     Set Accessory ID = (MSETAI)
729          **     Set Device ID = (vDEVID)&Cr&Lf
730          **
731          ** History:
732          **
733          **     Date      Programmer      Modification
734          **     -----      -
735          **     06/03/83      NZ          Added setting IDY timeout to 50ms
736          **     03/16/83      NZ          Added clear of NRD if reset
737          **     02/22/83      NZ          Wrote routine and documentation
738          **
739          *****
740          *****
741 F31DE 160 =CHKSET DO=DO+ =oOUTHs
742 F31E1 1564      C=DATO S      Read into C[S]
743 F31E5 180      DO=DO- =oOUTHs
744 F31E8 A46      C=C+C S      Check if reset
745 F31EB 500      RTNNC      If no carry, has NOT been reset
746          *
747          * Need to set device and accessory ID here
748          *
    
```

```

749 F31EE AF2          C=0   W
750 F31F1 15C8        DATO=C 9      Clear NRD, etc
751                    *
752 F31F5 20          =CHKST+ P=   0
753 F31F7 3300        LC(4) (=MSETIT)+50  Set IDY timeout to 50 msec
754 F31FD 8E00        GOSUBL =PUTC
755 F3203 400         RTNC
756 F3206 3500        LC(6) =MSETAI      Set accessory ID length
757 F320E 7960        GOSUB  Pute
758 F3212 400         RTNC
759 F3215 3500        LC(6) =MSETAI
760 F321D 7A50        GOSUB  Pute      Set accessory ID value
761 F3221 400         RTNC
762 F3224 3500        LC(6) =MSETDI      Set device ID length
763 F322C 7B40        GOSUB  Pute
764 F3230 400         RTNC
765                    *+
766                    *      LCASC (=vDEVID)+#000A0D*#100000000 xxxx<Cr><Lf>
767 F3233 3D          NIBHEX 3D
768 F3235 0000        CON(8) =vDEVID      Value of device ID
769 F323D D0A0        NIBHEX D0A000
770                    *+
771 F3243 AFA         A=C   W      Save in A[W]
772 F3246 B44        CHKSE1 A=A+1 S      Increment the pointer value
773 F3249 3500        LC(6) =MSETDI      Set device ID
774 F3251 816         CSRC
775 F3254 816         CSRC
776 F3257 AE6         C=A   B      Copy next byte to C[B]
777 F325A 812         CSLC
778 F325D AC6         C=A   S      Copy count to C[S]
779 F3260 812         CSLC      Now message is set up
780 F3263 7410        GOSUB  Pute      Send the message
781 F3267 400         RTNC
782 F326A 2E          P=   14      Don't alter A[S]
783 F326C B94         ASR   WP      Get next character
784 F326F B94         ASR   WP
785 F3272 20          P=   0
786 F3274 96C         ?A#0  B      Done yet?
787 F3277 FC          GOYES  CHKSE1      No...continue
788 F3279 01          RTN      Yes...done
789                    * _
790                    * _
791 F327B 8C00        =Pute  GOLONG =PUTE
792                    * _
793                    * _
794 F3281 1F00        =D1=DSP D1=(5) =IS-DSP

```

```
      000
795 F3288 01      RTN
796           *-
797           *-
798 F328A 1F00 =D1=DST D1=(5) =DSPSET
      000
799 F3291 01      RTN
800           *-
801           *-
802 F3293 1F00 =D1=DSX D1=(5) =DSPCHX
      000
803 F329A 01      RTN
```

```

804          STITLE Utility routines
805          *****
806          *****
807          **
808          ** Name:      SAVEST - Save status bits in STSAVE
809          ** Name:      RESTST - Restore status bits from STSAVE
810          **
811          ** Category:  SAVUTL
812          **
813          ** Purpose:
814          **      Save or restore status bits in =STSAVE RAM
815          **
816          ** Entry:
817          **      Nothing
818          **
819          ** Exit:
820          **      Status bits saved in/restored from =STSAVE
821          **
822          ** Calls:     None
823          **
824          ** Uses.....
825          **      Inclusive: STSAVE[2:0]/ST[11:0]
826          **
827          ** Stk lvls:  1 (internal push)
828          **
829          ** NOTE: Does not alter carry
830          **
831          ** History:
832          **
833          **      Date      Programmer      Modification
834          **      -----      -
835          **      12/21/82      NZ              Updated documentation
836          **
837          *****
838          *****
839 F329C 06  =SAVEST RSTK=C          Save C[A] on stack
840 F329E 136      CDOEX          Save D0 in C[A]
841 F32A1 1B00    DO=(5) =STSAVE
842          000
842 F32A8 0B      CSTEX
843 F32AA 15C2    DAT0=C 3          Write out the status bits
844 F32AE 0B      xxxxST CSTEX
845 F32B0 134          DO=C          Restore D0
846 F32B3 07          C=RSTK       Restore C[A]
847 F32B5 01          RTN
848          *-
849          *-
850 F32B7 06  =RESTST RSTK=C          Save C[A] on stack
851 F32B9 136      CDOEX          Save D0 in C[A]
852 F32BC 1B00    DO=(5) =STSAVE
853          000
853 F32C3 0B      CSTEX
854 F32C5 15E2    C=DAT0 3          Read back the status bits
855 F32C9 64EF    GOTO  xxxxST       Exit (Common code)
856          *****
  
```

```

857 *****
858 **
859 ** Name:      SAVEDO - Save D0 in STMTD0
860 ** Name:      RESTD0 - Restore D0 from STMTD1
861 ** Name:      SWAPD0 - Exchange D0 with STMTD0
862 ** Name:      SAVED1 - Save D1 in STMTD1
863 ** Name:      RESTD1 - Restore D1 from STMTD1
864 ** Name:      SAVE1A - Save A[W] in STMTRO
865 ** Name:      REST1A - Restore A[W] from STMTRO
866 ** Name:      SAVE2C - Save C[W] in STMTR1
867 ** Name:      REST2C - Restore C[W] from STMTR1
868 **
869 ** Category:  SAVUTL
870 **
871 ** Purpose:
872 **           Save or restore the value in mainframe STMTxx RAM:
873 **           these go away between statement executions
874 **
875 ** Entry:
876 **           None
877 **
878 ** Exit:
879 **           RESTXX: Restores the register indicated by XX
880 **           SAVEXX: Saves the register indicated by XX
881 **
882 ** Calls:     None
883 **
884 ** Uses.....
885 ** Inclusive: The designated RAM for SAVE, register for REST
886 **
887 ** Stk lvls:  SAVExx: 1
888 ** Stk lvls:  SWAPD0: 2
889 **
890 ** NOTE: Does not alter carry
891 **
892 ** History:
893 **
894 **           Date      Programmer      Modification
895 **           -----      -
896 **           12/21/82    NZ              Updated documentation
897 **
898 *****
899 *****
900 F32CD 06  =SAVED0 RSTK=C          Save C[A] on RSTK
901 F32CF 136      CDOEX
902 F32D2 1B00    DO=(5) =STMTD0
903          000
904 F32D9 144      DATO=C A
905 F32DC 136  SAVEOr CDOEX
906 F32DF 07      C=RSTK          Restore C[A] from RSTK
907 F32E1 01      RTN
908 **
909 F32E3 06  =SAVED1 RSTK=C          Save C[A] on RSTK
910 F32E5 137      CD1EX
  
```

```

911 F32E8 1F00      D1=(5) =STMTD1
      000
912 F32EF 145      DAT1=C A
913 F32F2 137  SAVE1r CD1EX
914 F32F5 07      C=RSTK      Restore C[A] from RSTK
915 F32F7 01      RTN
916      *_-
917      *_-
918 F32F9 06  =RESTD0 RSTK=C      Save C[A] on RSTK
919 F32FB 136      CDOEX
920 F32FE 1B00     DO=(5) =STMTD0
      000
921 F3305 146      C=DAT0 A
922 F3308 63DF     GOTO  SAVE0r
923      *_-
924      *_-
925 F330C 06  =RESTD1 RSTK=C      Save C[A] on RSTK
926 F330E 137      CD1EX
927 F3311 1F00     D1=(5) =STMTD1
      000
928 F3318 147      C=DAT1 A
929 F331B 66DF     GOTO  SAVE1r
930      *_-
931      *_-
932 F331F 06  =SWAPD0 RSTK=C      Save C[A] on RSTK
933 F3321 136      CDOEX
934 F3324 06      RSTK=C      Save old D0 on RSTK
935 F3326 1B00     DO=(5) =STMTD0    This alters C[A]
      000
936 F332D 146      C=DAT0 A      Get RAM D0 value
937 F3330 136      CDOEX      RAM D0 value in D0
938 F3333 07      C=RSTK      Old D0 value in C[A] now
939 F3335 136      CDOEX
940 F3338 06      RSTK=C      Now push new D0 value
941 F333A 136      CDOEX
942 F333D 1B00     DO=(5) =STMTD0    Get address again
      000
943 F3344 144      DAT0=C A      Write out old D0 value
944 F3347 07      C=RSTK      Get new D0 value from RSTK
945 F3349 629F     GOTO  SAVE0r
946      *_-
947      *_-
948 F334D 06  =SAVE1A RSTK=C      Save C[A] on RSTK
949 F334F 136      CDOEX
950 F3352 1B00     DO=(5) =STMTR0
      000
951 F3359 1507     DAT0=A W
952 F335D 6E7F     GOTO  SAVE0r
953      *_-
954      *_-
955 F3361 136     =SAVE2C CDOEX
956 F3364 06      RSTK=C      Save D0 on RSTK
957 F3366 136      CDOEX
958 F3369 1B00     DO=(5) =STMTR1
      000

```

```

959 F3370 1547      DATO=C W
960 F3374 136  SAVEOx CDOEX
961 F3377 07       C=RSTK          Restore DO from RSTK
962 F3379 136     CDOEX
963 F337C 01      RTN
964
965      * _
966 F337E 06  =REST1A RSTK=C          Save C[A] on RSTK
967 F3380 136     CDOEX
968 F3383 1B00    DO=(5) =STMTR0
      000
969 F338A 1527    A=DATO W
970 F338E 6D4F    GOTO  SAVEOr
971
972      * _
973 F3392 136  =REST2C CDOEX          Get DO into C[A] (Don't care if
974      *                               C[A] is lost - will be replaced)
975 F3395 06      RSTK=C          Save DO on RSTK
976 F3397 1B00    DO=(5) =STMTR1
      000
977 F339E 1567    C=DATO W
978 F33A2 61DF    GOTO  SAVEOx
979
980 *****
981 *****
982 ** Name:      TSAVDO - Save DO in FUNCDO
983 ** Name:      TRESDO - Restore DO from FUNCDO
984 ** Name:      TSWADO - Exchange DO with FUNCDO
985 ** Name:      TSAVD1 - Save D1 in FUNCDO
986 ** Name:      TRESD1 - Restore D1 from FUNCDO
987 ** Name:      TSAV1A - Save A[W] in FUNCRO
988 ** Name:      TRES1A - Restore A[W] from FUNCRO
989 ** Name:      TSAV2C - Save C[W] in FUNCRO
990 ** Name:      TRES2C - Restore C[W] from FUNCRO
991 **
992 ** Category:  SAVUTL
993 **
994 ** Purpose:
995 **   Save or restore the value in mainframe FUNCxx RAM:
996 **   these go away during function executions
997 **
998 ** Entry:
999 **   None
1000 **
1001 ** Exit:
1002 **   TRESxx: Restores the register indicated by xx
1003 **   TSAVxx: Saves the register indicated by xx
1004 **
1005 ** Calls:     None
1006 **
1007 ** Uses.....
1008 ** Inclusive: The designated RAM for TSAV, register for TRES
1009 **
1010 ** Stk lvls:  TSAVxx: 1
1011 ** Stk lvls:  TSWAD1: 2

```

```

1012      **
1013      ** NOTE: Does not alter carry
1014      **
1015      ** History:
1016      **
1017      **      Date      Programmer      Modification
1018      **      -----      -
1019      **      12/21/82      NZ      Updated documentation
1020      **
1021      ****
1022      ****
1023 F33A6 06 =TSAVDO RSTK=C      Save C[A] on RSTK
1024 F33A8 136      CDOEX
1025 F33AB 1B00      DO=(5) =FUNCD0
      000
1026 F33B2 144      DATO=C A
1027 F33B5 136 TSAVOr CDOEX
1028 F33B8 07      C=RSTK      Restore C[A] from RSTK
1029 F33BA 01      RTN
1030      *
1031      *
1032 F33BC 06 =TSAVD1 RSTK=C      Save C[A] on RSTK
1033 F33BE 137      CD1EX
1034 F33C1 1F00      D1=(5) =FUNCD1
      000
1035 F33C8 145      DAT1=C A
1036 F33CB 137 TSAV1r CD1EX
1037 F33CE 07      C=RSTK      Restore C[A] from RSTK
1038 F33D0 01      RTN
1039      *
1040      *
1041 F33D2 06 =TRESDO RSTK=C      Save C[A] on RSTK
1042 F33D4 136      CDOEX
1043 F33D7 1B00      DO=(5) =FUNCD0
      000
1044 F33DE 146      C=DATO A
1045 F33E1 63DF      GOTO TSAVOr
1046      *
1047      *
1048 F33E5 06 =TRES D1 RSTK=C      Save C[A] on RSTK
1049 F33E7 137      CD1EX
1050 F33EA 1F00      D1=(5) =FUNCD1
      000
1051 F33F1 147      C=DAT1 A
1052 F33F4 66DF      GOTO TSAV1r
1053      *
1054      *
1055 F33F8 06 =TSWAD1 RSTK=C      Save C[A] on RSTK
1056 F33FA 137      CD1EX
1057 F33FD 06      RSTK=C      Save old D1 on RSTK
1058 F33FF 1F00      D1=(5) =FUNCD1      This alters C[A]
      000
1059 F3406 147      C=DAT1 A      Get RAM D1 value
1060 F3409 137      CD1EX      RAM D1 value in D1
1061 F340C 07      C=RSTK      Old D1 value in C[A] now

```



```
1062 F340E 137          CD1EX
1063 F3411 06          RSTK=C                Now push new D1 value
1064 F3413 137          CD1EX
1065 F3416 1F00        D1=(5) =FUNCD1       Get address again
000
1066 F341D 145          DAT1=C A              Write out old D1 value
1067 F3420 07          C=RSTK                Get new D1 value from RSTK
1068 F3422 137          CD1EX
1069 F3425 07          C=RSTK                Recall old C[A]
1070 F3427 01          RTN
1071                  *_-
1072                  *_-
1073 F3429 136          =TSAV2C CDOEX
1074 F342C 06          RSTK=C                Save D0 on RSTK
1075 F342E 136          CDOEX
1076 F3431 1800        DO=(5) =FUNCR1
000
1077 F3438 1547        DAT0=C W
1078 F343C 136          TSAV0x CDOEX
1079 F343F 07          C=RSTK                Restore D0 from RSTK
1080 F3441 136          CDOEX
1081 F3444 01          RTN
1082                  *_-
1083                  *_-
1084 F3446 136          =TRES2C CDOEX       Get D0 into C[A] (Don't care if
1085                  *                C[A] is lost - will be replaced)
1086 F3449 06          RSTK=C                Save D0 on RSTK
1087 F344B 1800        DO=(5) =FUNCR1
000
1088 F3452 1567        C=DAT0 W
1089 F3456 65EF        GOTO TSAV0x
1090                  *****
1091                  *****
1092                  **
1093                  ** Name:          SAVSTS - Save RSTK levels, Status bits, D[A]
1094                  **
1095                  ** Category:     SAVUTL
1096                  **
1097                  ** Purpose:
1098                  **          Save 6 stack levels and status bits AND D[A] in SNAPBF
1099                  **
1100                  ** Entry:
1101                  **          C[A] is first stack level
1102                  **
1103                  ** Exit:
1104                  **          P=0, stack levels saved in =SNAPBF
1105                  **          Carry clear
1106                  **
1107                  ** Calls:         None
1108                  **
1109                  ** Uses.....
1110                  ** Inclusive: B[A],C[A],DO,P,SNAPBF[37:0]
1111                  **
1112                  ** Stk lvls:    (-6) (Saved in SNAPBF)
1113                  **
```

```

1114      ** History:
1115      **
1116      **      Date      Programmer      Modification
1117      **      -----      -
1118      ** 12/21/82      NZ      Updated documentation
1119      **
1120      ****
1121      ****
1122 F345A 2B =SAVSTS P= 16-5      Save 5 more levels
1123 F345C 1B00 DO=(5) =SNAPBF      Snap buffer
1124      000
1124 F3463 144 =SAVST+ DATO=C A      Write out first address
1125 F3466 164      DO=DO+ 5
1126 F3469 09      C=ST
1127 F346B 15C2      DATO=C 3      Save status bits
1128 F346F 162      DO=DO+ 3
1129 F3472 07      C=RSTK      Pop calling address
1130 F3474 D5      B=C A      Save calling address in B[A]
1131 F3476 07 SAVSTS C=RSTK      Pop a level
1132 F3478 144      DATO=C A      Save it in SNAPBF
1133 F347B 164      DO=DO+ 5
1134 F347E 0C      P=P+1
1135 F3480 55F      GONC SAVSTS      If no carry, not done yet
1136 F3483 D9      C=B A      Recall calling address...
1137 F3485 06      RSTK=C      ...push back on stack...
1138 F3487 DB      C=D A      ...SAVE D[A]...
1139 F3489 144      DATO=C A
1140 F348C 03      RTNCC      ...and return, carry clear
1141      ****
1142      ****
1143      **
1144      ** Name:      RESSTS - Restore RSTK lvls, D[A], and statuses
1145      **
1146      ** Category: SAVUTL
1147      **
1148      ** Purpose:
1149      **      Restore status, 6 stack levels, and D[A] from =SNAPBF
1150      **
1151      ** Entry:
1152      **      Nothing
1153      **
1154      ** Exit:
1155      **      P=0, last stack level in C[A]
1156      **      Carry clear
1157      **
1158      ** Calls:      None
1159      **
1160      ** Uses.....
1161      **      Inclusive: B[A],C[A],DO,P
1162      **
1163      ** Stk lvls:      (+6) (Restores RSTK levels from SNAPBF)
1164      **
1165      ** History:
1166      **
1167      **      Date      Programmer      Modification
  
```

```

1168      ** -----
1169      ** 12/21/82      NZ      Updated documentation
1170      **
1171      ****
1172      ****
1173 F348E 2B =RESSTS P=      16-5      # of levels to restore -1
1174 F3490 1B00 DO=(5) (=SNAPBF)+(6*5)+3 6 pointers @ 5 nibs+ 3 status
      000
1175 F3497 146      C=DATO A
1176 F349A D7      D=C      A      Restore D[A]
1177 F349C 07 =RESST+ C=RSTK      Pop calling address
1178 F349E D5      B=C      A      Save in B[A]
1179 F34A0 184 RESSTS DO=DO- 5      Predecrement the data pointer
1180 F34A3 146      C=DATO A      Read the pointer
1181 F34A6 06      RSTK=C      Push address onto stack
1182 F34A8 0C      P=P+1
1183 F34AA 55F      GONC RESSTS      Loop back for next pointer
1184      *
1185      * Now fetch status bits and last stack level
1186      *
1187 F34AD 182      DO=DO- 3
1188 F34B0 146      C=DATO A      Read status bits
1189 F34B3 0A      ST=C      Push into status bits
1190 F34B5 D9      C=B      A
1191 F34B7 06      RSTK=C      Push calling address onto stack
1192 F34B9 184      DO=DO- 5
1193 F34BC 146      C=DATO A      Read last level
1194 F34BF 03      RTNCC
  
```

```
1195          STITLE HPIL error message driver
1196          *****
1197          *****
1198          **
1199          ** Name:      ERROR - Error driver routine
1200          ** Name:      ERRORX - Error driver for execution errors
1201          ** Name:      ERRORP - Error driver for parse errors
1202          ** Name:      ERRORR - Error driver for parse (no RESPTR)
1203          **
1204          ** Category:  PILUTL
1205          **
1206          ** Purpose:
1207          **      ERRORX is execute error - jumps to mferr
1208          **      ERRORP is parse error - jumps to PARERR
1209          **      ERRORR is parse error - jumps to PARERR, no RESPTR
1210          **
1211          ** Entry:
1212          **      P contains the error type:
1213          **          0: Parse error (Type in C[0])
1214          **          1: Tape error (Type in C[0])
1215          **          2: HPIL error (Type in C[0])
1216          **          3: <undefined>
1217          **          4: Aborted
1218          **          5: Invalid Device Spec
1219          **          6: Non-numeric data
1220          **          7: <undefined>
1221          **          8: Out of range value
1222          **          9: No Mailbox
1223          **         10: <undefined>
1224          **         11: Insufficient Memory
1225          **         12: RESTORE IO needed
1226          **         13: <undefined>
1227          **         14: <undefined>
1228          **         15: <undefined>
1229          **
1230          ** Exit:
1231          **      ERRORX, ERRORP, and ERRORR return to the mainframe
1232          **      The error # is in C[B], P=0, C[3:2] is HP-IL LEX id
1233          **      Carry set
1234          **
1235          ** Calls:      GETMBX, ATNCHK, GETERR
1236          **
1237          ** Uses.....
1238          **      Inclusive: C[W], DO, P
1239          **
1240          ** Stk lvls:   2 (GETERR) {ERRORX, ERRORP, ERRORR use 3}
1241          **
1242          ** History:
1243          **
1244          **      Date      Programmer      Modification
1245          **      -----      -
1246          **      01/24/84      NZ          Check P= =eABORT after call to
1247          **                      GETERR (if so, need to jump to a
1248          **                      different place)
1249          **      12/21/82      NZ          Updated documentation
```

```

1250      **
1251      ****
1252      ****
1253 F34C1 7020 =ERRORX GOSUB  ERROR      Set up the error message
1254 F34C5 8C00      GOLONG =bSERR      (Jump to BSERR in mainframe)
      00

1255      *_-
1256      *_-
1257 F34CB 854 =ERRORR ST=1  4      Don't restore ntoken
1258 F34CE 80F0 =ERRORP CPEX  0      Put error # in C[0]
1259 F34D2 20      P=      =ePARSE      Parse error
1260 F34D4 7D00      GOSUB  ERROR      Set up the error message
1261 F34D8 84A =ERROR! ST=0  10      Clear implied LET flag...
1262 F34DB 136      CDOEX      Error # in DO[3:0]
1263 F34DE 8D00      GOVLNG =PARERR      ...and jump to error routine
      000

1264      *_-
1265      *_-
1266 F34E5 890 =ERROR  ?P=      =ePARSE      Is this a parse error?
1267 F34E8 23      GOYES  ERROR1      Yes...error subclass
1268 F34EA 890      ?P=      =eTAPE      Tape error?
1269 F34ED D2      GOYES  ERROR1      Yes...error subclass
1270 F34EF 890      ?P=      =ePIL      HPIL mailbox error?
1271 F34F2 82      GOYES  ERROR1      Yes...error subclass
1272 F34F4 880      ?P#     =eABORT      "Aborted"?
1273 F34F7 D1      GOYES  ERROR0      No...set up the message
1274      *
1275      * Aborted out...try to check status
1276      *
1277 F34F9 7000      GOSUB  =GETMBX      Get the last mailbox used
1278 F34FD 8E00      GOSUBL =ATNCHK      Check if ATTN key hit twice
      00

1279 F3503 401      GOC    ERROR0      Yes...abort out
1280 F3506 7E11      GOSUB  Geterr      Get the error message
1281 F350A 570      GONC   ERROR-      No error...say "Aborted"
1282 F350D 880      ?P#     =eABORT      Error...is it "Aborted"?
1283 F3510 A0      GOYES  ERROR1      No...set up the message
1284      *
1285 F3512 20      ERROR- P=      =eABORT      "Aborted"
1286      *
1287      * P>ePIL...set C[0]=P, C[1]=ePIL+1
1288      *
1289 F3514 80C0 ERROR0  C=P    0      Put error # in C[0]
1290 F3518 20      P=      (=ePIL)+1
1291 F351A 80C1 ERROR1  C=P    1      Error class --> C[1]
1292 F351E 22      P=      2
1293 F3520 3100      LC(2)  =LEXPIL
1294 F3524 20      P=      0
1295 F3526 02      RTNSC
  
```

```

1296          STITLE File spec execute handler
1297          *****
1298          *****
1299          **
1300          ** Name:          FILSPx - File spec execution routine
1301          **
1302          ** Category:    POLL
1303          **
1304          ** Purpose:
1305          **           File spec execution poll handler
1306          **
1307          ** Entry:
1308          **           ST(=sSTK) indicates whether this is literal/string
1309          **           P=0
1310          **           If literal:
1311          **             STMTDO points to start of file spec
1312          **           If string:
1313          **             TASTK (=AVMEME) points to the string header in RAM
1314          **
1315          ** Exit:
1316          **           Carry XM
1317          **           -----
1318          **           0   0: Handled: A=first 8, R0=last 2 chars of name;
1319          **                   D[S]=8; D[X]=loop address; ST8=1
1320          **                   D[3]: bit 3 is don't fill in name,
1321          **                   bit 2 is Acc ID=16 device
1322          **                   R3=Device ID/Volume lbl; R2=output
1323          **                   from SETUP (R2[14]=8!)
1324          **                   ST[8]=1 (not simple filename)
1325          **           0   1: Not handled: Nothing (DO restored by POLL)
1326          **           1   X: Error: C[3:0] is error code for mferr*
1327          **
1328          ** Calls:        SAVEST, D1@AVE, POP1S, D1=SDO, GETPI+, CHKMAS, ASLC4,
1329          **                RESTST, TRESDO
1330          **
1331          ** Uses.....
1332          ** Exclusive:  A, C, D, R0, R2, R3, DO, D1, P
1333          ** Inclusive:  A, B, C, D, R0, R1, R2, R3, R4, DO, D1, P, FUNCxx, STMTR1,
1334          **                STMTD1[3:0], ST[sDevOK]
1335          ** SETS ST(8) if handled
1336          **
1337          ** Stk lvls:   6 (GETPI+)
1338          **
1339          ** History:
1340          **
1341          **           Date          Programmer          Modification
1342          **           -----          -
1343          **           05/31/83      NZ              Reworked acc ID check to take
1344          **                               less code by removing check for
1345          **                               mass storage, NOT Acc ID=16
1346          **           05/11/83      NZ              Added check of accessory ID to
1347          **                               return with a bit indicating mass
1348          **                               storage - Acc ID=16, also able to
1349          **                               properly indicate "FILL" bit now
1350          **           03/17/83      NZ              Modified code around GETPI+ to
  
```

```

1351      **          match new entry/exit conditions
1352      ** 02/11/83    NZ          Added LOOP check for device type
1353      ** 12/21/82    NZ          Updated documentation
1354      **
1355      ****
1356      ****
1357      *
1358      * Necessary to save status...GETPI+ saves them only if calls
1359      * to EXPEXC are needed for an expression
1360      *
1361 F3528 707D =FILSPx GOSUB  SAVEST          Save status bits in =STSAVE
1362 F352C 860          ?ST=0  =sSTK          Is this a literal in memory?
1363 F352F E1          GOYES  FILSx1         Yes...recall start
1364      *
1365      * This is a string expression (already on the stack)
1366      *
1367 F3531 8E00          GOSUBL =D1@AVE          (TASTK=AVMEME=MTHSTK)
           00
1368 F3537 8F00          GOSBVL =POP1S         Pop the string
           000
1369      *
1370      * Now D1 @ start of string, A[A] is length
1371      *
1372 F353E 137          CD1EX
1373 F3541 D7          D=C    A              Temp save start in D[A]
1374 F3543 C2          C=C+A  A
1375 F3545 DF          CDEX   A              Now end in D[A], start in C[A]
1376 F3547 137        CD1EX
1377 F354A 5D1        GONC   FILSx2         D1 points to start of string
1378      *
1379      *
1380 F354D 8E00 FILSx1 GOSUBL =D1=SDO         Set D1 @ STMTDO
           00
1381 F3553 143          A=DAT1 A
1382 F3556 130          DO=A              Point DO to the start of spec
1383 F3559 14A          A=DAT0 B          If first character is tLITRL,
1384 F355C 3100        LC(2) =tLITRL      skip it
1385 F3560 966          ?R#C   B
1386 F3563 50          GOYES  FILSx2         Not tLITRL...go on
1387 F3565 161        DO=DO+ 2          tLITRL...skip over it
1388      *
1389      * Now DO @ start of literal/D1 at start of string
1390      *
1391 F3568 8E00 FILSx2 GOSUBL =GETPI+         Get the file name and device spec
           00
1392 F356E 427          GOC    FILSPs         Not nine...don't handle it
1393      *
1394      * Now B,D have everything needed to find the device again
1395      *
1396      * Clear unused bits in D[M]
1397      *
1398 F3571 AD3          D=0    M              Clear D[4:3] without changing D[S]
1399      *
1400      * Check if file spec was "" or "*" (if so, don't handle it)
1401      *

```

```

1402 F3574 96F      ?D#0  B          Not LOOP or NULL or "" or *
1403 F3577 C0      GOYES  FILSx.
1404
1405      *
1406      * Check that this is NOT "LOOP"
1407      *
1407 F3579 2F      P=      15
1408 F357B 300     LC(1)  =DsLoop   Check if LOOP
1409 F357E 947     ?D#C   S          LOOP?
1410 F3581 A6      GOYES  FILSP#    No...don't handle it
1411
1412      *
1413      * This is "LOOP"...not Acc ID=16 or mass storage, don't fill
1414      * name (Carry is CLEAR for LOOP)
1415      *
1416      * Set up for the mainframe to be able to save the device info
1417      *
1417 F3583 2E      FILSx. P=      14
1418 F3585 308     LC(1)  8          Set device code=8 (HPIL)
1419 F3588 10A     R2=C    Save output from SETUP in R2
1420 F358B AF9     C=B     W
1421 F358E 10B     R3=C    Save device ID/volume label in R3
1422 F3591 512     GONC   FILSx1   Go if "LOOP" was specified
1423
1424      *
1425      * First check what the accessory ID is...
1426      *
1426 F3594 8E00    GOSUBL =CHKMAS   Check if mass storage
      00
1427 F359A 4A0     GOC     FILSx?   Either error or not Acc ID=16
1428 F359D 23      P=      3
1429 F359F 304     LC(1)  4          This is Acc ID=16, fill in name
1430 F35A2 551     GONC   FILSx#   Go always
1431
1432      *
1433      *
1434      * Check if the accessory ID is "MASS STORAGE"
1435      *
1436 F35A5 880     FILSx? ?P#     =ePIL
1437 F35A8 15      GOYES  FILSPe   Error...not HPIL error
1438 F35AA 80FO    CPEX   0          First check if Device Type error
1439 F35AE 880     ?P#     =eDTYPE
1440 F35B1 44      GOYES  FILSPE   Error
1441
1442      *
1443      * This IS a device type error...
1444      *
1444 F35B3 23      FILSx1 P=      3
1445 F35B5 308     LC(1)  8
1446 F35B8 A87     FILSx# D=C     P          Set the "Don't fill filename" bit
1447 F35BB 2F      P=      15
1448 F35BD 308     LC(1)  8
1449 F35C0 20      P=      0
1450
1451      *
1452      * Device 8 is HP-IL
1453      *
1453 F35C2 AC7     D=C     S          First 8 chars in A[W]
1454 F35C5 114     A=R4
1455 F35C8 8E00    GOSUBL =ASLC4   Last 2 chars in A[3:0]

```



```

      00
1456 F35CE 120      AROEX      First 8 chars in A, last 2 in R0
1457              *
1458              * Restore the caller's status first
1459              *
1460 F35D1 72EC      GOSUB  RESTST
1461              *
1462              * Now restore DO (PC) following the device spec
1463              *
1464 F35D5 79FD      GOSUB  TRESDO      (Saved by GETPI+)
1465              *
1466              * ST[8] means this is not a simple filename...
1467              *
1468 F35D9 858        ST=1      8
1469 F35DC 821        XM=0
1470 F35DF 03        RTNCC      Be sure XM is zero - handled
                                Return (Handled, OK)
1471              *
1472              *
1473 F35E1 890  FILSPs ?P=      =eNORAM      Did I run out of memory?
1474 F35E4 51        GOYES  FILSPe      Yes...error
1475 F35E6 870      ?ST=1  =sDevOK      Was the device spec OK?
1476 F35E9 01        GOYES  FILSPe      Yes...loop error
1477 F35EB 78CC  FILSPH  GOSUB  RESTST      Restore status bits from =STSAVE
1478 F35EF 21  DIDST1  P=      1
1479 F35F1 0D        P=P-1
1480 F35F3 00        RTNSXM      Clear carry, P=0
                                Return carry clear, XM set
1481              *
1482              *
1483 F35F5 80FO  FILSPE  CPEX   0
1484 F35F9 6BEE  FILSPe  GOTO   ERROR      Return with C[3:0]->error #,RTNSC
```

```

1485          STITLE Store device ID handler
1486          *****
1487          *****
1488          **
1489          ** Name:          hDIDST - Store device ID info (from R2,R3)
1490          **
1491          ** Category:    POLL
1492          **
1493          ** Purpose:
1494          **           Handler for device ID storage (D1 @ destination point)
1495          **
1496          ** Entry:
1497          **           R2 contains C[W] from SETUP
1498          **           (R2[14] is the device code from FILSPx)
1499          **           R3 contains the device ID/volume label
1500          **
1501          ** Exit:
1502          **           P=0
1503          **           Carry clear:
1504          **             XM=0: Device ID saved @ D1
1505          **             XM=1: Not HPIL (No response)
1506          **             (If error, takes direct error jump to ERRORX)
1507          **
1508          ** Calls:        SNAPRS,SAVEIT
1509          **
1510          ** Uses.....
1511          ** Exclusive:    B,C,          P
1512          ** Inclusive:    A,B,C,D,R2,R3,D0,D1,P (If not handled, only C,P)
1513          **
1514          ** Stk lvls:     4 (SAVEIT)
1515          **
1516          ** History:
1517          **
1518          **           Date          Programmer          Modification
1519          **           -----          -
1520          **           01/24/84        NZ              Moved DIDST1 into FILSPx to make
1521          **           04/15/83        NZ              room for a GOLONG (needed 2 nibs)
1522          **           04/01/83        SC              Moved first SNAPRS call to save D
1523          **           12/21/82        NZ              in case not handled (FPOLL needs
1524          **                                     D[A] to be around if not handled)
1525          **                                     Changed to FPOLL, added SNAPRS
1526          **                                     calls to set up pointers
1527          **                                     Updated documentation
1528          **
1529          *****
1530          *****
1531          F35FD          =hDIDST
1532          F35FD 11A          C=R2
1533          F3600 80DE        P=C      14
1534          F3604 888        ?PH     8          Is this an HPIL assignment?
1535          F3607 8E          GOYES  DIDST1      No...leave it alone
1536          F3609 8E00        GOSUBL =sSNAPRS      Restore D1 from save area
1537          F360F 11B          C=R3
1538          F3612 AF5         B=C     W
  
```

```
1539 F3615 11A      C=R2
1540 F3618 8E00      GOSUBL =SAVEIT      Save the information @ (D1)
      00
1541 F361E 821      XM=0                Make sure XM=0
1542 F3621 500      RTNNC               If no carry, all OK...done
1543 F3624 6C9E      GOTO  ERRORX       If carry, error exit
1544                *-
1545                *-
1546 F3628 8C00 Geterr GOLONG =GETERR      Jump to get error message
      00
1547 F362E                END
```

ASLC4	Ext		-	1455			
ATNCHK	Ext		-	1278			
ATNFLG	Ext		-	180			
BDISPJ	Ext		-	279			
CHKASN	Ext		-	271			
CHKMAS	Ext		-	1426			
CHKSE1	Abs	995910	#F3246	-	772	787	
=CHKSET	Abs	995806	#F31DE	-	741	602	
=CHKST+	Abs	995829	#F31F5	-	752	87	
CHKSTS	Ext		-	369			
CSLC5	Ext		-	431			
CSRC5	Ext		-	433			
=D1=DSP	Abs	995969	#F3281	-	794	96	269
=D1=DST	Abs	995978	#F328A	-	798	113	244 509
=D1=DSX	Abs	995987	#F3293	-	802	273	287
D1=SDO	Ext		-	1380			
D1@AVE	Ext		-	1367			
DIDST1	Abs	996847	#F35EF	-	1478	1535	
DSPCHX	Ext		-	802			
DSPSET	Ext		-	435	798		
DispOK	Ext		-	247			
DsLoop	Ext		-	1408			
=ERROR	Abs	996581	#F34E5	-	1266	1253	1260 1484
=ERROR!	Abs	996568	#F34D8	-	1261		
ERROR-	Abs	996626	#F3512	-	1285	1281	
ERROR0	Abs	996628	#F3514	-	1289	1273	1279
ERROR1	Abs	996634	#F351A	-	1291	1267	1269 1271 1283
=ERRORP	Abs	996558	#F34CE	-	1258		
=ERRORR	Abs	996555	#F34CB	-	1257		
=ERRORX	Abs	996545	#F34C1	-	1253	1543	
Except	Ext		-	617			
FIBOFF	Ext		-	432			
FILSPE	Abs	996853	#F35F5	-	1483	1440	
FILSPe	Abs	996857	#F35F9	-	1484	1437	1474 1476
FILSPn	Abs	996843	#F35EB	-	1477	1410	
FILSPs	Abs	996833	#F35E1	-	1473	1392	
=FILSPx	Abs	996648	#F3528	-	1361		
FILSx#	Abs	996792	#F35B8	-	1446	1430	
FILSx.	Abs	996739	#F3583	-	1417	1403	
FILSx1	Abs	996685	#F354D	-	1380	1363	
FILSx2	Abs	996712	#F3568	-	1391	1377	1386
FILSx?	Abs	996773	#F35A5	-	1436	1427	
FILSx1	Abs	996787	#F35B3	-	1444	1422	
FNDMBX	Ext		-	81	367	589	
FUNCD0	Ext		-	1025	1043		
FUNCD1	Ext		-	1034	1050	1058	1065
FUNCR1	Ext		-	1076	1087		
GETERR	Ext		-	85	1546		
=GETHSS	Abs	995791	#F31CF	-	688	591	
GETMBX	Ext		-	1277			
GETPI+	Ext		-	1391			
GETST-	Ext		-	605			
Geterr	Abs	996904	#F3628	-	1546	1280	
I/DALL	Ext		-	70			
I/ORES	Ext		-	302			

I/ores	Abs	995371	#F302B	-	302	232	265	268	
IS-DSP	Ext			-	258	441	794		
KEYPTR	Ext			-	641				
LEXPIL	Ext			-	1293				
LOOPST	Ext			-	111	347	499		
LoopOK	Ext			-	512				
MBOX^	Ext			-	583	649			
Offed	Ext			-	502				
PARERR	Ext			-	1263				
PILCN1	Abs	995233	#F2FA1	-	240	233			
=PILCNF	Abs	995217	#F2F91	-	230				
PILCS0	Abs	995031	#F2ED7	-	65				
PILCS3	Abs	995066	#F2EFA	-	80	89			
PILCS4	Abs	995101	#F2F1D	-	92	82			
=PILCST	Abs	995031	#F2ED7	-	59	238			
PILMO5	Abs	995577	#F30F9	-	504	503			
=PILMLP	Abs	995559	#F30E7	-	499				
PILMRC	Abs	995601	#F3111	-	515	505			
PILPO1	Abs	995419	#F305B	-	366	388			
PILPO2	Abs	995459	#F3083	-	387	370	376		
PILPO3	Abs	995465	#F3089	-	392	353	361	368	
=PILPOF	Abs	995378	#F3032	-	343				
PILSO0	Abs	995627	#F312B	-	576	575			
PILSO7	Abs	995605	#F3115	-	566	571	577		
PILS20	Abs	995652	#F3144	-	588	596			
PILS23	Abs	995673	#F3159	-	594	618	626	631	637
PILS50	Abs	995766	#F31B6	-	647	590	608		
PILS9+	Abs	995787	#F31CB	-	653	566			
=PILSRQ	Abs	995609	#F3119	-	569				
=PILWKP	Abs	995353	#F3019	-	290				
PILWks	Abs	995357	#F301D	-	294	259	261		
=PILWNK	Abs	995176	#F2F68	-	166				
PILWNx	Abs	995213	#F2F8D	-	186	168	179		
PILxxx	Abs	995334	#F3006	-	282	277			
POP1S	Ext			-	1368				
PUTC	Ext			-	754				
PUTC+	Ext			-	382				
PUTCN	Ext			-	604				
PUTE	Ext			-	791				
=Pute	Abs	995963	#F327B	-	791	757	760	763	780
REQS10	Abs	995714	#F3182	-	611	606			
REQS30	Abs	995727	#F318F	-	621	616			
REQSER	Abs	995680	#F3160	-	602	593			
=RESST+	Abs	996508	#F349C	-	1177				
=RESSTS	Abs	996494	#F348E	-	1173	651			
RESSTs	Abs	996512	#F34A0	-	1179	1183			
=REST1A	Abs	996222	#F337E	-	966				
=REST2C	Abs	996242	#F3392	-	973				
=RESTD0	Abs	996089	#F32F9	-	918				
=RESTD1	Abs	996108	#F330C	-	925				
RESTOR	Ext			-	253				
=RESTR1	Abs	995469	#F308D	-	429	343			
RESTRs	Abs	995526	#F30C6	-	448	442	443	444	
=RESTST	Abs	996023	#F32B7	-	850	1460	1477		
RESTs4	Abs	995552	#F30E0	-	461	455	457		

=RTNCCX	Abs	995170	#F2F62	-	129	186	291	392	515	653
RTNCCx	Abs	995353	#F3019	-	291	272	276			
SAVEOr	Abs	996060	#F32DC	-	904	922	945	952	970	
SAVEOx	Abs	996212	#F3374	-	960	978				
=SAVE1A	Abs	996173	#F334D	-	948					
SAVE1r	Abs	996082	#F32F2	-	913	929				
=SAVE2C	Abs	996193	#F3361	-	955					
=SAVEDO	Abs	996045	#F32CD	-	900					
=SAVED1	Abs	996067	#F32E3	-	909					
SAVEIT	Ext			-	1540					
=SAVEST	Abs	995996	#F329C	-	839	1361				
=SAVST+	Abs	996451	#F3463	-	1124					
=SAVSTS	Abs	996442	#F345A	-	1122	582				
SAVSTs	Abs	996470	#F3476	-	1131	1135				
SNAPBF	Ext			-	1123	1174				
STMTD0	Ext			-	902	920	935	942		
STMTD1	Ext			-	911	927				
STMTR0	Ext			-	950	968				
STMTR1	Ext			-	958	976				
STSAVE	Ext			-	841	852				
=SWAPDO	Abs	996127	#F331F	-	932					
TERCHR	Ext			-	123					
=TRES2C	Abs	996422	#F3446	-	1084					
=TRESDO	Abs	996306	#F33D2	-	1041	1464				
=TRESD1	Abs	996325	#F33E5	-	1048					
TSAVOr	Abs	996277	#F33B5	-	1027	1045				
TSAVOx	Abs	996412	#F343C	-	1078	1089				
TSAV1r	Abs	996299	#F33CB	-	1036	1052				
=TSAV2C	Abs	996393	#F3429	-	1073					
=TSAVDO	Abs	996262	#F33A6	-	1023					
=TSAVD1	Abs	996284	#F33BC	-	1032					
=TSWAD1	Abs	996344	#F33F8	-	1055					
WNKOO	Abs	995194	#F2F7A	-	178	177				
bPILAI	Ext			-	267					
bPILSV	Ext			-	69	231				
bSERR	Ext			-	1254					
bSTMXQ	Ext			-	264					
eABORT	Ext			-	607	1272	1282	1285		
eDTYPE	Ext			-	1439					
eNORAM	Ext			-	1473					
ePARSE	Ext			-	1259	1266				
ePIL	Ext			-	1270	1290	1436			
eTAPE	Ext			-	1268					
fIDORM	Ext			-	635					
fIPDWN	Ext			-	359					
=hDIDST	Abs	996861	#F35FD	-	1531					
hsRQSR	Ext			-	592					
mPDLOP	Ext			-	381					
mSETAI	Ext			-	759					
mSETAI	Ext			-	756					
mSETDI	Ext			-	773					
mSETD1	Ext			-	762					
mSETIT	Ext			-	753					
mSTSTC	Ext			-	603					
oINHS	Ext			-	689	691				

oOUTHS	Ext	-	741	743
sCONTR	Ext	-	375	
sDATAV	Ext	-	625	
sDIAsr	Ext	-	176	574
sDevOK	Ext	-	1475	
sFLAG?	Ext	-	360	636
sINTR	Ext	-	615	
sNAPRS	Ext	-	1536	
sRMOTE	Ext	-	630	
sSTK	Ext	-	1362	
tLITRL	Ext	-	1384	
vDEVID	Ext	-	768	
xxxxST	Abs	996014 #F32AE	-	844 855

Input Parameters

Source file name is NZ&BIF::MS

Listing file name is NZ/BIF:TI:ML

Object file name is NZ%BIF:TI:MS

Initial flag settings are
111111
0123456789012345

Errors

None

Saturn Assembler News


```
1      *
2      *
3      *      N  N  ZZZZZ  &      III  00000  BBBB
4      *      N  N      Z  & &      I  0  0  B  B
5      *      NN N      Z  & &      I  0  0  B  B
6      *      N N N      Z  &      I  0  0  BBBB
7      *      N NN      Z  & & &      I  0  0  B  B
8      *      N  N  Z      & &      I  0  0  B  B
9      *      N  N  ZZZZZ  && &      III  00000  BBBB
10     *
```

```
11     TITLE I/O Buffer routines <830927.1450>
12 F362E   ABS #F362E      TIXHP6 address (fixed)
13     *****
14     *****
15     **
16     ** Name:      I/OFSC - Find a scratch I/O buffer (#C00->#FFF)
17     **
18     ** Category:  BUFUTL
19     **
20     ** Purpose:
21     **      File I/O scratch buffer (Return ID of first unused
22     **      buffer)
23     **
24     ** Entry:
25     **      Nothing
26     **
27     ** Exit:
28     **      P=0
29     **      Carry clear: C[X] is buffer ID
30     **      Carry set: no buffer available (C[X]=0)
31     **
32     ** Calls:      I/OFND
33     **
34     ** Uses.....
35     **      Inclusive: R[W],C[X],D1,P
36     **
37     ** Stk lvls:  1 (I/OFND)
38     **
39     ** History:
40     **
41     **      Date      Programmer      Modification
42     **      -----
43     **      09/27/83      NZ      Changed documentation to reflect
44     **      current routine (I/OFSCR)
45     **      01/04/83      NZ      Updated documentation
46     **
47     *****
48     *****
49 F362E 20  =I/OFSC P=      0
50 F3630 8000 GOVLNG =I/OFSCR
51 F3637 000      END
```

=I/OFSC Abs 996910 #F362E - 49
IOFSCR Ext - 50

Input Parameters

Source file name is NZ&IOB::MS

Listing file name is NZ/IOB:TI:ML::-1

Object file name is NZXIOB:TI:MS::-1

Initial flag settings are
111111
0123456789012345

Errors

None

Saturn Assembler News

```

1      *
2      *      N  N  ZZZZ  &      DDDD  SSS  PPPP
3      *      N  N      Z  & &      D  D  S  S  P  P
4      *      NN N      Z  & &      D  D  S      P  P
5      *      N N N      Z      &      D  D  SSS  PPPP
6      *      N NN  Z      & & &      D  D      S  P
7      *      N  N  Z      & &      D  D  S  S  P
8      *      N  N  ZZZZ  && &  DDDD  SSS  P
9      *
10     *
11     *      TITLE  Display driver <840301.1344>
12 F3637  *      ABS    WF3637      TIXHP6 address (fixed)
13     *      *****
14     *      *****
15     *
16     ** Name:      BDISPJ - HPIL Character-oriented display routine
17     **
18     ** Category:  PILI/O
19     **
20     ** Purpose:
21     **      Routine to display characters on HPIL devices
22     **
23     ** Entry:
24     **      A[B] is a data byte
25     **      HEX mode
26     **
27     ** Exit:
28     **      A[B] is the data byte from entry
29     **      Display status bits restored
30     **      HEX mode, carry clear
31     **
32     ** Calls:      CHKASN,SETLP,FNDMBX,START,GTYPE,MTYL,FINDA,
33     **              GETMBX,WRITIT,SENDIT,SENDI+,PUTD,PUTX,END,
34     **              MOVCU+,DO=CUR,DO@CUR,Clear?,SendBf,
35     **              BLANKC,LCleft,DSPCL?
36     **
37     ** Uses.....
38     ** Exclusive:  A[15:2],B[W],C[W],D[A],          DO,D1,P,(ST)
39     ** Inclusive:  A[15:2],B[W],C[W],D[15:13],D[5:0],DO,D1,P,(ST)
40     **
41     ** Stk lvls:  4 (START)
42     **
43     ** NOTE:
44     **      Does not alter A[B], returns (DSPSTA+3) in SStatus bits
45     **
46     ** History:
47     **
48     **      Date      Programmer      Modification
49     **      -----      -
50     **      02/24/84      NZ          Reworked and packed to fix bug
51     **
52     **
53     **
54     **      09/28/83      NZ          Updated documentation
55     **      06/24/83      NZ          Fixed bug of losing <Cr> if DISP

```

```

56      **                device is a printer device
57      ** 05/18/83      NZ          Changed return from GTYPE to
58      **                match new exit conditions of same
59      ** 04/14/83      NZ          Added check to ignore NULL char
60      ** 02/16/83      NZ          Removed Talker code (doesn't work
61      **                with multiple loop displays)
62      ** 12/09/82      NZ          Added documentation
63      **
64      *****
65      *****
66      Esc    EQU    #1B          <Escape>
67      Bs     EQU    #08          <Backspace>
68      *
69      RepCur EQU    0           Status bit...Replace the cursor
70      *
71      Delete EQU    4           Status bit...Delete character
72      CurLft EQU    5           Status bit...Cursor direction
73      SetCur EQU    6           Status bit...Set vs move cursor
74      Protec EQU    SetCur     Status bit...Hit protected char?
75      *
76      *-
77      *-
78 F3637      =BDISPJ
79 F3637 1B00      DO=(5) =IS-DSP     IS assignment
      000
80 F363E 15E6      C=DATO 7         Read it in...
81 F3642 7000      GOSUB  =CHKASM     Check if assigned...
82 F3646 551       GONC  DISPOO     Assigned
83 F3649 6A63     DISPOF GOTO  DISPOF     This is NOT assigned...return
84      *-
85      *-
86      *
87      * Now get back the correct loop for the display
88      *
89 F364D 7000     DISPO2 GOSUB  =SETLP     SETUP sets C[S] to current mbox
90 F3651 7000      GOSUB  =FNDMBX     FNDMBX sets MBOX^ to current mbox
91 F3655 4D2       GOC   DISPNS     If carry, not found...not set up?
92 F3658 67C0      GOTO  DISPOK
93      *-
94      *-
95 F365C 1900     DISPOO DO=(2) =DSPSET     Status nibble for display
96 F3660 0B       CSTEM
97 F3662 1562      C=DATO XS         Read in status...
98 F3666 0B       CSTEM
99 F3668 860       ?ST=0 =LoopOK
100 F366B ED       GOYES  DISPOF     Loop has been offed...exit now
101 F366D D7       D=C   A           Put address in D[A] for START
102 F366F 94E      ?C#0 S
103 F3672 11       GOYES  DISPNS     ...not current...set it up
104 F3674 870      ?ST=1 =DispOK     Currently set up?
105 F3677 6D       GOYES  DISPO2     Yes...check if mailbox is there
106      *
107      * Display is NOT set up...check if this is a new assignment
108      *
109      * (New assignments have BOTH ST(=H82163) and ST(=Printr) true)

```

```

110          *
111 F3679 860          ?ST=0  =H82163      Not HP82163A?
112 F367C 80          GOYES  DISPNO      No...this is NOT a new assignment
113 F367E 860          ?ST=0  =Printr    Not printer?
114 F3681 50          GOYES  DISPNO      No...this is NOT a new assignment
115 F3683 850  DISPNS  ST=1   =DispOK     Reuse this status as a flag
116          *
117          * If ST(DispOK)=1, then need to check accessory ID here
118          *
119 F3686          DISPNO
120          *
121          * Loop is NOT set up for DISPLAY IS
122          *
123          * Save character on RSTK before calls to START, GTYPE, etc
124          *
125 F3686 D6          C=A    A
126 F3688 06          RSTK=C          Push the character
127          *
128          * Call START, with device specifier in D[A]...
129          *
130 F368A 8E00          GOSUBL =START      Set up Loop
      00
131 F3690 4E3          GOC    DISPNO.      Error
132 F3693 860          ?ST=0  =DispOK     Are the status bits OK already?
133 F3696 33          GOYES  DISPN4      Yes...continue
134          *
135          * Get the accessory ID of the device in A[B]
136          *
137 F3698 8E00          GOSUBL =GTYPE      Returns Acc Id in A[B]
      00
138 F369E 403          GOC    DISPNO.      Error if carry
139          *
140          * If no response, then A[B] is zeroed by GTYPE
141          *
142          * Now set DSPSET true, set up other bits of DSPSET using B[B],
143          * then restore all and return
144          *
145 F36A1 840          ST=0   =H82163      Preclear these statuses
146 F36A4 840          ST=0   =Printr
147 F36A7 80D1          P=C    1          Copy class nibble into P ← C=A A
148 F36AB 891          ?P=    1          Mass storage class?
149 F36AE 84          GOYES  DISPN1      Yes...error
150 F36B0 882          ?PM    2          Printer class device?
151 F36B3 80          GOYES  DISPN3      No...check if HP82163A
152          *
153          * Printer class device
154          *
155 F36B5 850          ST=1   =Printr
156 F36B8 501          GONC   DISPN4      Go always
157          *
158          *
159 F36BB 20  DISPN3  P=    0
160 F36BD 3103        LCHEX 30          HP82163A accessory id
161 F36C1 966          ?AMC   B
162 F36C4 50          GOYES  DISPN4      Not an HP82163A

```

All addresses below are wrong.

```

163 F36C6 850          ST=1  =H82163
164 F36C9          DISPM4
165                  *
166                  * Now set up the display as a listener (Acc ID in A[B])
167                  *
168 F36C9 8E00          GOSUBL =MTYL          (Character is on RSTK)
                   00
169 F36CF 462        DISPM.  GOC   DISPM1      Error
170 F36D2 850          ST=1  =DispOK      Display set up
171 F36D5 1A00        DO=(4) =DSPSET
                   00
172 F36DB 0B          CSTEM
173 F36DD 1542        DATO=C XS          Write it back out
174 F36E1 0B          CSTEM
175 F36E3 1900        DO=(2) =IS-DSP
176 F36E7 DB          C=D   A
177 F36E9 15C2        DATO=C 3          Write out the address
178 F36ED 07          C=RSTK
179 F36EF DA          A=C   A          Restore the character to A[B]
180 F36F1 20          P=    0
181 F36F3 5C2        GONC   DISPOK      Go always
182                  *
183                  *
184                  *
185                  * If here, had a loop error...clear DISPLAY IS
186                  *
187 F36F6 07          DISPM1  C=RSTK
188 F36F8 DA          A=C   A          Restore character from RSTK
189 F36FA 1A00        DO=(4) =IS-DSP      DISPLAY IS assignment
                   00
190 F3700 146          C=DATO A          Read code nibble into C[3]
191 F3703 F6          CSR   A          (code into C[XS])
192 F3705 0B          CSTEM
193 F3707 85B        ST=1  11          Set "OFF"ed flag
194 F370A 0B          CSTEM
195 F370C F2          CSL   A          Back to C[3]
196 F370E AB2        C=0   X
197 F3711 A3E        C=C-1 X          C[X]=FFF
198 F3714 15C3        DATO=C 4          OFF the display
199 F3718 6052        GOTO   DISPEX      Done
200                  *
201                  *
202 F371C 6792        DISPOX  GOTO   DISPOX      Done, don't check carry
203                  *
204                  *
205                  *
206                  * Loop is set up now
207                  *
208 F3720          DISPOK
209                  *
210                  * First ensure that not in an escape sequence
211                  *
212 F3720 1B00        DO=(5) =ESCSTA      Escape status
                   000
213 F3727 15E0        C=DATO 1          Read it...

```

```

214 F372B A0E      C=C-1 P      ...decrement it...
215 F372E 4B4      GOC   DISPN E  Not escape
216              *
217              * This is in an escape sequence...what do I do?
218              *
219              *
220              * Check if printer...if so, return
221              *
222 F3731 870      ?ST=1 =Printr
223 F3734 8E      GOYES DISPOx   Exit, restore all levels
224              *
225              * Not a printer...continue
226              *
227 F3736 90A      ?C=0  P      Is it "escape"?
228 F3739 90      GOYES DISP1   Yes...check further
229 F373B 846      DspSn0 ST=0   SetCur  No...send the character without
230 F373E 6552     GOTO   DspSn0 repositioning the cursor
231              *
232              *
233              *
234              * Escape mode
235              *
236 F3742 844      DISP1  ST=0   Delete   Assume NOT a delete until proven
237              *                               otherwise
238 F3745 8F00     GOSBVL =FINDA A[B] is value
                000
239 F374C 34      CON(2) \C\   Right arrow
240 F374E 6C0     REL(3) RArrow
241 F3751 44      CON(2) \D\   Left arrow
242 F3753 7D0     REL(3) LArrow
243 F3756 05      CON(2) \P\   Delete character
244 F3758 890     REL(3) DelChr
245 F375B F4      CON(2) \O\   Delete character with wrap
246 F375D 390     REL(3) DelChr
247 F3760 E4      CON(2) \N\   Insert char with wrap
248 F3762 990     REL(3) InsChr
249 F3765 B4      CON(2) \K\   Delete through end of line
250 F3767 011     REL(3) DelLin
251 F376A 30      CON(2) 3     Cursor far right
252 F376C 4C0     REL(3) FarRt
253 F376F 40      CON(2) 4     Cursor far left
254 F3771 001     REL(3) FarLft
255 F3774 00      CON(2) 0     Others...
256 F3776 68F1     GOTO   EscSnd Send <Esc> <character> & return
257              *
258              *
259              *
260              * If <Lf>: Send it immediately, independent of current mode
261              * If <Cr>: If (not Printr): send immediately (Don't set cursor)
262              *                               else: transmit buffer, then <Cr>
263              * If chr$(0): Ignore it entirely if not in escape sequence
264              * If <anything else> and <Printr>: return without action
265              *
266 F377A 968     DISPN E ?A=0   B      Is A[B]=0?
267 F377D F9      GOYES DISPOx   Yes...exit.

```



```

268 F377F 31A0      LCHEX  OA      <Lf>
269 F3783 962      ?A=C  B
270 F3786 5B       GOYES  Dspsn0     Send it
271 F3788 30D      LCHEX  D          Preload <Cr>
272 F378B 870      ?ST=1 =Printr
273 F378E B0       GOYES  DISP.1     Check further in printer code
274 F3790 962      ?A=C  B          Is it a <Cr>?
275 F3793 8A       GOYES  Dspsn0     Yes...don't reposition the cursor
276 F3795 6251     GOTO   DISP2     No...process the character
277          *-
278          *-
279 F3799 966  DISP.1 ?A=MC  B          Is it a <Cr>?
280 F379C 08       GOYES  DISPOx    No...Exit, no action
281 F379E 77C3     GOSUB  Clear?    Is the clear flag set?
282 F37A2 489      GOC    Dspsn0     Yes...send only the <Cr>
283          *
284          * This is a printer, and I got a <Cr>...
285          * need to send whole buffer
286          *
287 F37A5 1900     DO=(2) (=DSPBFS)-2 (Clear? leaves DO @ DSPSTA+3)
288 F37A9 31F5     LC(2)  95
289 F37AD 161  DISP.2 DO=DO+ 2
290 F37B0 14A      A=DATO  B
291 F37B3 968      ?A=0   B
292 F37B6 80       GOYES  DISP.3     End of buffer (Logical)
293 F37B8 A6E       C=C-1  B          End of buffer (Physical)?
294 F37BB 51F      GONC   DISP.2     No...try next character
295          *
296          * Now DO points to first "non-character"
297          *
298 F37BE AF0  DISP.3 A=0     W          Clear for ASRB below
299 F37C1 132      ADOEX
300 F37C4 3400     LC(5)  =DSPBFS
      000
301 F37CB 135      D1=C
302 F37CE EA       A=A-C  A          Set D1 @ DSPBFS also
303 F37D0 81C      ASRB
304          *
305          * Set up for HPIL transfer
306          *
307 F37D3 7000     GOSUB  =GETMBX   Restore the HPIL mailbox to DO
308 F37D7 8E00     GOSUBL =WRITIT   Send the buffer
      00
309 F37DD 20       P=     0
310 F37DF 31D0     LCHEX  OD          Restore the <Cr>
311 F37E3 DA       A=C    A
312 F37E5 460      GOC    DISPEX    Exit if error
313 F37E8 7893  DISP.. GOSUB  Putd      Send it to the printer
314 F37EC 6C71  DISPEX GOTO   DISPEX
315          *-
316          *-
317          *
318          * Code to check if Insert or Delete
319          *
320 F37F0      DelChr

```

```

321      *
322      * Delete character (Either HP82163A or "other")
323      *
324 F37F0 854      ST=1  Delete      This IS a delete
325 F37F3 7CC1    GOSUB  SendBF      Send to end of line
326 F37F7 6171    GOTO   DISPEX     Restore, etc.
327      *
328      *
329 F37FB      InsChr
330      *
331      * Insert character (Send Esc Q Esc N to turn on insert mode)
332      *
333      * (Esc Q is for HP82163A, as it does not understand Esc N)
334      *
335 F37FB 7000    GOSUB  =GETMBX     Get back the mailbox first
336 F37FF 35B1    LCHEX  1B511B     Esc Q Esc
337      15B1
337 F3807 8E00    GOSUBL =PUTX
338      00
338 F380D 4ED     GOC   DISPEX     Error if carry
339 F3810 6A2F    GOTO   Dspsn0    Now send the current char (N)
340      *
341      *
342 F3814      RArrow
343      *
344      * Right arrow
345      *
346 F3814 7573    GOSUB  DO@CUR
347 F3818 14E     C=DATO B
348 F381B 96A     ?C=0   B
349 F381E F4      GOYES  DISPOX     At end of buffer NOW
350 F3820 845     ST=0   CurLft
351 F3823 846     Arrow  ST=0   SetCur  This is NOT just a set, but MOVE
352 F3826 6981    GOTO   DISPMC    MOVCUR, DISPOX
353      *
354      *
355 F382A      LArrow
356      *
357      * Left arrow
358      *
359 F382A 855     ST=1   CurLft
360 F382D 55F     GONC   Arrow     Go always (FINDA:RTNCC)
361      *
362      *
363 F3830      FarRt
364      *
365      * Cursor far right
366      *
367 F3830 845     ST=0   CurLft    This is cursor RIGHT
368 F3833 7653    Farxx  GOSUB  DO@CUR    C[B] is current cursor value
369 F3837 DA      A=C    A          Save cursor value in A[B]
370 F3839 846     ST=0   SetCur   This is NOT just a SET, but MOVE
371 F383C 875     FarRt1 ?ST=1  CurLft    Is this LEFT?
372 F383F E0      GOYES  FarRt2    Yes...don't check for end
373 F3841 7843    GOSUB  DO@CUR    No...check if at end already

```

```

374 F3845 14E          C=DATO B
375 F3848 96A          ?C=0 B
376 F384B C0           GOYES FarRt3      Already at far right of buffer
377 F384D 850 FarRt2 ST=1 RepCur      Reposition the cursor at new loc.
378 F3850 7C62         GOSUB MOVCU+
379 F3854 57E          GONC FarRt1       Moved it...move it again
380 F3857 20 FarRt3 P= 0           Force P back to zero
381 F3859 3130         LC(2) 3           Cursor far right
382 F385D 865          ?ST=0 CurLft      Is this RIGHT?
383 F3860 40           GOYES FarEnd      Yes...exit
384 F3862 E6           C=C+1 A           No...(LEFT=4)
385 F3864 7D33 FarEnd GOSUB DO=CUR
386 F3868 148          DATO=A B           Restore the cursor value
387 F386B DA           A=C A
388 F386D 6641 DISPOx GOTO DISPOX      Finish it up
389          *-
390          *-
391 F3871          FarLft
392 F3871 855          ST=1 CurLft
393 F3874 5EB          GONC Farxx        Go always
394          *-
395          *-
396          *
397          * Delete through end of line
398          *
399 F3877 8F00 Dellin GOSBVL =SCNRT
          000
400          *
401          * Check if no protected fields after this...if none, send
402          * <Esc> J (Clear to end of screen)
403          *
404 F387E 4D0          GOC Dello         If carry, reached end of buffer
405 F3881 130          DO=A
406 F3884 14E          C=DATO B           Read in indicated character
407 F3887 96E          ?C#0 B
408 F388A 31           GOYES Dell1       Protected field
409 F388C D4 Dell0 A=B A
410 F388E 7DE2         GOSUB GTPEsc      GETMBX, PUTEsc
411 F3892 415          GOC DISPeX       Carry exit
412 F3895 31A4         LCASC \J\
413 F3899 6E4F         GOTO DISP..       Putd, DISPEX
414          *-
415          *-
416          *
417          * Delete to protected field
418          *
419 F389D 870 Dell1 ?ST=1 =H82163      Is the display an HP82163A?
420 F38A0 90           GOYES Dell2       Yes...skip turning off insert mode
421 F38A2 7413         GOSUB InsOff      No...turn off insert mode
422 F38A6 453          GOC DelEx        Error...set up the char, exit
423 F38A9 AF2 Dell2 C=0 W
424 F38AC DB           C=D A
425 F38AE EE           C=A-C A
426 F38B0 81E          CSRB
427 F38B3 E6           C=C+1 A           Increment for current character

```

```

428      *
429      * Now C[A] is count of blanks to send
430      *
431 F38B5 DA      A=C   A      Copy count to A[A]
432 F38B7 D7      D=C   A      D[A]=count
433 F38B9 8E00    GOSUBL =BLANKC  Blanks (Clear the items)
      00
434 F38BF AF5     B=C   W      Copy to B[7:0]
435 F38C2 8E00    GOSUBL =SENDI+  Get mailbox, Send A[A] blanks
      00
436 F38C8 431    GOC    DelEx   If carry, abort
437      *
438      * Now back up to starting point
439      *
440 F38CB DB      C=D   A
441 F38CD DA      A=C   A      Count to A[A]
442 F38CF C4      A=A+A  A      Double count for <Esc> D
443 F38D1 73D1    GOSUB  SendBk   Send Esc D's (count in A[A])
444 F38D5 460     GOC    DelEx   Error...set up the char, exit
445 F38D8 72F2    GOSUB  InsOn   Turn on insert mode (if not HP82163)
446 F38DC 20     DelEx  P=     O
447 F38DE 31B4    LCASC  \K\    Restore original character (K)
448 F38E2 DA      A=C   A
449 F38E4 6480    DISPeX GOTO   DISPEX  Done...exit
450      *-
451      *-
452 F38E8         DISP2
453      *
454      * Check if it is an <Esc>...if so, do NOTHING until next char
455      *
456 F38E8 31B1    LC(2)  Esc
457 F38EC 962     ?A=C   B      Is this an escape?
458 F38EF F0      GOYES  DISPoX  Yes...exit, no change
459      *
460      * Check if backspace - if so, do a backspace and return
461      *
462 F38F1 3180    LC(2)  Bs      <Bs>
463 F38F5 966     ?A=C   B      Is this a backspace?
464 F38F8 A0      GOYES  DISP25  No...check further
465      *
466      * This is a backspace
467      *
468 F38FA 6F2F    GOTO   LArrow  Carry MUST be clear for LArrow
469      *-
470      *-
471 F38FE 65B0    DISPoX GOTO   DISPOX  Jump (GOYES out of range)
472      *-
473      *-
474 F3902 185     DISP25 DO=DO- 6      Move to DSPSTA from ESCSTA
475 F3905 15E2    C=DATO 3
476 F3909 0A      ST=C
477 F390B 8F00    GOSBVL =DSPCL?  Restore user status for DSPCL?
      000
478 F3912 1A00    DO=(4) (=DSPSTA)+3  Restore display status for me
      00

```

```

479 F3918 14E      C=DATO B
480 F391B 1A00    DO=(4) =DSPSET      Point to the HPIL status nibble
      00
481 F3921 1562    C=DATO XS          Recall the HPIL status from RAM
482 F3925 0A      ST=C
483              *
484              * Check if cursor is at end of buffer
485              *
486 F3927 7A72    GOSUB DO=CUR
487 F392B 14E      C=DATO B
488 F392E D5      B=C      A          Copy cursor value to B[B]
489 F3930 31F5    LC(2) 95
490 F3934 9E5     ?B<C      B          Reached physical end of buffer?
491 F3937 02      GOYES DISP30      No...check if insert mode
492              *
493              * Cursor is at end of buffer...check if insert or replace mode
494              *
495 F3939 870     ?ST=1 =Insert
496 F393C 2C      GOYES DISPOX      Exit, no error (no room)
497              *
498              * At end of buffer, not insert...send char, backspace
499              *
500 F393E 7000    GOSUB =GETMBX     Get mailbox
501 F3942 3500    LCHEX 441B00
      B144
502 F394A AE6     C=A      B          (char)&<esc>&"D"
503 F394D 8E00    GOSUBL =PUTX      Send it
      00
504 F3953 6510    GOTO  DISPEX      Exit
505              *
506              *
507 F3957        DISP30
508              *
509              * Cursor is NOT at end of buffer...check if insert or replace
510              *
511 F3957 860     ?ST=0 =Insert     Insert mode?
512 F395A 73      GOYES DspSnd      Not Insert...send the char
513              *
514              * Insert mode...call SendBf (It checks for HP82163A)
515              *
516 F395C 844     ST=0  Delete      This is NOT delete
517 F395F 7060    GOSUB SendBf      Send to end of line
518 F3963 856     ST=1  SetCur     Set the cursor to new spot...
519 F3966 5F3     GONC  DspSn2     If OK, position it
520              *
521              * Following jump taken ONLY if entered through DISPEX
522              * (Packing technique)
523              *
524 F3969 5A4    DISPEX GONC  DISPOX      If no carry, finish up
525 F396C 4C0    GOC   DspErr     Go always
526              *
527              *
528 F396F 7C02    EscSnd GOSUB GTPEsc     GETMBX, PUTEsc
529 F3973 846     ST=0  SetCur     ...DON'T set the cursor
530 F3976 512     GONC  DspSn1     Go unless interrupted

```

```

531 F3979 840 DspErr ST=0 =LoopOK      Interrupted
532 F397C 840          ST=0 =DispOK      (If interrupted, display not OK)
533 F397F 1800          DO=(5) =DSPSET      Rewrite display settings
      000
534 F3986 0B          CSTEM
535 F3988 1542          DATO=C XS
536 F398C 0B          CSTEM
537 F398E 452          GOC  DISPOX      Go always...exit
538          *-
539          *-
540 F3991          DspSnd
541          *
542          * Send the character and return
543          *
544 F3991 856          ST=1  SetCur      SET the cursor to next position
545 F3994 7000 DspSn0 GOSUB =GETMBX      Find the mailbox...
546 F3998 D6  DspSn1 C=A  A          ...copy character to C[B]...
547 F399A 79E1          GOSUB Putd          ...Send the character
548 F399E 4AD          GOC  DspErr      Interrupted
549 F39A1 866          ?ST=0 SetCur      Set the new cursor position?
550 F39A4 01          GOYES DISPOX      No...exit
551 F39A6 7FB1 DspSn2 GOSUB Clear?      Check if Clear is set
552 F39AA 490          GOC  DISPOX      Yes...exit (Don't move cursor)
553 F39AD 845          ST=0  CurLft      No...move the cursor RIGHT
554 F39B0 7901 DISPMC GOSUB MOVCUR
555 F39B4          DISPOX
556          *
557          * Now restore status bits and return
558          *
559 F39B4          DISPOF
560 F39B4 1800          DO=(5) (=DSPSTA)+3  Display status bits
      000
561 F39BB 15E2          C=DATO 3
562 F39BF 0A          ST=C          Restore them
563 F39C1 03  RtnCC  RTNCC      Done...return, carry clear
564          *****
565          *****
566          **
567          ** Name:      SendBf - Insert/delete a char, send line if needed
568          **
569          ** Category:  LOCAL
570          **
571          ** Purpose:
572          **      Insert/delete a character, even if this is an HP82163A
573          **      display device
574          **
575          ** Entry:
576          **      ST(Insert):
577          **          if 1, insert (send from position through end)
578          **              (send character from A[B] first)
579          **      ST(Delete) is type:
580          **          if 1, delete (send from next char to end,
581          **              append blank)
582          **          if 0, insert (send char from A[B], then to end)
583          **

```

```

584      ** Exit:
585      **      A[B] is not changed from entry
586      **      Carry clear:
587      **      All OK (P=0)
588      **      Carry set:
589      **      Interrupted (P=error code)
590      **
591      ** Calls:      SCNRT,GETMBX,PUTEsc,PUTD,WRITIT,LCleft
592      **
593      ** Uses.....
594      ** Exclusive: A[15:2],B[W],C[W],      DO,D1  ST[Protec]
595      ** Inclusive: A[15:2],B[W],C[W],D[A],DO,D1,P,ST[Protec,3:0]
596      **
597      ** Stk lvls:   2 (WRITIT)(SCNRT)
598      **
599      ** History:
600      **
601      **      Date      Programmer      Modification
602      **      -----      -
603      **      02/24/84      NZ      Rearranged code to allow common
604      **                                     subroutines for turning off and
605      **                                     on the insert cursor on display
606      **                                     device
607      **      06/24/83      NZ      Packed code by no longer preserve
608      **                                     D1 in this routine
609      **      06/02/83      NZ      Added code to do Esc M (Insert w/
610      **                                     wrap)
611      **      12/09/82      NZ      Added documentation
612      **
613      ** *****
614      ** *****
615 F39C3      SendBf
616      *
617      * Find first character NOT to send (Either EOB or protected)
618      *
619 F39C3 8F00      GOSBVL =SCNRT      Scan right
        000
620      *
621      * SCNRT returns A[A]-->past unprotected item, carry set if end
622      * of buffer, D[A] is pointer to first after current position,
623      * B[B] contains the entry A[B]
624      *
625 F39CA 5C0      GONC      NotEnd      If carry, at end of buffer
626      *
627      * If Insert and End of buffer, return (Do nothing)
628      *
629 F39CD 860      ?ST=0 =Insert      Is it NOT insert?
630 F39D0 70      GOYES NotEnd      Not insert...continue
631 F39D2 864      ?ST=0 Delete      Is it a delete?
632 F39D5 CE      GOYES RtoCC      No...buffer is full, insert: exit
633 F39D7      NotEnd
634      *
635      * B[B] is the new character...saved here for now
636      *
637      * D[A] is first char after current position in buffer

```

?ST=1 Delete
GOYES NotEnd
GONC Sendex

```

638      *
639 F39D7 AF2      C=0      W      Clear high bits for CSRB below
640 F39DA DB      C=D      A      Start of string in C[A]
641 F39DC 135     D1=C
642 F39DF 846     ST=0     Protec  Check if protected field
643 F39E2 130     DO=A
644 F39E5 14E     C=DATO  B
645 F39E8 96A     ?C=0    B
646 F39EB 50      GOYES   NotPro   Not protected (EOB)
647 F39ED 856     ST=1     Protec
648 F39F0 137     NotPro  CD1EX    Bring pointer back to C[A]...
649 F39F3 135     D1=C      ...And copy back to D1
650 F39F6 EE      C=A-C    A      # of nibbles to send
651 F39F8 81E     CSRB
652 F39FB DA      A=C      A      A[A] is length to send (bytes)
653      *
654      * Now D1 points past start of buffer, A[A] is a character count
655      *
656      * Get the mailbox address into D0 now...
657      *
658 F39FD 7000     GOSUB   =GETMBX    Alters only C,D0
659      *
660      * Now D0 points to the mailbox
661      *
662      * Check if Protec is set...if so, and in insert mode, and not
663      * HP82163A, then send <Esc>R to turn OFF insert mode
664      *
665 F3A01 870     ?ST=1   =H82163    HP82163A?
666 F3A04 62      GOYES   Send#     Yes...continue
667 F3A06 876     ?ST=1   Protec    Protected?
668 F3A09 A1      GOYES   Send-     Yes...continue
669      *
670      * Not HP82163A, not protected...just send the char (or delete
671      * escape sequence)
672      *
673 F3A0B D0      A=0      A
674 F3A0D 864     ?ST=0    Delete    Is this a delete?
675 F3A10 90      GOYES   Send+     No...just the character
676 F3A12 7D61    GOSUB   PUTEsc  Yes...send Esc...
677 F3A16 480     GOC      Sendex
678 F3A19 D9      Send+   C=B      A      Copy B[B] (the character)
679 F3A1B 7861    GOSUB   Putd
680 F3A1F D4      Sendex  A=B      A      Restore the character from B[B]
681 F3A21 01      RTN
682      *
683      *
684      *
685      * This is not HP82163A, Protected
686      *
687 F3A23 7391    Send-   GOSUB   InsOff   Turn off insert mode, if on
688 F3A27 47F     GOC      Sendex   Error...restore, return
689      *
690      * Check if insert...if so, send the character in B[B] first
691      * If not insert (if delete), skip first character in buffer
692      *

```



```

693      * Check if this is the logical end of buffer
694      *
695 F3A2A 1C1 Send#  D1=D1- 2      Point to first character
696 F3A2D 14F      C=DAT1 B      Check the character for EOB
697 F3A30 171      D1=D1+ 2      Restore pointer to next char
698 F3A33 96E      ?C#0  B      End of line?
699 F3A36 40      GOYES Send00      No...check if need to adjust
700 F3A38 D0      A=0  A      Yes...set =0
701 F3A3A 874 Send00 ?ST=1 Delete      Delete?
702 F3A3D A1      GOYES SendNI      Yes...NOT insert
703      *
704      * This is an insert
705      *
706 F3A3F 1C1      D1=D1- 2      This is an insert...
707 F3A42 96A      ?C=0  B      Is it End of buffer?
708 F3A45 90      GOYES Send02      Yes...skip this adjustment
709 F3A47 876      ?ST=1 Protec      Is it protected?
710 F3A4A 40      GOYES Send02      Yes...leave A[A] unchanged
711 F3A4C E4      A=A+1  A      Increment count
712      *
713      * Now A[A] is corrected character count, D1@ first char to
714      * be sent.
715      *
716 F3A4E D9 Send02 C=B  A      Read the character from B[B]
717 F3A50 7331 GOSUB Putd      Send the character
718 F3A54 4AC      GOC  Sendex      Error...exit
719      *
720      * This is the entry point for a delete
721      *
722 F3A57      SendNI
723      *
724      * Now retransmit the line...
725      *
726 F3A57 8E00 GOSUBL =WRITIT      Send the data to the loop
727      *
728      * If carry set, ATTN hit...return
729      *
730 F3A5D 41C      GOC  Sendex      Exit after restoring A[B]
731      *
732      * Done with transfer now...check if delete; if so, send blank
733      *
734 F3A60 864      ?ST=0 Delete
735 F3A63 D0      GOYES SendLs      Insert...no trailing blank
736 F3A65 3102 LCASC  \ \      Delete...
737 F3A69 7A11 GOSUB Putd      ...send a trailing blank
738 F3A6D 41B      GOC  Sendex      Exit if error
739      *
740      * Now D1 points to the "Next" character...subtract current
741      * position and divide by 2 to get # of bytes sent
742      *
743 F3A70 866 SendLs ?ST=0 Protec      Is this NOT protected field?
744 F3A73 90      GOYES SendL1      Not protected...back up
745 F3A75 7551 GOSUB InsOn      Turn insert mode back on
746 F3A79 45A      GOC  Sendex

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```

747 F3A7C AFO SendL1 A=0 W Clear high bits for ASRB below
748 F3A7F 133 AD1EX
749 F3A82 3400 LC(5) =DSPBFS
    000
750 F3A89 EA A=A-C A
751 F3A8B 81C ASRB A[A] is # bytes from buffer start
752 F3A8E 1F00 D1=(5) =CURSOR
    000
753 F3A95 D2 C=0 A
754 F3A97 14F C=DAT1 B Read the cursor...
755 F3A9A EA A=A-C A Now A[A] is # backspaces to send
756 F3A9C C4 A=A+A A Double for <Esc> D
757 F3A9E DC ABEX A Now character in A[B], # in B[A]
758 F3AA0 814 ASRC
759 F3AA3 814 ASRC Save character in A[15:14]
760 F3AA6 D4 A=B A Count back to A[A]
761 F3AA8 7201 SendBk GOSUB LCleft Load C with Esc D Esc D
762 F3AAC AF5 B=C W
763 F3AAF 8E00 GOSUBL =SENDIT Send the sequence
    00
764 F3AB5 810 ASLC
765 F3AB8 810 ASLC Restore A[B] from A[15:14]
766 F3ABB 01 RTM Don't alter carry
767 *****
768 *****
769 **
770 ** Name: MOVCUR - Move the cursor right/left
771 ** Name: MOVCU+ - Move the cursor permanently (no restore)
772 **
773 ** Category: LOCAL
774 **
775 ** Purpose:
776 ** Move the cursor in the direction specified by CurLft
777 ** status bit (Similar to mainframe routine by same name)
778 **
779 ** Entry:
780 ** CurLft set to move left, clear to move right
781 ** P=0
782 **
783 ** Exit:
784 ** Contents of A[A] restored upon exit
785 ** Carry set if no move
786 ** Carry clear if moved, cursor positioned on display
787 ** Clears ST(=LoopOK) if interrupted
788 **
789 ** Calls: DO=CUR,MOV60,GETMSK,SENDI+,LCleft
790 **
791 ** Uses.....
792 ** Exclusive: A[15:5],B[W],C[W],D[A], P
793 ** Inclusive: A[15:5],B[W],C[W],D[A],DO,P,ST[3:0]
794 **
795 ** Stk lvls: 2 (SENDI+)
796 **
797 ** NOTE: Does not alter A[A]
798 **

```

```

799      ** History:
800      **
801      **   Date      Programmer      Modification
802      **   -----      -
803      ** 02/24/84      NZ          Moved MOV60 to inline code (at
804      **                                     MOV10)
805      ** 12/09/82      NZ          Added documentation
806      **
807      ****
808      ****
809 F3ABD 840  MOVCUR  ST=0  RepCur  Do NOT replace cursor
810 F3ACO 71E0 MOVCU+  GOSUB  DO=CUR
811 F3AC4 14E          C=DATO  B
812 F3AC7 D7          D=C      A          Save original value in D[B]
813 F3AC9 D8          B=A      A          Save original character in B[A]
814 F3ACB 14A  MOV10  A=DATO  B
815 F3ACE CC          A=A-1  A          Assume LEFT first
816 F3AD0 875          ?ST=1  CurLft  Is it LEFT?
817 F3AD3 60          GOYES  MOV12  Yes...good choice
818 F3AD5 E4          A=A+1  A          No...undo LEFT,
819 F3AD7 E4          A=A+1  A          do RIGHT
820 F3AD9 31F5 MOV12  LC(2)  95
821 F3ADD 9E6          ?A>C   B          Would this be past end of display?
822 F3AE0 C6          GOYES  MOV50  Yes, then restore original value
823 F3AE2 148          DATO=A  B          No, then update cursor position
824 F3AE5 D4          A=B     A          Save original char in A[B]
825 F3AE7 8F00          GOSBVL =GETMSK  Get bit map (Alters B[A],C,DO,P)
      000
826 F3AEE D8          B=A     A          Resave original char in B[B]
827 F3AF0 15A0          A=DATO 1          Read mask nibble
828 F3AF4 0E06          A=A&C   P
829 F3AF8 79A0          GOSUB  DO=CUR
830 F3AFC 90C          ?AWO    P          Is it protected?
831 F3AFF CC          GOYES  MOV10  Yes, then keep looking
832      *
833      * Now calculate how far to move cursor, and which direction...
834      * ...and restore cursor value
835      *
836 F3B01 D0          A=0     A          Clear high nibbles of A[A]
837 F3B03 14A          A=DATO  B          Read in cursor position
838 F3B06 DB          C=D     A
839 F3B08 870          ?ST=1  RepCur  Replace the cursor?
840 F3B0B 50          GOYES  MOV15  Yes...don't restore it
841 F3B0D 14C          DATO=C  B          Restore original cursor position
842 F3B10 B6A  MOV15  A=A-C   B          Offset (Bytes) in A[B]
843 F3B13 37B1          LCHEX  431B431B  Right arrows
      34B1
      34
844 F3B1D 590          GONC   MOV20  If carry, left arrow
845      *
846      * Left arrows needed
847      *
848 F3B20 7A80 MOV17  GOSUB  LCleft  Left arrows
849 F3B24 BE8          A=-A   B
850 F3B27 AFD  MOV20  BCEX   W          Move arrows to B[W], char to C[B]

```



```
905      **      Set/clear carry if clear bit in DSPSTA is set/clear
906      **
907      ** Entry:
908      **      None
909      **
910      ** Exit:
911      **      Carry set if ST[Clear] is set, else clear
912      **      DO @ DSPSTA+3
913      **
914      ** Calls:      None
915      **
916      ** Uses.....
917      **      Inclusive: C[X],DO
918      **
919      ** Stk lvls:  0
920      **
921      ** History:
922      **
923      **      Date      Programmer      Modification
924      **      -----      -
925      **      09/28/83      NZ      Added documentation
926      **
927      ****
928      ****
929 F3B69 1B00 Clear? DO=(5) (=DSPSTA)+3 Point to status
          000
930 F3B70 15E2      C=DATO 3      Read in 3 nibbles of status
931 F3B74 0B      CSTEM      Now check if CLEAR is set...
932 F3B76 870      ?ST=1 =Clear
933 F3B79 20      GOYES Clear1      Set/clear carry...
934 F3B7B 0B Clear1 CSTEM      (Restore my status)
935      *
936      * If carry set, then =Clear is set
937      *
938 F3B7D 01      RTN      Return, carry unchanged
939      *_
940      *_
941 F3B7F 7000 GTPEsc GOSUB =GETMBX      Get the mailbox
942 F3B83 31B1 PUTEsc LC(2) Esc      Send an Escape
943 F3B87 8C00 Putd GOLONG =PUTD
          00
944      ****
945      ****
946      **
947      ** Name:      DO@CUR - Set DO to the current cursor position
948      **
949      ** Category:  LOCAL
950      **
951      ** Purpose:
952      **      Set DO to the cursor position in the display
953      **
954      ** Entry:
955      **      None
956      **
957      ** Exit:
```

```

958      **      DO at cursor position
959      **      Carry clear
960      **      C[A] is cursor value (from =CURSOR)
961      **
962      ** Calls:      DO=CUR
963      **
964      ** Uses.....
965      ** Inclusive: C[A],DO
966      **
967      ** Stk lvls:  1 (DO=CUR)
968      **
969      ** History:
970      **
971      **      Date      Programmer      Modification
972      **      -----      -
973      ** 02/18/83      NZ      Added DO=CUR call, renamed to
974      **                DO@CUR
975      ** 12/09/82      NZ      Added documentation
976      **
977      ****
978      ****
979 F3B8D 7410 DO@CUR  GOSUB  DO=CUR      Leaves DO pointing to cursor loc
980 F3B91 D2      C=0      A
981 F3B93 14E     C=DATO  B
982 F3B96 161     DO=DO+  2      (=CURSOR)-(=DSPBFS)
983 F3B99 132     ADOEX
984 F3B9C CA      A=C+A  A      Save A[A] in DO, set A[A] to DSPBFS
985 F3B9E CA      A=C+A  A
986 F3BA0 132     ADOEX
987 F3BA3 03      Rtncc  RTNCC      Restore A[A], set DO to cursor
988      * _
989      * _
990 F3BA5 1800 DO=CUR  DO=(5) =CURSOR
991      000
991 F3BAC 01      RTN
992      * _
993      * _
994 F3BAE 37B1 LCleft  LCHEX  441B441B      Esc D Esc D
995      44B1
996      44
995 F3BB8 01      RTN
996      * _
997      * _
998 F3BBA 860    InsOff  ?ST=0 =Insert      Insert mode?
999 F3BBD 6E      GOYES  Rtncc      No...leave alone
1000      *
1001      * This is not HP82163A, protected, insert mode...temporarily
1002      * disable insert mode
1003      *
1004 F3BBF 7CBF      GOSUB  GTPEsc      Get mailbox, Put Esc...
1005 F3BC3 400      RTN      (Error)
1006 F3BC6 3125     LCASC  \R\      ...R
1007 F3BCA 6CBF      GOTO   Putd
1008      * _
1009      * _

```

```
1010 F38CE 870 InsOn ?ST=1 =H82163      Is this an HP82163A?
1011 F38D1 2D      GOYES Rtncc      Yes...exit
1012 F38D3 860     ?ST=0 =Insert    Am I in insert mode?
1013 F38D6 DC      GOYES Rtncc      No...exit
1014 F38D8 77AF    GOSUB PUTEsc     Send <Esc>N to turn insert on
1015 F38DC 400     RTNC
1016 F38DF 31E4    LCASC \N\
1017 F38E3 63AF    GOTO Putd
1018                *-
1019                *-
1020 F38E7 0        CON(1) =FIXSPC   11 nibbles available here
1021 F38E8          BSS 11-1
1022 F38F7          END
```


Send+	Abs	997941	#F3A35	-	681	678						
Send-	Abs	997951	#F3A3F	-	690	671						
Send00	Abs	997990	#F3A66	-	713	711						
Send02	Abs	998010	#F3A7A	-	728	720	722					
=SendBf	Abs	997855	#F39DF	-	618	325	520					
SendL1	Abs	998071	#F3AB7	-	764	756	758	760				
SendLs	Abs	998044	#F3A9C	-	755	747						
SendNI	Abs	998019	#F3A83	-	734	714						
Sendex	Abs	997947	#F3A3B	-	683	635	680	697	700	730	742	750
SetCur	Abs	6	#00006	-	69	70	231	349	369	521	533	548
					553	864	885					
WRITIT	Ext			-	308	738						
Wallby	Ext			-	98	144	165	668	757			

Input Parameters

Source file name is NZ&DSP::MS

Listing file name is NZ/DSP:TI:ML::-1

Object file name is NZ%DSP:TI:MS::-1

Initial flag settings are
 111111
 0123456789012345

Errors

None

Saturn Assembler News

```

1      *
2      *      N  N  ZZZZZ  &      BBBB  U  U  TTTT
3      *      N  N      Z  & &  B  B  U  U  T
4      *      NN N      Z  & &  B  B  U  U  T
5      *      N  N  N  Z      &      BBBB  U  U  T
6      *      N  NN  Z      & & &  B  B  U  U  T
7      *      N  N  Z      & &  B  B  U  U  T
8      *      N  N  ZZZZZ  && &  BBBB  UUU  T
9      *
10     *

```

```

11     TITLE BASIC UTILITIES <840104.1515>
12 F3BF7 ABS #F3BF7 IZHP6 address (fixed)

```

```

13 *****
14 *****

```

```

15 **
16 ** Name:      GETMBX - Get address of mailbox (last FNDMBX)
17 **

```

```

18 ** Category:  PTRUTL
19 **

```

```

20 ** Purpose:
21 **   Get the HPIL mailbox address from RAM and put it in DO
22 **

```

```

23 ** Entry:
24 **   Nothing
25 **

```

```

26 ** Exit:
27 **   C[A], DO-->Mailbox
28 **   Carry clear
29 **

```

```

30 ** Calls:     None
31 **

```

```

32 ** Uses.....
33 **   Inclusive: C[A],DO
34 **

```

```

35 ** Stk lvls:  0
36 **

```

```

37 ** NOTE: Does not alter P!
38 **

```

```

39 ** History:
40 **

```

Date	Programmer	Modification
11/11/82	NZ	Added documentation

```

41 *****
42 *****

```

```

43 F3BF7 1B00 =GETMBX DO=(5) =MBOX^ Mailbox pointer (in RAM)
44 000

```

```

45 F3BFE 146 C=DAT0 A Read the pointer to the mailbox
46 *

```

```

47 F3C01 F2 CSL A Mbox address is stored as words
48 * offset from 20000!

```

```

49 F3C03 80F4 CPEX 4

```

```

50 F3C07 22 P= 2

```

```

51 F3C09 80F4 CPEX 4 Set nibble 4 to 2 (page 20000)

```

```

55      *
56      * Now C[A] is the mailbox address
57      *
58 F3C0D 134      DO=C          Put the address into D0...
59 F3C10 03      RTNCC        ...and return with carry clear!
60      *****
61      *****
62      **
63      ** Name:      SETLP - Set up C[S] for FNDBMX from D[A] info
64      **
65      ** Category:  PILUTL
66      **
67      ** Purpose:
68      **      Given D[A] set up for device search, return the loop #
69      **      minus one in C[S]
70      **
71      ** Entry:
72      **      D[A] is device info (see START documentation)
73      **
74      ** Exit:
75      **      Carry clear
76      **      P=0
77      **      Mailbox # in C[S]
78      **
79      ** Calls:     None
80      **
81      ** Uses.....
82      **      Inclusive: C[A],C[S],P
83      **
84      ** Stk lvls:  0
85      **
86      ** History:
87      **
88      **      Date      Programmer      Modification
89      **      -----      -
90      **      11/11/82      NZ          Added documentation
91      **
92      *****
93      *****
94 F3C12 20      =SETLP  P=      0
95 F3C14 310E      LCHEX  E0
96 F3C18 0E6F      C=C!D  B      To check for FIND (Could be [A])
97 F3C1C B66      C=C+1  B      If carry, is a FIND...
98      *
99      * If carry, FIND some device...if not carry, address
100     * (If address, high bits of D[XS]=mailbox #; else D[3]=mbox #)
101     *
102 F3C1F DB      C=D      A      Copy to C[A] for either case
103 F3C21 570      GONC    SETLP1  Go if address
104 F3C24 F6      CSR      A
105 F3C26 490      GOC     SETLP2  Go always (FIND Nth device)
106     *_
107     *_
108     *
109     * Address!

```

```
110      *
111 F3C29 BB6 SETLP1 CSR X      (Clears C[X$])
112 F3C2C C6      C=C+C A      Multiply C[X]*4
113 F3C2E C6      C=C+C A      Now C[2] is the mailbox #
114 F3C30 80D2 SETLP2 P=C 2      Now P is the mailbox #...
115 F3C34 80CF      C=P 15      ...now in C[S]!
116 F3C38 20      P= 0
117 F3C3A 03      RTNCC
118      *****
119      *****
120      **
121      ** Name:      FNDMBX - Find an HPIL mailbox (C[S] is #)
122      ** Name:      FNDMB- - Find mailbox, clear disp bits, chk OFF
123      ** Name:      FNDMBD - Find an HPIL mailbox, clear disp bits
124      ** Name:      FNDMB+ - Find an HPIL mailbox (D[A] is spec)
125      **
126      ** Category:  PTRUTL
127      **
128      ** Purpose:
129      **      Search the configuration tables to find a HPIL mailbox
130      **      (C[S] is the number of the mailbox minus 1 - if C[S]
131      **      is 2 then find the 3rd mailbox!)
132      **
133      ** Entry:
134      **      FNDMBX,FNDMB-,FNDMBD:
135      **      C[S] is the mailbox number -1
136      **      FNDMB+:
137      **      D[A] is the device spec
138      **
139      ** Exit:
140      **      Carry clear: D0 points to the mailbox, (MBOX^) is set
141      **      to the mailbox
142      **      Carry set: Mailbox and/or configuration buffer not
143      **      found (P is the error number)
144      **
145      ** Calls:      CNFFND (FNDMB+ also calls SETLP)
146      **
147      ** Uses.....
148      **      Exclusive: C[W],D0,P
149      **      Inclusive: C[W],D0,P
150      **
151      ** Stk lvls:   1 (CNFFND)(SETLP)
152      **
153      ** History:
154      **
155      **      Date      Programmer      Modification
156      **      -----
157      **      05/23/83      NZ      Reworked error exit for loop is
158      **      now "OFFED" (Returns P= eOFFED)
159      **      03/16/83      NZ      Changed FNDMBe to return P=eBADMD
160      **      03/08/83      NZ      Added FNDMB-
161      **      11/11/82      NZ      Added documentation
162      **
163      *****
164      *****
```

```

165      *
166      * First set C[S] to be the mailbox #, minus 1
167      *
168 F3C3C 72DF =FNDMB+ GOSUB  SETLP
169      *
170      * C[S] is now the mailbox #
171      *
172 F3C40      =FNDMB-
173      *
174      * Get LOOP SStatus to clear InptOK bit
175      *
176 F3C40 1800      DO=(5) =LOOPST
      000
177 F3C47 1562      C=DATO XS          Read into ST[3:0]
178 F3C4B 0B        CSTEM
179      *
180      * Is the following test desirable??? (will error out if OFFED)
181      *
182 F3C4D 20        P=      =eOFFED      Set P before the test
183 F3C4F 870      ?ST=1  =Offed      Is the loop "OFFED" (OFFIO)?
184 F3C52 20        GOYES  FNDMB.      Set carry if "RESTORE IO Needed"
185 F3C54          FNDMB.
186 F3C54 0B        CSTEM
187 F3C56 4A6      GOC      FNDMB9      "RESTORE IO Needed"
188 F3C59 D2        C=0      A          Clear "set up" bits, "Device" bit
189 F3C5B 1542     DATO=C XS          Device, "set up" bits cleared
190      *
191      * Set DispOK bit false (Display is NOT set up on loop)
192      *
193 F3C5F 1800 =FNDMBD DO=(5) =DSPSET
      000
194 F3C66 1562      C=DATO XS
195 F3C6A 0B        CSTEM
196 F3C6C 840      ST=0\  =DispOK      Display is NOT set up
197 F3C6F 0B        CSTEM
198 F3C71 1542     DATO=C XS
199      *
200      * Get the mailbox address (search the device table for it)
201      *
202 F3C75 80DF =FNDMBX P=C      15      Save mailbox # in P for now
203 F3C79 D6      C=A      A
204 F3C7B 7974     GOSUB  Cslc5      Save A[A] in C[9:5]
205 F3C7F 80CF     C=P      15      Restore mailbox # to C[S]
206 F3C83 137      CD1EX          SAVE D1 IN DO (TEMPORARILY)
207 F3C86 134      DO=C
208 F3C89 20      P=      0
209 F3C8B 31DF     LCHEX  FD          CONFIGURATION BUFFER - MM I/O
210 F3C8F 8F00     GOSBVL =CNFFND     Configuration find
      000
211 F3C96 542      GONC      FNDMBE     ...Not found (error!!!)
212      *
213      * Found memory-mapped i/o buffer!!!!
214      *
215 F3C99 173      D1=D1+ 4          Skip to proper offset into entry
216 F3C9C 24      P=      4

```

```
217 F3C9E 8A8 FNDMB1 ?A=0 A Done searching yet?
218 F3CA1 A1 GOYES FNDMBE Yes...didn't find a mailbox!
219 F3CA3 147 C=DAT1 A
220 F3CA6 AOE C=C-1 P If zero, is PIL mailbox!
221 F3CA9 452 GOC FNDMB3 Yep...found it!
222 *
223 * Haven't found it yet...keep trying!
224 *
225 F3CAC 179 FNDMB2 D1=D1+ 10 Next entry
226 F3CAF 132 ADOEX
227 F3CB2 189 DO=DO- 10 Decrement A[A] by 10
228 F3CB5 132 ADOEX
229 F3CB8 55E GONC FNDMB1 Loop back for more...
230 *
231 * This is an error!
232 *
233 F3CBB 20 FNDMBE P= 0
234 F3CBD 0D P=P-1 Set carry!!!
235 F3CBF 20 P= =eNMBX No mailbox...carry is set!
236 *
237 * Restore A[A], D1 before returning (COMMON return code)
238 *
239 F3CC1 136 FNDMB9 CDOEX Old D1 value-->C, C[A] to DO
240 F3CC4 135 D1=C Now D1 is restored
241 F3CC7 7424 GOSUB Csrc5
242 F3CCB DA A=C A Now A[A] is restored
243 F3CCD 01 RTN
244 *-
245 *-
246 F3CCF FNDMB3
247 *
248 * Found a mailbox...check if it is the correct one!
249 *
250 F3CCF A4E C=C-1 S
251 F3CD2 59D GONC FNDMB2 Go to the next entry!
252 *
253 * Have THE mailbox!
254 * (P is still 4)
255 *
256 * Save the address away in MBOX^ first!
257 *
258 F3CD5 1F00 D1=(5) =MBOX^
000
259 F3CDC 15D2 DAT1=C 3
260 *
261 * Now get the actual address
262 *
263 F3CE0 F2 CSL A Offset to words (multiply by 16)
264 F3CE2 302 LCHEX 2 Now C has the mailbox address!
265 F3CE5 21 P= 1
266 F3CE7 0D P=P-1 Clear carry, set P=0
267 F3CE9 57D GONC FNDMB9 GO ALWAYS!
268 *****
269 *****
270 **
```



```
271      ** Name:      CHKASN - Check if an HPIL assignment is active
272      **
273      ** Category:  PILUTL
274      **
275      ** Purpose:
276      **      Check if the assignment is none, HPIL, or "other"
277      **      (If "OFF"ed, returns as if no assignment)
278      **
279      ** Entry:
280      **      C[6:0] is the assignment table value
281      **
282      ** Exit:
283      **      Carry set if not assigned/not HPIL/"OFF"ed/LOOP/NULL
284      **      Carry clear if assigned...B[W],C[X] set up for START
285      **      If C[S]<>0, this is a FIND (Address unknown)
286      **
287      ** Calls:      I/OFND
288      **
289      ** Uses.....
290      ** Exclusive: B[W],C[W],P
291      ** Inclusive: B[W],C[W],P
292      **
293      ** Stk lvls:   2 (pushed D1;I/OFND)
294      **
295      ** History:
296      **
297      **      Date      Programmer      Modification
298      **      -----      -
299      **      11/11/82      NZ              Added documentation
300      **
301      ****
302      ****
303 F3CEC =CHKASN
304      *
305      * Assign table format:
306      *
307      *      nib:  usage:
308      *      ---  -----
309      *      2-0:  If device address known, address, loop # here
310      *            If LOOP, nibs 1-0=0, nib 2 is loop #
311      *            If NULL, F00
312      *            If not known/not assigned/IObuffer, FFF
313      *            If assigned, not HPIL, Fxx, xx<>FF
314      *
315      *      3:   If unassigned/not HPIL, F
316      *            If IO buffer with one entry, 4
317      *            If address specified, 0
318      *            If type specified, loop # + 1 (nib 3: 1,2,3)
319      *            If this assignment has been "OFF"ed, bit 3 is 1
320      *
321      *      6-4: If type, nib 6: sequence #, nibs 5-4: Acc id
322      *            If address, 6-4: address, loop #
323      *            If IO buffer, 6-4: IO buffer #
324      *            If unassigned (NOT "OFF"ed), FFF
325      *            If not HPIL and nib 3=F, not defined
```

```

326      *
327 F3CEC AC2      C=0   S      Preclear "FIND" flag
328 F3CEF 20      P=    0
329      *
330      * Check if this is OK as is...
331      *
332 F3CF1 96A      ?C=0  B      Is it LOOP or NULL?
333 F3CF4 00      RTNYES      Yes..."not" set up
334 F3CF6 B26      C=C+1 XS
335 F3CF9 A2E      C=C-1 XS
336 F3CFC 500      RTNNC      This is OK as is
337 F3CFF B36      C=C+1 X
338 F3D02 A3E      C=C-1 X
339 F3D05 4F0      GOC   CHKASO
340 F3D08 02      RTNSC      This is NOT a HPIL assignment!
341      *
342      *
343 F3D0A 0      CON(1) =FIXSPC      11 nibbles available here
344 F3D0B      BSS   11-1
345      *
346      *
347 F3D15      CHKASO
348      *
349      * Check if this is not assigned (nibble 3="F")
350      *
351 F3D15 23      P=    3
352 F3D17 B06      C=C+1 P
353 F3D1A A0E      C=C-1 P      Alter carry only...not value!
354 F3D1D 20      P=    0      Reset P to 0!
355 F3D1F 400      RTNC      Not defined...return!
356 F3D22 BF6      CSR   W      Now code nibble in C[XS]
357 F3D25 92E      ?C#0 XS
358 F3D28 60      GOYES  CHKAS1      This is not an address...
359 F3D2A 6470     GOTO   CHKAS9      This is an address!
360      *
361      *
362      *
363      * If here, have either iobuffer, type, or "OFF"ed assignment
364      *
365 F3D2E BF6     CHKAS1 CSR   W      C[1] is the code nibble!
366 F3D31 80D1     P=C   1      Copy C[1] into P
367 F3D35 80CF     C=P   15     Use C[S] to test it
368      *
369      * If C[S] is >=8, then "OFF"ed (RTNSC)
370      *
371 F3D39 A46      C=C+C S
372 F3D3C AC2      C=0   S      Clear it again!
373 F3D3F 20      P=    0
374 F3D41 400      RTNC      If carry, "OFF"ed!
375      *
376      * Now either iobuffer or type
377      *
378 F3D44 80D1     P=C   1      Is this a single entry buffer?
379 F3D48 890     ?P=   1      Yes...process it!
380 F3D4B 71      GOYES  CHKAS2

```

```

381 F3D44 80D1      P=C      1
382 F3D48 890      ?P=      =SngDev      Is this a single entry buffer?
383 F3D4B 71       GOYES    CHKAS2      Yes...process it!
384                *
385                * This is a TYPE!
386                *
387 F3D4D F6       CSR      A
388 F3D4F F6       CSR      A      C[XS] is sequence #, C[B] is type
389 F3D51 D5       B=C      A      Copy to B[B]
390                *
391                * C[XS] is sequence #, P is loop # + 1 (C[4:3]=0)
392                *
393 F3D53 0D       P=P-1
394 F3D55 80F3     CPEX     3      P is now loop #
395 F3D59 A4E     C=C-1    S      Get loop # in C[3]
396                *                               Set C[S]="F" for "FIND" flag
397                * Now C[3] is loop #, C[XS] is sequence #, P=0
398                *
399 F3D5C 3100     LC(2)    =DevTyp   This is a device type!
400 F3D60 03      RTNCC
401                *                               C[2] is seq #, B[B] is ACC ID
402                *                               C[3] is loop #
403                *
404 F3D62          CHKAS2
405                *
406                * I/O buffer!
407                *
408                * C[4:2] is I/O buffer #
409                *
410                * Now save A[W] in B[W], D1 on RSTK
411                *
412 F3D62 7540     GOSUB    CHKASs    Save info, find the buffer
413 F3D66 563     GONC     CHKASx    Not found...(Error!)
414                *
415                * Now D1 @ I/O buffer start, A[A] is length of buffer
416                *
417 F3D69 147     C=DAT1   A      Read type, seq #, loop #
418 F3D6C 172     D1=D1+ 3      Move to next word
419 F3D6F 1537    A=DAT1   W
420 F3D73 AFC     ABEX     W      Restore A[W], B[W] is ID/label
421 F3D76 816     CSRC
422 F3D79 F2      CSL      A      Type in C[S] now
423 F3D7B F2      CSL      A
424                *
425                * Now C[3] is loop #, C[2] is sequence #
426                *
427                *
428                * P is now zero...clear C[S], set P=C[S]
429                *
430 F3D7D 80FF    CPEX     15      Find out what it is
431                *
432                * P is now device type
433                *
434 F3D81 137     CD1EX
435 F3D84 1D00    D1=(2)   =DevID   Preload Device ID

```

```

436 F3D88 892          ?P=    2          Device ID?
437 F3D88 60          GOYES  CHKAS3      (Set carry if Device ID)
438 F3D8D 1D00        D1=(2) =VolLb1    Volume label!
439 F3D91             CHKAS3
440 F3D91 A4E         C=C-1  S          Set C[S]="F"
441 F3D94 20          CHKAS4  P=    0
442 F3D96 07          C=RSTK           Restore D1
443 F3D98 137        CD1EX
444 F3D9B 03          RTNCC           Done (return, carry clear)
445                 * _
446                 * _
447 F3D9D 02          CHKASx  RTNSC
448                 * _
449                 * _
450                 *
451                 * This is an address!
452                 *
453 F3D9F             CHKAS9
454 F3D9F BF6         CSR    W          (Clears C[S])
455 F3DA2 A4E         C=C-1  S          Set C[S]="F" (Do store on return)
456 F3DA5 F6          CSR    A
457 F3DA7 F6          CSR    A          Now C[X] is the address!
458 F3DA9 03          RTNCC
459                 * _
460                 * _
461 F3DAB F6          CHKASs  CSR    A
462 F3DAD F6          CSR    A          Shift the ID to C[X]
463 F3DAF 20          P=    0          Set P=0 for later!
464 F3DB1 D5          B=C    A
465 F3DB3 07          C=RSTK           Save calling address in B[A]
466 F3DB5 137        CD1EX
467 F3DB8 06          RSTK=C          Save D1 on RSTK
468 F3DBA 137        CD1EX
469 F3DBD 06          RSTK=C          Restore calling routine address
470 F3DBF D9          C=B    A          Restore C[A]
471 F3DC1 AF8         B=A    W          Save A in B[W]
472 F3DC4 6943        GOTO   1/OFND     Find it!
473                 *****
474                 *****
475                 **
476                 ** Name:      SETUP - Given info from START, set up C[6:0]
477                 **
478                 ** Category:  PILUTL
479                 **
480                 ** Purpose:
481                 **      Build a recall string in C[6:0] (carry set if buffer
482                 **      required to store this)
483                 **
484                 ** Entry:
485                 **      D is the info returned from START
486                 **      D[X] is address, (loop #) * 1024
487                 **      D[S] is type (0=address, 1=device type, 2=device ID,
488                 **      3=volume label, 4=NULL, 5=LOOP)
489                 **      D[3] is sequence # for types 1 and 2
490                 **      B is as returned from START

```

```

491      **
492      ** Exit:
493      **      C[6:0] is the information to put into an IS-xxx entry
494      **      P=0
495      **      C[S]=0 if entry will fit in IS-xxx, else C[S]#0
496      **
497      ** Calls:      CSLC5,CSRC4,CSLC3
498      **
499      ** Uses.....
500      ** Inclusive: C[W],P
501      **
502      ** Stk lvls:  1 (CSLC5)(CSRC4)(CSLC3)
503      **
504      ** History:
505      **
506      **      Date      Programmer      Modification
507      **      -----      -
508      **      04/22/83      NZ      Fixed bug of creating an I/O buf
509      **      for NULL and LOOP
510      **      11/12/82      NZ      Added documentation
511      **
512      ****
513      ****
514 F3DC8 =SETUP
515      ****
516      *
517      * D[S] is type:
518      *      0: Address
519      *      1: Device type, sequence #
520      *      2: Device ID, sequence #
521      *      3: Volume label
522      *      4: NULL
523      *      5: LOOP
524      *
525      * Buffer layout:
526      *      +-----+
527      *      | Device ID/vol Lbl | search type | loop # | sequence # |
528      *      +-----+
529      * nibs:      16          1          1          1
530      * (high memory)                                (low memory)
531      *
532      *
533      * Layout of entry:
534      * Type=0,4,5: (For types 4 & 5, true addr = 0)
535      *      +-----+
536      *      | Find address + loop*1024 | 0 | true addr + loop*1024 |
537      *      +-----+
538      * nibs:      3          1          3
539      * (high memory)                                (low memory)
540      *
541      * Type=1:
542      *      +-----+
543      *      | Seq # | device type | loop + 1 | true addr+loop*1024 |
544      *      +-----+
545      * nibs: 1          2          1          3
  
```

```

546 *
547 *
548 *****
549 *
550 F3DC8 DB          C=D   A          Copy address first to save code
551 F3DCA ACB        C=D   S          Get device type from D[S]
552 F3DCD AAE        C=C-1 S
553 F3DD0 441        GOC   SETUP0     Address
554 F3DD3 AAE        C=C-1 S          Is it a device type (acc id)?
555 F3DD6 4E2        GOC   SETUP1     Yes...continue
556 F3DD9 AAE        C=C-1 S          Is it a device ID?
557 F3DDC 464        GOC   SETUP2     Yes...continue
558 F3DDF AAE        C=C-1 S          Is it a volume label?
559 F3DE2 404        GOC   SETUP2     Yes...continue
560 *
561 * This is either address, NULL, or LOOP
562 *
563 F3DE5 7F03 SETUP0 GOSUB Cslc5     Rotate 5 nibbles (so C=0 A works)
564 F3DE9 D2         C=0   A          Clear device type (address=0)
565 F3DEB BF6        CSR   W
566 F3DEE ABB        SETUPx C=D   X          Now C[6:0] is set up!
567 F3DF1 2F         P=    15
568 F3DF3 300        LC(1) =DsNull    Check if NULL
569 F3DF6 20         P=    0
570 F3DF8 947        ?C#D S
571 F3DFB 50         GOYES SETUP,     Not NULL
572 F3DFD A2E        C=C-1 XS     NULL...set C[X]="FOO"
573 F3E00 AC2        SETUP, C=0   S          Clear flag for WILL fit...
574 F3E03 03         RTNCC          Return...WILL fit in entry!
575 *
576 *
577 F3E05           SETUP1
578 *
579 * Device type
580 *
581 F3E05 AD2        C=0   M          Clear high nibbles of C[A]
582 F3E08 C6         C=C+C A
583 F3E0A C6         C=C+C A          C[3] is now loop #
584 F3E0C 72E2       GOSUB Csrc4     Put loop # into C[S]
585 F3E10 DB         C=D   A          C[3] is sequence # now
586 F3E12 F6        CSR   A          C[2] is sequence #
587 F3E14 AE9        C=B   B          C[X] is sequence #, type
588 F3E17 B46        C=C+1 S          Now loop + 1 in C[S]
589 F3E1A 8E00       GOSUBL =CSLC4   C[6:4] is seq #, type; C[3]=loop
590 F3E20 5DC        GONC   SETUPx     Go always!
591 *
592 *
593 F3E23           SETUP2
594 *
595 * Whether this is a device ID or a volume label, the following
596 * is all the same!
597 *
598 F3E23 D2         C=0   A
599 F3E25 AAB        C=D   XS          Loop*4 to C[XS]

```

```
600 F3E28 C6      C=C+C  A
601 F3E2A C6      C=C+C  A      Now loop # in C[3]
602 F3E2C F2      CSL    A      Loop # to C[4]
603 F3E2E 23      P=     3
604 F3E30 A8B     C=D    P      Copy D[3] (sequence #)
605 F3E33 BF2     CSL    W      Loop # to C[5], seq # to C[4]
606 F3E36 ABB     C=D    X      Copy true address to C[X]
607 F3E39 2F      P=    15
608 F3E3B 30A     LC(1)  4      Offset from D[S] value for table
609 F3E3E A4B     C=C+D  S
610 F3E41 80FF    CPEX   15     Set C[S]="F", P=type+4
611 F3E45 80F3    CPEX   3      Store type in C[3], set P=0
612 F3E49 03      RTNCC                    Return, C[S]="F" (won't fit)
613 *****
614 *****
615 **
616 ** Name:      SAVEIT - Save device info at (D1) (7 nibbles)
617 **
618 ** Category:  PILUTL
619 **
620 ** Purpose:
621 **   Save device descriptor entry @ D1
622 **
623 ** Entry:
624 **   D1 @ destination entry
625 **   B,C are exit conditions of SETUP
626 **
627 ** Exit:
628 **   Carry clear, P=0 (Error exits directly)
629 **
630 ** Calls:     CSRC3;4;5,CSLC4;9,I/OALL,I/OFSC,I/ODAL
631 **
632 ** Uses.....
633 ** Exclusive: A,B,C,D,R2,R3,D0,D1,P
634 ** Inclusive: A,B,C,D,R2,R3,D0,D1,P
635 **
636 ** Stk lvls:  3 (I/OALL)(I/ODAL)
637 **
638 ** Algorithm:
639 **   Check if entry will fit in 7 nibbles:
640 **   If will not fit, goto SAVEI1
641 **   SAVEIO:Read old entry; write new entry
642 **   If old entry used buffer, deallocate the buffer
643 **   RTNCC
644 **   ----
645 **   SAVEI1:Create a buffer for the entry
646 **   Write the entry
647 **   Build the info for the 7 nibble field
648 **   Goto SAVEIO
649 **
650 ** History:
651 **
652 **   Date      Programmer      Modification
653 **   ----      -
654 **   07/21/83  NZ              Changed error exit to direct exit
```

```

655          ** 11/12/82    NZ          Added documentation
656          **
657          ****
658          ****
659 F3E4B 94E =SAVEIT ?C#0   S          Does this need an I/O buffer?
660 F3E4E 92          GOYES SAVEI1    Yes...needs I/O buffer!
661          *
662          * Will fit in IS-xxx entry...write it!
663          *
664 F3E50 15B6 SAVEIO  A=DAT1 7          Read old type...
665 F3E54 15D6          DAT1=C 7          ...write new type...
666          *
667          * Now check if old type used an I/O buffer
668          *
669 F3E58 AF6          C=R    W          Must be WORD for CSRC4 below!!!
670 F3E5B 80D3          P=C    3          Check code nibble
671 F3E5F 890          ?P=    =SngDev
672 F3E62 20          GOYES SAVEI-    Single item I/O buffer
673 F3E64 20 SAVEI-  P=    0
674 F3E66 500          RTNCC          Done if no carry!
675 F3E69 7582          GOSUB  Csrc4    Buffer # in C[X] now
676 F3E6D 8E00          GOSUBL =I/odal    Deallocate the buffer
        00
677 F3E73 20          P=    0
678 F3E75 03          RTNCC
679          *-
680          *-
681 F3E77          SAVEI1
682          *
683          * Will NOT fit in IS-xxx entry...create a buffer &write it out
684          *
685          * C[X] is true address, C[4] is sequence #, C[5] is loop #
686          * D[S] is type
687          *
688 F3E77 7772          GOSUB  Csrc4
689 F3E7B ACB          C=D    S          Save D[S] in C (--> R2)
690 F3E7E 8E00          GOSUBL =CSLC9    C[8:5] is type, addr
        00
691 F3E84 137          CD1EX
692 F3E87 10B          R3=C          Save D1 in R3[A],info in R3[11:5]
693 F3E8A AF9          C=B    W
694 F3E8D 10A          R2=C          Save B[W] in R2
695 F3E90 8E00          GOSUBL =I/DFSC    Find I/O scratch buffer
        00
696 F3E96 425          GOC    NORAME    Error...no buffers (eMEM?)
697          *
698          * Now Buffer ID in C[X]
699          *
700 F3E99 D5          B=C    A          Save ID in B[X]
701 F3E9B D2          C=0    A
702 F3E9D 3131          LC(2) 19          Need 19 (decimal) nibs for it!
703 F3EA1 DD          BCEX   A
704 F3EA3 8F00          GOSBVL =I/DALL    Allocate a buffer for this!
        000
705 F3EAA 5E3          GONC   NORAME    Error (eMEM?)

```



```

706      *
707      * D1 @ data start, D0 @ buffer ID
708      *
709 F3EAD 11B      C=R3      Recover the first info
710 F3EB0 135      D1=C      Recover pointer to save area
711 F3EB3 7832     GOSUB Csrc5  Move address to C[X]
712 F3EB7 D7       D=C      A      Save address in D[X]
713 F3EB9 8E00     GOSUBL =CSRC3  Move Loop, seq #, type to C[X]
      00
714 F3EBF 1523     A=DAT0 X    Read buffer ID...
715 F3EC3 165      DO=DO+ 6    ...point to data area...
716 F3EC6 15C2     DAT0=C 3    Write out the seq #, loop, type
717 F3ECA 162      DO=DO+ 3    Point to next area
718 F3ECD 11A      C=R2      Recall dev word
719 F3ED0 1547     DAT0=C W    Write out the device ID/vol label
720      *
721      * Now set up the descriptor entry!
722      *
723 F3ED4 AB6      C=A      X      Get buffer ID
724 F3ED7 7022     GOSUB Cslc4  ID --> C[6:4]
725 F3EDB 23       P=      3
726 F3EDD 300      LC(1) =SngDev  Single item buffer
727 F3EE0 20       P=      0
728 F3EE2 ABB      C=D      X      Recall address!
729 F3EE5 6A6F     GOTO  SAVEIO  Write it out, check old buffer
730      *-
731      *-
732 F3EE9 20       =NORAME P=      =eNORAM  Insufficient memory
733 F3EEB 8C00     GOLONG =ERRORX  Set it up!
      00
734      *****
735      *****
736      **
737      ** Name:      RESTOR - Clear "OFFED" bits in IS table entries
738      **
739      ** Category:  PILUTL
740      **
741      ** Purpose:
742      **      Reactivate all devices (clear their OFFED bits)
743      **
744      ** Entry:
745      **      Nothing
746      **
747      ** Exit:
748      **      Carry clear
749      **
750      ** Calls:      Nothing
751      **
752      ** Uses.....
753      **      Inclusive: C[XS],D0
754      **
755      ** Stk lvls:   1 (Internal GOSUB)
756      **
757      ** NOTE: Does not alter P!
758      **

```

```
759      ** History:
760      **
761      **   Date      Programmer      Modification
762      **   -----      -
763      **  11/12/82      NZ          Added documentation
764      **
765      ****
766      ****
767 F3EF1 1B00 =RESTOR DO=(5) (=IS-DSP)+3  IS-DSP+3
          000
768 F3EF8 7300      GOSUB PILCNs
769 F3EFC 166      DO=DO+ 7          IS-PRT+3
770      *
771      * Fall into PILCHs for IS-PRT, return carry clear
772      *
773 F3EFF 1562 PILCNs C=DATO XS
774 F3F03 B26      C=C+1 XS
775 F3F06 A2E      C=C-1 XS
776 F3F09 4D0      GOC   PILCNs      If "Fxx", leave as is!
777 F3F0C 0B      CSTEM
778 F3F0E 84B      ST=0  11          Clear OFFed flag
779 F3F11 0B      CSTEM
780 F3F13 1542     DATO=C XS
781 F3F17 03     PILCNs RTNCC
782      ****
783      ****
784      **
785      ** Name:      GETSTR - Set up for string/literal expression
786      **
787      ** Category:  EXCUTL
788      **
789      ** Purpose:
790      **   Set up either a literal or string expression
791      **
792      ** Entry:
793      **   DO points to the item in memory
794      **
795      ** Exit:
796      **   If error, takes hard error exit (EXPEXC, REVPOP)
797      **   Carry clear
798      **   ST(=sSTK)=0: DO points to the first character
799      **   ST(=sSTK)=1: D[A] is the end of the string
800      **                   D1 points to the first character
801      **                   A[R] is the string length in nibbles
802      **
803      ** Calls:      EXPEXC+,RESTST,REVPOP,D1=Ave
804      **
805      ** Uses.....
806      ** Exclusive:  A, C,D,          DO,D1,P,          ST[sSTK]
807      ** Inclusive: A,B,C,D,R0,R1,R2,R3,R4,DO,D1,P,FUNCxx,ST[11:0]
808      **
809      ** Stk lvls:  5 (EXPEXC+)
810      **
811      ** History:
812      **
```

```

813      **      Date      Programmer      Modification
814      **      -----      -----      -----
815      **      03/16/83      NZ      Changed EXPEXC to EXPEX+, added
816      **                                     call to RESTST
817      **      11/12/82      NZ      Added documentation
818      **
819      *****
820      *****
821 F3F19 840 =GETSTR ST=0 =sSTK
822 F3F1C 14A      A=DATO B      Read in the first character
823      *
824      * Check first if this is t*!
825      *
826 F3F1F 20      P=      0
827 F3F21 3100      LC(2) =tCOLON      Check if device spec, no filename
828 F3F25 962      ?A=C      B      Is this device spec?
829 F3F28 83      GOYES GETST1      Yes...exit, sSTK=0, DO @ tCOLON
830      *
831      * This is not a literal device spec...check literal file spec
832      *
833 F3F2A 161      DO=DO+ 2      If literal filespec, skip tLITRL!
834 F3F2D 3100      LC(2) =tLITRL
835 F3F31 962      ?A=C      B      Is this a literal filespec?
836 F3F34 C2      GOYES GETST1      Yes...exit, sSTK=0, skip tLITRL
837 F3F36 181      DO=DO- 2      No...undo DO=DO+ 2 done above
838      *
839      * This is not a literal, therefore must be a string expression
840      *
841 F3F39 74C1      GOSUB EXPEX+      Save status, evaluate the string
842 F3F3D 74D1      GOSUB Restst      Restore status bits
843 F3F41 8F00 =GETST+ GOSBYL =REVPOP      Reverse it and pop it!
      000
844      *
845      * Now A[A] is the length, D1 points to the first byte!
846      *
847 F3F48 850      ST=1 =sSTK      This is off the stack!
848 F3F4B 137      CD1EX
849 F3F4E D7      D=C      A      Save start of string in D[A]
850 F3F50 C2      C=C+A      A      Now C[A] points to string end
851 F3F52 8E00      GOSUBL =D1=AVE
      00
852 F3F58 145      DAT1=C      A      ...write it out...
853 F3F5B DF      CDEX      A      ...put end in D[A], start in C[A]
854 F3F5D 135      D1=C      ...put in D1...
855 F3F60 03      GETST1 RTNCC      ...and return with all set up!
856      *****
857      *****
858      **
859      ** Name:      NXTCHR - Get next character from input
860      **
861      ** Category:  EXCUTL
862      **
863      ** Purpose:
864      **      Get the next character from the input string
865      **

```

```

866      ** Entry:
867      **      D1 points to next byte, if any
868      **      ST(sSTK) is status:  1--> Reading from stack
869      **                                 0--> Reading from program memory
870      **      IF ST(sSTK)=1, D[A] is the end of the string
871      **
872      ** Exit:
873      **      P=0 if sSTK=0, P=(unchanged) if sSTK=1
874      **      If carry clear, A[B] is the next byte
875      **      If carry set, reached end of string
876      **      (If sSTK=0, A[B] is terminating character)
877      **
878      ** Calls:      None
879      **
880      ** Uses.....
881      ** Inclusive: A[B],DO,D1,P (DO if sSTK=0, D1 if sSTK=1)
882      **
883      ** Stk lvls:  0
884      **
885      ** History:
886      **
887      **      Date      Programmer      Modification
888      **      -----      -
889      **      11/12/82      NZ              Added documentation
890      **
891      ****
892      ****
893 F3F62 870 =NXTCHR ?ST=1 =sSTK
894 F3F65 71  GOYES NXTCH1
895 F3F67 14A A=DAT0 B
896 F3F6A 21  P= 1
897 F3F6C B04 A=A+1 P
898 F3F6F A0C A=A-1 P
899 F3F72 20  P= 0
900 F3F74 400 RTNC
901 F3F77 161 DO=DO+ 2
902 F3F7A 03  RTNCC
903      * _
904      * _
905 F3F7C 14B NXTCH1 A=DAT1 B
906 F3F7F 137 CD1EX
907 F3F82 8BF ?C>=D A
908 F3F85 20  GOYES NXTCH2
909 F3F87 137 NXTCH2 CD1EX
910 F3F8A 400 RTNC
911 F3F8D 171 D1=D1+ 2
912 F3F90 03  RTNCC
913      ****
914      ****
915      **
916      ** Name:      LSTCHR - Unsupported entry point
917      **
918      ** Category:  LOCAL (EXCUTL)
919      **
920      ** Purpose:

```

```
921      **      Inverse of nxtchr (Reverses the pointers)
922      **
923      ** Entry:
924      **      Same as NXTCHR
925      **
926      ** Exit:
927      **      D0 or D1 adjusted to the last character
928      **      A[B] is the last character
929      **      Carry set if D0/D1 NOT changed
930      **
931      ** Calls:      None
932      **
933      ** Uses.....
934      ** Inclusive: A[B],D0,D1,P
935      **
936      ** Stk lvls:  0
937      **
938      ** Detail:
939      **      NOTE!!! If reading from program memory AND NEXT char
940      **      is a terminator, LSTCHR will NOT back up!
941      **
942      ** History:
943      **
944      **      Date      Programmer      Modification
945      **      -----      -
946      **      11/12/82      NZ      Added documentation
947      **
948      ****
949      ****
950 F3F92 870 =LSTCHR ?ST=1 =sSTK
951 F3F95 A1      GOYES LSTCH1
952 F3F97 14A     A=DATO B
953 F3F9A 21      P= 1
954 F3F9C B04     A=A+1 P
955 F3F9F A0C     A=A-1 P
956 F3FA2 400     RTNC
957 F3FA5 181     DO=DO- 2
958 F3FA8 14A     A=DATO B
959 F3FAB 20      P= 0
960 F3FAD 03      RTNCC
961      *_-
962      *_-
963 F3FAF 137     LSTCH1 CD1EX
964 F3FB2 8BF     ?C>=D A
965 F3FB5 20      GOYES LSTCH2
966 F3FB7 137     LSTCH2 CD1EX
967 F3FBA 400     RTNC
968 F3FBD 1C1     D1=D1- 2
969 F3FC0 03      RTNCC
970      ****
971      ****
972      **
973      ** Name:      BAKCHR
974      **
975      ** Category:  EXCUTL
```

```

976      **
977      ** Purpose:
978      **   Unconditionally back up one character (undoes the
979      **   operation of NXTCHR, only IF a NXTCHR has been done)
980      **
981      ** Entry:
982      **   ST(=sSTK):
983      **     1: Reading from stack (@ D1)
984      **     0: Reading from memory (@ D0)
985      **
986      ** Exit:
987      **   D0/D1 adjusted according to sSTK
988      **   Carry clear
989      **
990      ** Calls:      None
991      **
992      ** Uses.....
993      **   Inclusive: D0,D1 (D0 if sSTK=0, D1 if sSTK=1)
994      **
995      ** Stk lvls:  0
996      **
997      ** Detail:
998      **   Allows backing up input stream one character if the
999      **   caller knows that there is a character before current
1000     **   character
1001     **
1002     ** History:
1003     **
1004     **   Date      Programmer      Modification
1005     **   -----      -
1006     **   09/26/83      NZ          Updated documentation
1007     **   11/12/82      NZ          Added documentation
1008     **
1009     ****
1010     ****
1011     F3FC2 870 =BAKCHR ?ST=1 =sSTK
1012     F3FC5 70   GOYES BAKCH1      String...back up D1
1013     F3FC7 181   DO=D0- 2      Literal...back up D0
1014     F3FCA 03   RTNCC
1015     **
1016     **
1017     F3FCC 1C1 BAKCH1 D1=D1- 2      Back up D1
1018     F3FCF 03   RTNCC
1019     ****
1020     ****
1021     **
1022     ** Name:      GETHEX - Evaluate literal expr, return hex value
1023     **
1024     ** Category:  GENUTL
1025     **
1026     ** Purpose:
1027     **   Get the value of an expression in program memory
1028     **
1029     ** Entry:
1030     **   D0 points to the expression in program memory
  
```

```

1031      **
1032      ** Exit:
1033      **      Carry clear: HEX value in A[3:0], A[4]=0, P=0
1034      **      Carry set: Error (P=error #)
1035      **
1036      ** Calls:      EXPEX+,FLTDH,AVM+16,RESTST
1037      **
1038      ** Uses.....
1039      ** Exclusive:  C,                P
1040      ** Inclusive:  A,B,C,D,R0,R1,R2,R3,R4,D0,D1,P,FUNCxx
1041      **
1042      ** Stk lvls:   5 (EXPEX+)
1043      **
1044      ** History:
1045      **
1046      **      Date      Programmer      Modification
1047      **      -----      -
1048      **      03/16/83      NZ          Changed to EXPEX+, added RESTST
1049      **      11/12/82      NZ          Added documentation
1050      **
1051      ****
1052      ****
1053 F3FD1 7C21 =GETHEX GOSUB EXPEX+      Save status, call EXPEXC
1054 F3FD5 7C31      GOSUB Restst      Restore status
1055 F3FD9 75E0      GOSUB AVM+16      pop it off the stack, reset AVMEME
1056 F3FDD 309      LCHEX 9
1057 F3FE0 98A      ?C>=A P      Real number?
1058 F3FE3 60      GOYES GETHE1      Yes!
1059      *
1060      * Not real...must be complex or string?
1061      *
1062 F3FE5 20      P=      =eNUMR      Not real number!
1063 F3FE7 02      RTNSC
1064      *
1065      *
1066 F3FE9 8E00 GETHE1 GOSUBL =FLTDH      Convert to HEX number
1067      00
1067 F3FEF 5D0      GONC GETHE3      Either <0 OR too big...error!
1068 F3FF2 24      P=      4      OK number...check MY range!
1069 F3FF4 90C      ?A#0 P
1070 F3FF7 60      GOYES GETHE3      Positive, four or fewer digits
1071 F3FF9 20      GETHE2 P=      0      Reset P=0
1072 F3FFB 03      RTNCC
1073      *
1074      *
1075 F3FFD 20      GETHE3 P=      =eRANGE      Range error!
1076 F3FFF 02      RTNSC
1077      ****
1078      ****
1079      **
1080      ** Name:      GTYPRM - Get one-byte hex value from literal
1081      ** Name:      GTYPR+ - Clear status bits 11:0, GTYPRM
1082      ** Name:      GHEXBT - Pop number off stack, get hex byte value
1083      ** Name:      GHEXB+ - Use A[W] as value, convert to hex byte
1084      **

```

```

1085      ** Category:  EXCUTL
1086      **
1087      ** Purpose:
1088      **      Given DO pointing to a numeric expression in program
1089      **      memory, return the HEX value of the expression
1090      **
1091      ** Entry:
1092      **      ST(sSTK)=0: DO points to the expression
1093      **      ST(sSTK)=1: R[W] contains a floating number
1094      **
1095      ** Exit:
1096      **      If carry clear, B[B] is the HEX type, B[4:2]=0,P=0,
1097      **      C[B]=(DevTyp), C[X5]=0
1098      **      If carry set, error (P=type)
1099      **
1100      ** Calls:      EXPEX+,RESTST,AVM+16,FLTDH
1101      **
1102      ** Uses.....
1103      ** Exclusive:  A,B,C,                                P
1104      ** Inclusive:  A,B,C,D,RO,R1,R2,R3,R4,DO,D1,P,FUNCxx
1105      **
1106      ** Stk lvls:   5 (EXPEX+)
1107      **
1108      ** History:
1109      **
1110      **      Date      Programmer      Modification
1111      **      -----      -
1112      **      03/16/83      NZ      Changed to EXPEX+, added RESTST
1113      **      03/02/83      NZ      Added GTYPR+ entry point
1114      **      11/12/82      NZ      Added documentation
1115      **
1116      ** *****
1117      ** *****
1118 F4001 08 =GTYPR+ CLRST      Clear all status bits
1119 F4003 20 =GTYPRM P=      0
1120 F4005 870      ?ST=1 =sSTK      Is expression in A[W] now?
1121 F4008 E0      GOYES GTYPRO      Yes...skip EXPEX+
1122 F400A 73F0     GOSUB EXPEX+      Expression execution
1123 F400E 7301     GOSUB Restst      Restore status
1124 F4012 7CA0 =GHEXBT GOSUB AVM+16      Add 16 to AVMEME
1125 F4016      =GHEXB+
1126 F4016 309     GTYPRO LCHEX 9
1127 F4019 986      ?C<A P
1128 F401C C1      GOYES GTYPRe      Not a floating number...error
1129 F401E 8E00     GOSUBL =FLTDH      Convert to HEX
1130      00
1130 F4024 571     GONC GTYPRr      Error!
1131 F4027 D1      B=0 A
1132 F4029 AEC     ABEX B      Check if A[4:2] is zero
1133 F402C 8AC     ?A#0 A      Zero?
1134 F402F DO      GOYES GTYPRr      No...range error!
1135      *
1136      * Now B[A] is the ID in HEX
1137      *
1138 F4031 3200     LC(3) =DevTyp      This is a device TYPE!

```



```

0
1139 F4036 01      RTN
1140              *-
1141              *-
1142 F4038 20      GTYPRe P=      =eNNUMR
1143 F403A 02      RTNSC
1144              *-
1145              *-
1146 F403C 20      GTYPRr P=      =eRANGE      Out of range!
1147 F403E 02      RTNSC
1148              *****
1149              *****
1150              **
1151              ** Name:      GADRRM - Get HPIL address from program memory
1152              ** Name:      GADRR+ - Get HPIL address from stack value
1153              **
1154              ** Category:  PILUTL
1155              **
1156              ** Purpose:
1157              **      Get an HPIL address from program memory
1158              **
1159              ** Entry:
1160              **      ST(sSTK)=0: D0 points to the expression in program mem
1161              **      ST(sSTK)=1: A[W] contains a floating number
1162              **
1163              ** Exit:
1164              **      Carry clear: C[X] is the HPIL address, P=0
1165              **      Carry set: Error (P is error #)
1166              **
1167              ** Calls:      EXPEX+,RESTST,AVM+16,GHEXB+
1168              **
1169              ** Uses.....
1170              ** Exclusive: A,B,C,D,          P
1171              ** Inclusive: A,B,C,D,RO,R1,R2,R3,R4,D0,D1,P,FUNCxx
1172              **
1173              ** Stk lvls:  5 (EXPEX+)
1174              **
1175              ** History:
1176              **
1177              **      Date      Programmer      Modification
1178              **      -----      -
1179              **      07/13/83      NZ          Added check for primary addr=0
1180              **      03/16/83      NZ          Changed to EXPEX+,added RESTST
1181              **      11/12/82      NZ          Added documentation
1182              **
1183              *****
1184              *****
1185 F4040 20      =GADRRM P=      0
1186 F4042 870      ?ST=1 =sSTK      Is expression already in A[W]?
1187 F4045 E0      GOYES GADRR0      Yes...skip EXPEX+
1188 F4047 76B0     GOSUB EXPEX+     EXPResion EXCution
1189 F404B 76C0     GOSUB Restst     Restore status bits
1190 F404F 7F60     =GADRR+ GOSUB AVM+16 Skip the item
1191 F4053 AF6      GADRR0 C=A      W
1192 F4056 AF7      D=C      W      Save the expression in D

```

```
1193 F4059 79BF      GOSUB  GHXB+      Get HEX byte (Primary address)
1194 F405D 400       RTNC              Error...range error
1195 F4060 D9        C=B      A
1196 F4062 AFF       CDEX      W      Save IP in D[A], get back expr
1197 F4065 AFA       A=C      W      Put expression in A[W]
1198 F4068 94C       ?A#0     S
1199 F406B 35        GOYES    GADDRr      Negative!!
1200 F406D 3260      LC(3)    6      If exp >6 (or negative), error!
      0
1201 F4072 9B6       ?A>C     X
1202 F4075 94        GOYES    GADDRr      Error (range)
1203 F4077 A86       C=A      P
1204 F407A B8E       C=-C-1  P
1205 F407D 80D0      P=C      0      Now P-->First fractional digit+2
1206 F4081 BD0      GADRR1  ASL      M
1207 F4084 0C        P=P+1
1208 F4086 5AF       GONC     GADRR1      Go if not done yet...
1209      *
1210      * Now the mantissa is properly adjusted to the fractional part
1211      * (The mantissa has the original integer part removed)
1212      *
1213 F4089 D0         A=0      A
1214 F408B BF0       ASL      W      Normalize the number!
1215 F408E 948       ?A=0     S
1216 F4091 70        GOYES    GADRR2      Now is normalized!
1217 F4093 BF4       ASR      W
1218 F4096 E4        A=A+1    A      Exponent=1 means use 2 digits
1219 F4098 7A7F      GADRR2  GOSUB    GHXB+
1220 F409C 400       RTNC              GHXB+ sets HEX mode
1221      *
1222      * Now B[B] is secondary address, D[B] is primary address
1223      *
1224 F409F 31F1      LC(2)    31     Check range of secondary address
1225 F40A3 9E1       ?B>C     B      Is it legal range? [0,31]
1226 F40A6 81        GOYES    GADDRr      No!!!
1227 F40A8 9EB       ?D>=C    B
1228 F40AB 31        GOYES    GADDRr      Bad primary range!
1229 F40AD 96B       ?D=0     B
1230 F40B0 E0        GOYES    GADDRr      Primary must be >0!
1231 F40B2 D9        C=B      A
1232 F40B4 F2        CSL      A      Shift the secondary address left
1233 F40B6 C6        C=C+C    A      5 bits...then OR with D[X]
1234 F40B8 0EFF      C=C!D    A      Now address is in C[X]
1235 F40BC 03        RTNCC
1236      *-
1237      *-
1238 F40BE 20        GADDRr  P=      =eRANGE
1239 F40C0 02        RTNSC
1240      *****
1241      *****
1242      **
1243      ** Name:      RVM+16 - Pop a numeric value from RVMEME
1244      **
1245      ** Category:  PTRUTL
1246      **
```

```

1247      ** Purpose:
1248      **      Add 16 to RVMEME (to skip a numeric expression) and
1249      **      read in the value at the old D1
1250      **
1251      ** Entry:
1252      **      RVMEME stack has a numeric item
1253      **
1254      ** Exit:
1255      **      A[W] contains the old stack data item
1256      **      D1 points to old (=RVMEME)
1257      **      C[R] is NEW =RVMEME
1258      **      Carry unchanged
1259      **
1260      ** Calls:      D1=RVE
1261      **
1262      ** Uses.....
1263      ** Inclusive: A[W],C[R],C[S],D1
1264      **
1265      ** Stk lvls:  1 (D1=RVE)
1266      **
1267      ** NOTE: Preserves carry!!!!
1268      **
1269      ** History:
1270      **
1271      **      Date      Programmer      Modification
1272      **      -----      -
1273      **      07/13/83      NZ      Added read of A[W]
1274      **      11/12/82      NZ      Added documentation
1275      **
1276      **
1277      **
1278 F40C2 AC2 =RVM+16 C=0   S      Save carry status in C[S]
1279 F40C5 450      GOC   RVM++
1280 F40C8 B46      C=C+1 S
1281 F40CB 8E00 RVM++ GOSUBL =D1=RVE
1282      00
1282 F40D1 147      C=DAT1 A
1283 F40D4 137      CD1EX
1284 F40D7 17F      D1=D1+ 16
1285 F40DA 137      CD1EX
1286 F40DD 145      DAT1=C A
1287 F40E0 135      D1=C      Leave D1-->RVMEME-16
1288 F40E3 1CF      D1=D1- 16
1289 F40E6 1537     A=DAT1 W      Read in the value to A[W]
1290 F40EA A4E      C=C-1 S      Sets carry if zero, else clears
1291 F40ED 01      RTN
1292      **
1293      **
1294 F40EF 816 Csrc5 CSRC
1295 F40F2 8C00 Csrc4 GOLONG =CSRC4
1296      00
1297      **
1298 F40F8 812 Cslc5 CSLC
1299 F40FB 8C00 Cslc4 GOLONG =CSLC4

```

```

      00
1300      *_
1301      *_
1302 F4101 8E00 =EXPEX+ GOSUBL =SAVEST
      00
1303 F4107 8D00 =eXPEXC GOVLNG =EXPEXC
      000
1304      *_
1305      *_
1306 F410E 8D00 =i/OFND GOVLNG =I/OFND
      000
1307      *_
1308      *_
1309 F4115 8C00 Restst GOLONG =RESTST
      00
1310      ****
1311      ****
1312      **
1313      ** Name:      CHKRIO - Check if device is an ASSIGN WORD
1314      **
1315      ** Category:  PILUTL
1316      **
1317      ** Purpose:
1318      **      Check if a string is an ASSIGN WORD (if so, return
1319      **      its value)
1320      **
1321      ** Entry:
1322      **      B contains a string (B[B] is the first character, any
1323      **      unused characters are #00)
1324      **
1325      ** Exit:
1326      **      P=0
1327      **      Carry set if buffer not found or not an ASSIGN WORD
1328      **      Carry clear if found...address in C[X]
1329      **
1330      ** Calls:      CSLC5,ASRC5,I/OFND
1331      **
1332      ** Uses.....
1333      ** Exclusive: A[W],C[W],P
1334      ** Inclusive: A[W],C[W],P
1335      **
1336      ** Stk lvls:  1 (I/OFND)(CSLC5)(ASRC5)
1337      **
1338      ** History:
1339      **
1340      **      Date      Programmer      Modification
1341      **      -----      -
1342      **      11/12/82      NZ      Added documentation
1343      **
1344      ****
1345      ****
1346 F411B 137 =CHKRIO CD1EX      Save D1 from I/OFND in C[9:5]
1347 F411E 76DF      GOSUB      Cslc5
1348 F4122 20      P=      0
1349 F4124 3200      LC(3) =bPILAI      ASSIGN IO buffer ID
```

```

0
1350 F4129 71EF      GOSUB  1/OFND      I/O FiND
1351 F412D AFA       A=C      W         Save D1 in A[9:5]
1352 F4130 AF2       C=0      W
1353 F4133 04        SETHEX
1354 F4135 490       GOC      CHKRIO    Found...
1355 F4138 2F        P=       15
1356 F413A 0C        P=P+1
1357 F413C 4F1       GOC      CHKRI3    Set carry, P=0
                                Go always (not found...restore D1)
1358 * _
1359 * _
1360 *
1361 * D1--> Table of assignments (length of 30 entries*4 nibbles)
1362 *
1363 F413F 20      CHKRIO  P=      0
1364 F4141 D0      A=0      A         Address counter
1365 F4143 E4      CHKRI1  A=A+1  A         Increment A[B]
1366 F4145 31F1    LC(2)    31         Check if done
1367 F4149 9EE     ?A>=C   B
1368 F414C E0      GOYES   CHKRI2    Done...not found!
1369 F414E 15F3    C=DAT1  4
1370 F4152 173    D1=D1+  4
1371 F4155 975    ?B#C    W
1372 F4158 BE      GOYES   CHKRI1    Not a match.
1373 *
1374 * If carry clear, found it; else not found
1375 *
1376 F415A D6      CHKRI2  C=A      A         Copy address to C[X]
1377 F415C 8E00    CHKRI3  GOSUBL  =ASRC5  Not found!
00
1378 F4162 131      D1=A
1379 F4165 01      RTN      Return, carry unchanged
1380 *****
1381 *****
1382 **
1383 ** Name:          ROMTYP - Check if device is a RESERVED WORD
1384 **
1385 ** Category:     PILUTL
1386 **
1387 ** Purpose:
1388 **      Check if the string in B[W] is a RESERVED WORD; if so,
1389 **      return the value that corresponds to that word
1390 **
1391 ** Entry:
1392 **      B contains the string (B[B] is the first character)
1393 **
1394 ** Exit:
1395 **      P=0
1396 **      Carry clear: B[B] is the device type; B[XS]=0
1397 **      Carry set: not found
1398 **
1399 ** Calls:        None
1400 **
1401 ** Uses.....
1402 ** Inclusive: B[A],C[W],P (B[A] only if found)
```

```
1403      **
1404      ** Stk lvls:  1 (Internal call)(internal push)
1405      **
1406      ** History:
1407      **
1408      **      Date      Programmer      Modification
1409      **      -----      -
1410      ** 09/26/83      NZ      Updated documentation
1411      ** 11/12/82      NZ      Added documentation
1412      **
1413      ****
1414      ****
1415 F4167 72A0 =ROMTYP GOSUB ROMTY1
1416      *
1417      * TABLE!!!
1418      *
1419      *
1420      * The table entry structure is:
1421      *      1 nibble: length of name minus 1, in nibbles (n-1)
1422      *      n nibbles: name (Bytes in order!)
1423      *      2 nibbles: device type
1424      *
1425      * The table consists of entries terminated by length nibble=0
1426      *
1427 F416B 7      NIBHEX 7      Length of "TAPE"
1428 F416C 4514  NIBASC \TAPE\  TAPE:TYPE=10
1429      0554
1429 F4174 01      NIBHEX 01
1430 F4176 D      NIBHEX D      Length of "MASSMEM"
1431 F4177 D414  NIBASC \MASSMEM\  MASSMEM:TYPE=1F (MASS MEM. CLASS)
1432      3535
1433      D454
1434      D4
1432 F4185 F1      NIBHEX F1
1433 F4187 D      NIBHEX D      Length of "PRINTER"
1434 F4188 0525  NIBASC \PRINTER\  PRINTER:TYPE=2F (PRINTER CLASS)
1435      94E4
1436      4554
1437      25
1435 F4196 F2      NIBHEX F2
1436 F4198 D      NIBHEX D      Length of "DISPLAY"
1437 F4199 4494  NIBASC \DISPLAY\  DISPLAY:TYPE=3F (DISPLAY CLASS)
1438      3505
1439      C414
1440      95
1438 F41A7 F3      NIBHEX F3
1439 F41A9 7      NIBHEX 7      Length of "GPIO"
1440 F41AA 7405  NIBASC \GPIO\    GPIO:TYPE=40
1441      94F4
1441 F41B2 04      NIBHEX 04
1442 F41B4 9      NIBHEX 9      Length of "MODEM"
1443 F41B5 D4F4  NIBASC \MODEM\  MODEM:TYPE=41
1444      4454
1444      D4
1444 F41BF 14      NIBHEX 14
```

```

1445 F41C1 9          NIBHEX 9          Length of "RS232"
1446 F41C2 2535      NIBASC \RS232\      RS232:TYPE=42
                2333
                23
1447 F41CC 24        NIBHEX 24
1448 F41CE 7         NIBHEX 7          Length of "HPIB"
1449 F41CF 8405      NIBASC \HPIB\      HPIB:TYPE=43
                9424
1450 F41D7 34        NIBHEX 34
1451 F41D9 D         NIBHEX D          Length of "INTRFCE"
1452 F41DA 94E4      NIBASC \INTRFCE\   INTRFCE:TYPE=4F
                4525
                6434
                54
1453 F41E8 F4        NIBHEX F4
1454 F41EA D         NIBHEX D          Length of "INSTRMT"
1455 F41EB 94E4      NIBASC \INSTRMT\   INSTRMT:TYPE=5F (INSTRMT CLASS)
                3545
                25D4
                45
1456 F41F9 F5        NIBHEX F5
1457 F41FB D         NIBHEX D          Length of "GRAPHIC"
1458 F41FC 7425      NIBASC \GRAPHIC\   GRAPHIC:TYPE=6F (GRAPHIC I/O)
                1405
                8494
                34
1459 F420A F6        NIBHEX F6
1460                * END OF TABLE INDICATOR...NULL
1461 F420C 0         NIBHEX 0
1462                *
1463                * END OF TABLE!
1464                *
1465 F420D 07        ROMTY1  C=RSTK      Get pointer to table from stack..
1466 F420F 137       CD1EX      ..Put it in D1, put D1 in C[A]..
1467 F4212 06        RSTK=C      ..and save D1 value on the stack!
1468                *
1469                * Loop to process names...
1470                *
1471 F4214 AF2        ROMTY2  C=0      W
1472 F4217 14F       C=DAT1 B      Read length of the device word
1473 F421A 170       D1=D1+ 1
1474 F421D 80D0      P=C      0      Copy length into P
1475 F4221 890       ?P=      0      END OF TABLE??
1476 F4224 12        GOYES ROMTY3    Yes...restore D1, P; carry set!
1477                *
1478                * Have a non-zero length now!
1479                *
1480 F4226 1571      C=DAT1 WP      Read the device word...
1481                *
1482 F422A 171       D1=D1+ 2      Increment D1 by the length +2
1483 F422D 137       CD1EX
1484 F4230 809       C+P+1        If match, back off the +2!
1485 F4233 137       CD1EX
1486                *
1487                * Now C[W] is the device word, zero-filled (if blank-filled is

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```
1488      * desired, change the C=0 W above to a LCASC \      \)
1489      *
1490 F4236 975      ?B#C  W
1491 F4239 BD      GOYES  ROMTY2      Not matched!
1492      *
1493      * This is a match...continue!
1494      *
1495 F423B 1C1      D1=D1- 2      Point to device type byte...
1496      *
1497      * (Carry is clear from the statement above)
1498      *
1499 F423E D2      C=0  A      Clear C[X]...
1500 F4240 14F      C=DAT1 B      Read device type!
1501 F4243 D5      B=C  A      Copy C[X] to B[X]
1502      *
1503      * Common return point!
1504      *
1505 F4245 07      ROMTY3 C=RSTK
1506 F4247 135      D1=C      Restore D1...
1507 F424A 20      P= 0
1508 F424C D2      C=0  A
1509 F424E 3100      LC(2) =DevTyp      Device type
1510 F4252 01      RTN      ...and return, carry unchanged!
1511      *****
1512      *****
1513      **
1514      ** Name:      RDINFO - Read device info from SAVSTK + POLL
1515      **
1516      ** Category:  SAVSTK
1517      **
1518      ** Purpose:
1519      **      Read information from the SAVSTK, given one POLL level
1520      **      in front of the data
1521      **
1522      ** Entry:
1523      **      ST(=sDEST) is source/destination selector
1524      **
1525      ** Exit:
1526      **      P=0
1527      **      A[W] is first 8 chars
1528      **      RO is last 2 chars
1529      **      D[A] is device
1530      **
1531      ** Calls:      None
1532      **
1533      ** Uses.....
1534      **      Inclusive: A[W],C[A],D[A],RO,D1,P
1535      **
1536      ** Stk lvls:  0
1537      **
1538      ** NOTE: This is similar to the mainframe routine by the same
1539      **      name except for the first few lines which skip the
1540      **      POLL save area
1541      **
1542      ** History:
```



```

1543      **
1544      **      Date      Programmer      Modification
1545      **      -----      -----      -----
1546      **      11/12/82      NZ      Added documentation
1547      **
1548      ****
1549      ****
1550 F4254 1F00 =RDINFO D1=(5) =SAVSTK
           000
1551 F425B 143      A=DAT1 A
1552 F425E 20      P=      O
1553 F4260 D2      C=0      A
1554 F4262 3100    LC(2) =1POLSV      Length of POLL save area
1555 F4266 EA      A=A-C A
1556 F4268 131     D1=A      D1-->device save area
1557 F426B 1C0     D1=D1- (=1DEVC)+4  Length of device +2 chars of name
1558 F426E 1CF     D1=D1- 16      Length of 8 chars of name
1559 F4271 860     ?ST=0 =sDEST
1560 F4274 80      GOYES RDIN10
1561 F4276 1C0     D1=D1- (=1DEVC)+4
1562 F4279 1CF     D1=D1- 16      Skip source info
1563 F427C 1537 RDIN10 A=DAT1 W      First 8 chars
1564 F4280 17F     D1=D1+ 16      Move past them
1565 F4283 147     C=DAT1 A      Last 2 chars
1566 F4286 108     RO=C      -->R0
1567 F4289 173     D1=D1+ 4      Skip last 2 chars
1568 F428C 147     C=DAT1 A      Device info
1569 F428F D7      D=C      A      -->D
1570 F4291 03      RTNCC
1571 F4293      END

```

ASRC5	Ext		-	1377					
AVM++	Abs	999627	#F40CB	-	1281	1279			
=AVM+16	Abs	999618	#F40C2	-	1278	1055	1124	1190	
BAKCH1	Abs	999372	#F3FCC	-	1017	1012			
=BAKCHR	Abs	999362	#F3FC2	-	1011				
CHKAI0	Abs	999743	#F413F	-	1363	1354			
CHKAI1	Abs	999747	#F4143	-	1365	1372			
CHKAI2	Abs	999770	#F415A	-	1376	1368			
CHKAI3	Abs	999772	#F415C	-	1377	1357			
=CHKAI0	Abs	999707	#F411B	-	1346				
CHKAS!	Abs	998673	#F3D11	-	346	345			
CHKAS#	Abs	998666	#F3D0A	-	343	336			
CHKAS0	Abs	998677	#F3D15	-	350	339			
CHKAS1	Abs	998702	#F3D2E	-	368	361			
CHKAS2	Abs	998754	#F3D62	-	404	383			
CHKAS3	Abs	998801	#F3D91	-	439	437			
CHKAS4	Abs	998804	#F3D94	-	441				
CHKAS9	Abs	998815	#F3D9F	-	453	362			
=CHKASN	Abs	998636	#F3CEC	-	303				
CHKASs	Abs	998827	#F3DAB	-	461	412			
CHKASx	Abs	998813	#F3D9D	-	447	413			
CNFFND	Ext			-	210				
CSLC4	Ext			-	589	1299			
CSLC9	Ext			-	690				
CSRC3	Ext			-	713				
CSRC4	Ext			-	1295				
Cslc4	Abs	999675	#F40FB	-	1299	724			
Cslc5	Abs	999672	#F40F8	-	1298	204	563	1347	
Csrc4	Abs	999666	#F40F2	-	1295	584	675	688	
Csrc5	Abs	999663	#F40EF	-	1294	241	711		
D1=AVE	Ext			-	851	1281			
DSPSET	Ext			-	193				
DevID	Ext			-	435				
DevTyp	Ext			-	399	1138	1509		
DispOK	Ext			-	196				
DsNull	Ext			-	568				
ERRORX	Ext			-	733				
=EXPEX+	Abs	999681	#F4101	-	1302	841	1053	1122	1188
EXPEXC	Ext			-	1303				
=FNDMB+	Abs	998460	#F3C3C	-	168				
=FNDMB-	Abs	998464	#F3C40	-	172				
FNDMB.	Abs	998484	#F3C54	-	185	184			
FNDMB1	Abs	998558	#F3C9E	-	217	229			
FNDMB2	Abs	998572	#F3CAC	-	225	251			
FNDMB3	Abs	998607	#F3CCF	-	246	221			
FNDMB9	Abs	998593	#F3CC1	-	239	187	267		
=FNDMBD	Abs	998495	#F3C5F	-	193				
FNDMBE	Abs	998587	#F3CBB	-	233	211	218		
=FNDMBX	Abs	998517	#F3C75	-	202				
GADDRr	Abs	999614	#F40BE	-	1238	1199	1202	1226	1228 1230
=GADDR+	Abs	999503	#F404F	-	1190				
GADDR0	Abs	999507	#F4053	-	1191	1187			
GADDR1	Abs	999553	#F4081	-	1206	1208			
GADDR2	Abs	999576	#F4098	-	1219	1216			
=GADDRM	Abs	999488	#F4040	-	1185				

GETHE1	Abs	999401	#F3FE9	-	1066	1058			
GETHE2	Abs	999417	#F3FF9	-	1071				
GETHE3	Abs	999421	#F3FFD	-	1075	1067	1070		
=GETHEX	Abs	999377	#F3FD1	-	1053				
=GETMBX	Abs	998391	#F3BF7	-	47				
=GETST+	Abs	999233	#F3F41	-	843				
GETST1	Abs	999264	#F3F60	-	855	829	836		
=GETSTR	Abs	999193	#F3F19	-	821				
=GHEXB+	Abs	999446	#F4016	-	1125	1193	1219		
=GHEXBT	Abs	999442	#F4012	-	1124				
=GTYP+	Abs	999425	#F4001	-	1118				
GTYPRO	Abs	999446	#F4016	-	1126	1121			
=GTYP+M	Abs	999427	#F4003	-	1119				
GTYPRe	Abs	999480	#F4038	-	1142	1128			
GTYP+R	Abs	999484	#F403C	-	1146	1130	1134		
I/OALL	Ext			-	704				
I/OFND	Ext			-	1306				
I/OFSC	Ext			-	695				
I/oda1	Ext			-	676				
IS-DSP	Ext			-	767				
LOOPST	Ext			-	176				
LSTCH1	Abs	999343	#F3FAF	-	963	951			
LSTCH2	Abs	999351	#F3FB7	-	966	965			
=LSTCHR	Abs	999314	#F3F92	-	950				
MBOX^	Ext			-	47	258			
=NORAME	Abs	999145	#F3EE9	-	732	696	705		
NXTCH1	Abs	999292	#F3F7C	-	905	894			
NXTCH2	Abs	999303	#F3F87	-	909	908			
=NXTCHR	Abs	999266	#F3F62	-	893				
Offed	Ext			-	183				
PILCns	Abs	999167	#F3EFF	-	773	768			
PILCns	Abs	999191	#F3F17	-	781	776			
RDIN10	Abs	1000060	#F427C	-	1563	1560			
=RDINFO	Abs	1000020	#F4254	-	1550				
=RESTOR	Abs	999153	#F3EF1	-	767				
RESTST	Ext			-	1309				
REVPOP	Ext			-	843				
ROMTY1	Abs	999949	#F420D	-	1465	1415			
ROMTY2	Abs	999956	#F4214	-	1471	1491			
ROMTY3	Abs	1000005	#F4245	-	1505	1476			
=ROMTYP	Abs	999783	#F4167	-	1415				
Restst	Abs	999701	#F4115	-	1309	842	1054	1123	1189
SAVEI-	Abs	999012	#F3E64	-	673	672			
SAVEI0	Abs	998992	#F3E50	-	664	729			
SAVEI1	Abs	999031	#F3E77	-	681	660			
=SAVEIT	Abs	998987	#F3E4B	-	659				
SAVEST	Ext			-	1302				
SAVSTK	Ext			-	1550				
=SETLP	Abs	998418	#F3C12	-	94	168			
SETLP1	Abs	998441	#F3C29	-	111	103			
SETLP2	Abs	998448	#F3C30	-	114	105			
=SETUP	Abs	998856	#F3DC8	-	514				
SETUP,	Abs	998912	#F3E00	-	573	571			
SETUP0	Abs	998885	#F3DE5	-	563	553			
SETUP1	Abs	998917	#F3E05	-	577	555			

Input Parameters

Source file name is NZ&BUT::MS

Listing file name is NZ/BUT:TI:ML::-1

Object file name is NZXBUT:TI:MS::-1

Initial flag settings are
111111
0123456789012345

Errors

None

Saturn Assembler News

```
1      *
2      *      N  N  ZZZZZ  &      CCC      A      SSS
3      *      N  N      Z  & &    C  C    A  A    S  S
4      *      NN N      Z  & &    C      A  A    S
5      *      N  NN     Z      &    C      A  A    SSS
6      *      N  NN     Z      & & & C      AAAAA  S
7      *      N  N  Z      & &    C  C    A  A    S  S
8      *      N  N  ZZZZZ  && &   CCC    A  A    SSS
9      *
10     *
```

```
11     TITLE CASSETTE ROUTINES<831221.1632>
12 F4293 ABS #F4293 TIXHP6 address (fixed)
13     *****
14     *****
```

```
15     **
16     ** Name: TSTAT,TSTATA - Check the drive status
17     **
```

```
18     ** Category: PILUTL
19     **
```

```
20     ** Purpose:
21     ** Check status of mass storage device
22     **
```

```
23     ** Entry:
24     ** D[X] contains the address of the drive
25     ** DO points to the mailbox
26     **
```

```
27     ** Exit:
28     ** Carry clear:
29     ** Drive is addressed as a talker
30     ** Status in C[B]
31     ** Carry set:
32     ** Error (P, C[0] are error code)
33     **
```

```
34     ** Calls: YTML,PUTE,GETD (YTML only for TSTAT)
35     **
```

```
36     ** Uses.....
37     ** Exclusive: C[W],P
38     ** Inclusive: C[W],P,ST[3:0]
39     **
```

```
40     ** Stk lvls: 2 (YTML;PUTC)(GETD;GET)
41     **
```

```
42     ** History:
43     **
```

Date	Programmer	Modification
11/19/82	NZ	Added documentation

```
44     **
45     *****
46     *****
```

```
50 F4293 7DA5 =TSTAT GOSUB Ytml
51 F4297 400 RTNC Error
52 F429A 20 =TSTATA P= 0
53 F429C 3500 LC(6) (=MSST)+1 Send status, limit=1
54 F42A4 8E00 GOSUBL =PUTE
```

```
00
55 F42AA 400          RTNC          Error
56 F42AD 7D85      TSTAT1 GOSUB  Getd
57 F42B1 400          RTNC          RTNSC if not data frame
58 F42B4 80D1          P=C          1
59 F42B8 880          ?PH         0          Is it either BUSY or Error?
60 F42BB 40          GOYES TSTAT2      Yes...check which!
61 F42BD 03          RTNCC
62          *_-
63          *_-
64 F42BF 891      TSTAT2 ?P=      1          Is it an error?
65 F42C2 00          RTNYES        Yes...RTNSC
66 F42C4 55D          GONC TSTATA      No...must be busy...try again
67          *****
68          *****
69          **
70          ** Name:      SEEKA - Seek a record (record # in A[3:0])
71          ** Name:      SEEKB - Seek record (drive=listener,me=talker)
72          **
73          ** Category:  PILUTL
74          **
75          ** Purpose:
76          **      Seek to the specified record
77          **
78          ** Entry:
79          **      SEEKA: Desired record # is in A[3:0]
80          **      SEEKB: Desired record # is in A[3:0], drive is talker,
81          **      I am listener
82          **      Drive address in D[X]
83          **      DO points to the mailbox
84          **
85          ** Exit:
86          **      Carry clear:
87          **      Drive is talker, I am listener, P=0
88          **      Carry set:
89          **      Error (P,C[0] are error code)
90          **
91          ** Calls:      MTYL,DDL,PUTD,<TSTAT>
92          **
93          ** Uses.....
94          **      Exclusive: C[W],P
95          **      Inclusive: C[W],P,ST[3:0]
96          **
97          ** Stk lvls:  2 (MTYL) <TSTAT>
98          **
99          ** History:
100         **
101         **      Date      Programmer      Modification
102         **      -----      -
103         **      11/19/82      NZ          Added documentation
104         **
105         *****
106         *****
107 F42C7 72B7      =SEEKA GOSUB  Mtyl
108 F42CB 400          RTNC          Error
```

```

109 F42CE 20 =SEEKB P= =Seek
110 F42D0 7367 GOSUB Ddl
111 F42D4 400 RTNC Error
112 F42D7 D6 C=A A Get track # first
113 F42D9 F6 CSR A
114 F42DB F6 CSR A
115 F42DD 7097 GOSUB Putd Send track number
116 F42E1 400 RTNC Error
117 F42E4 D6 C=A A Now get record # on track
118 F42E6 7787 GOSUB Putd Send record number
119 F42EA 400 RTNC Error
120 *
121 * Following can be packed to GONC if needed
122 *
123 F42ED 65AF GOTO TSTAT Check status and exit
124 *****
125 *****
126 **
127 ** Name: CHKMAS - Check if D[X] is mass storage device
128 **
129 ** Category: PILUTL
130 **
131 ** Purpose:
132 ** Check if a device (at D[X]) is mass storage
133 **
134 ** Entry:
135 ** D[X] is device address
136 ** DO points to the mailbox
137 **
138 ** Exit:
139 ** Carry clear:
140 ** Device is mass storage (Acc ID=#10), P=0
141 ** Carry set:
142 ** Not mass storage OR loop error
143 ** (P, C[0] are error code - if P= =ePIL, C[0]=eDTYPE,
144 ** than C[1] is device class, A[B] is full Acc ID)
145 **
146 ** Calls: GTYPE
147 **
148 ** Uses.....
149 ** Exclusive: C[W],P
150 ** Inclusive: A[A],C[W],P,ST[3:0]
151 **
152 ** Stk lvls: 3 (GTYPE)
153 **
154 ** History:
155 **
156 ** Date Programmer Modification
157 ** -----
158 ** 05/25/83 NZ Rewrote again to save code, added
159 ** exit condition for C[1] (device
160 ** class)
161 ** 02/16/83 NZ Rewrote to not use mQSTAT, which
162 ** was removed from Diamond
163 ** (Added A[A] register usage)

```



```
164      **                               (Added 2 stack levels)
165      ** 11/19/82      NZ      Added documentation
166      **
167      ****
168      ****
169 F42F1 8E00 =CHKMAS GOSUBL =GTYPE      Get the acc ID of the device in A
      00
170 F42F7 400      RTNC      (Error)
171 F42FA 3101     LCHEX 10      Check if Acc ID=16
172 F42FE 966     ?#C   B
173 F4301 40      GOYES  CHKMAe      Not Acc ID=16
174 F4303 03      Rtncc  RTNCC
175      *-
176      *-
177 F4305 D6      CHKMAe C=A   A      Copy accessory ID to C[B] first
178 F4307 300     LC(1) =eDTYPE      Device type error
179 F430A 20      P=      =ePIL
180 F430C 02      RTNSC
181      ****
182      ****
183      **
184      ** Name:      CHKBIT - Check if device indicates Acc ID=16
185      **
186      ** Category:  LOCAL
187      **
188      ** Purpose:
189      **      Check if bit "4" of D[3] is set or clear
190      **
191      ** Entry:
192      **      D[3:0] is device spec from file spec execute
193      **
194      ** Exit:
195      **      Carry set if bit is set (Acc ID=16 device)
196      **
197      ** Calls:      None
198      **
199      ** Uses.....
200      ** Inclusive: C[A]
201      **
202      ** Stk lvls:  0
203      **
204      ** History:
205      **
206      **      Date      Programmer      Modification
207      **      -----      -
208      ** 05/12/83      NZ      Wrote routine and documentation
209      **
210      ****
211      ****
212 F430E DB      =CHKBIT C=D   A      Copy to C[A] for checking
213 F4310 F2      CSL   A
214 F4312 C6      C=C+C  A
215 F4314 C6      C=C+C  A      Check the desired bit
216 F4316 01      RTN      Carry set iff bit set
217      ****
```

```
218 *****
219 **
220 ** Name:      CLEARN - Clear a record on device (send zeroes)
221 ** Name:      CLLLOOP - Send 0's to a device (A[A] is count)
222 **
223 ** Category:  PILI/O
224 **
225 ** Purpose:
226 **      Clear a record (output zeroes to a specific record)
227 **
228 ** Entry:
229 **      D[X] contains the address of the drive
230 **      Diamond is talker, drive is listener
231 **      Record number in A[3:0]
232 **      DO points to the mailbox
233 **
234 ** Exit:
235 **      Carry clear:
236 **      Successful (P=0)
237 **      Carry set:
238 **      Error (P, C[0] are error code)
239 **
240 ** Calls:      <SENDIT>
241 **
242 ** Uses.....
243 ** Exclusive:  A[A],B[W],      P
244 ** Inclusive:  A[A],B[W],C[W],P,ST[3:0]
245 **
246 ** Stk lvls:   1 <SENDIT>
247 **
248 ** History:
249 **
250 **      Date      Programmer      Modification
251 **      -----      -
252 **      03/22/83      NZ      Removed CLERRR entry point
253 **      11/19/82      NZ      Added documentation
254 **
255 *****
256 *****
257 F4318 DO =CLEARN A=0      A
258 F431A B24      A=A+1 XS      Set A[A]<--#00100 (256)
259 F431D AF1 =CLLOOP B=0      W      A[A] is the # of bytes to clear
260 F4320 8C00      GOLONG =SENDIT      Send all zeroes!
      00
261 *****
262 *****
263 **
264 ** Name:      FORMAT - Format medium in specified drive
265 **
266 ** Category:  EXCUTL
267 **
268 ** Purpose:
269 **      Format medium in specified drive (initialize it)
270 **
271 ** Entry:
```

```

272      **      R0 contains vol label ([11:0]), # of entries ([15:12])
273      **      Drive address is in D[X]
274      **      D0 points to the mailbox
275      **
276      ** Exit:
277      **      Carry clear:
278      **      P=0, drive is rewinding (successful formatting)
279      **      Carry set:
280      **      Error (P, C[0] are error code)
281      **
282      ** Calls:      DDL,DDT,READI3,WRITIT,PRMSGA,CLLOOP,CLEARN,
283      **              MTYL,YTML,TSTAT,SEEKA,PUTALR,PUTDX,PUTD,PUTE,
284      **              GETD,ChkEOT,Dd1Wrt,D1=SCR,F->SCR,PUTDIR,
285      **              CSLC4,CSLC5,CSRC5,ASLC4,ASRC4,YMDHMS,<ENDTAP>
286      **
287      ** Uses.....
288      ** Exclusive: A,B,C,D,R0, R2,D1,P
289      ** Inclusive: A,B,C,D,R0,R1,R2,D1,P,SCRCH[63:0],ST[8:0]
290      **
291      ** Stk lvls:  4 (CLEARR)
292      **
293      ** History:
294      **
295      **      Date      Programmer      Modification
296      **      -----      -
297      **      11/19/82      NZ              Added documentation
298      **
299      ****
300      ****
301 F4326 796F =FORMAT GOSUB TSTAT      Check drive status
302 F432A 561      GONC  FORM10      OK...continue
303 F432D 880      ?P#   =eTAPE      Is it a drive error message?
304 F4330 00      RTNYES      No...must be for real
305 F4332 80FO      CPEX   0      Yes...check further
306 F4336 890      ?P=   =eNEWTA      Is it "New Medium" error?
307 F4339 DE      GOYES  FORMAT      Yes...try again
308 F433B 80FO      CPEX   0      No...
309 F433F 02      RTNSC      ...Error!
310      * _
311      * _
312 F4341      FORM10      Check if # entries is OK...
313      *
314      * Get # entries from R0[15:12]
315      *
316 F4341 118      C=R0
317 F4344 D2      C=0  A      Clear low nibbles for rotate...
318 F4346 7157      GOSUB Cslc4      ...Now C[A] is # of entries
319      *
320      * Convert to records and store in B[A]
321      *
322 F434A 822      SB=0
323 F434D C6      C=C+C  A
324 F434F F6      CSR   A      Divide by 8
325 F4351 832      ?SB=0      Was there a remainder?
326 F4354 40      GOYES  FORM20      No...continue

```



```

379 F439F D6          C=A   A
380 F43A1 8AD  FORM50 ?B#0  A      Check if given dir length=0
381 F43A4 B0          GOYES  FORM60  Not zero...leave it as is
382                *
383                * Specified directory length is zero...need to use default
384                *
385                * Default is 1/32 of total records (ignore low bits)
386                *
387 F43A6 D5          B=C   A      Copy total to B[A]...
388 F43A8 E5          B=B+1 A      ...add one for zero basing...
389 F43AA F5          BSR   A      ...divide by 16...
390 F43AC 81D        BSRB           ...and 2 (total 32)!
391 F43AF          FORM60
392                *
393                * Now B[A] is directory length in records, R0[15:12] is length
394                * in entries, C[A] is max addressable record address
395                *
396                * Check if room by the formula T - 2 - R >= N,
397                * where T=total # of addressable records on medium (C[A]-1),
398                *       R=# records needed for N directory entries (B[A]),
399                *       and N=# of directory entries (R0[15:12]).
400                *
401 F43AF CE          C=C-1  A      Offset to total recs - 2
402 F43B1 E9          C=C-B  A      Subtract # records needed
403 F43B3 421        GOC    FORM65  Error!!!
404 F43B6 110        A=R0           Check if it passes test...
405 F43B9 D0          A=0   A      ...Precognize high nibbles...
406 F43BB 8E00      GOSUBL =ASLC4   ...Rotate # entries into A[A]...
      00
407 F43C1 8BA          ?C>=A  A      ...and check for fit!
408 F43C4 60          GOYES  FORM70  OK...continue!
409                *
410                * Error...out of range!
411                *
412 F43C6 20  FORM65  P=      =eRANGE  not OK...range error!
413 F43C8 02          RTNSC
414                *
415                *
416 F43CA          FORM70
417                *
418                * Now write the actual # of records for the directory from B[3:0]
419                *
420 F43CA 110        A=R0
421 F43CD 8E00      GOSUBL =ASLC4
      00
422 F43D3 23        P=      3
423 F43D5 A94        A=B    WP
424 F43D8 78C6      GOSUB  Asrc4
425 F43DC 100        RO=A           R0[15:12] is # of records, rest is
426                *                               volume label
427 F43DF 7A96      GOSUB  Mtyl
428 F43E3 400        RTNC
429 F43E6 20        P=      =Format
430 F43E8 7B46      GOSUB  Ddl      Format all records of the medium
431 F43EC 400        RTNC

```

```
432 F43EF 70RE      GOSUB  TSTAT      Wait until finished, check status
433 F43F3 400      RTNC          Error formatting medium
434                *****
435                *
436                * Now actually write the structure on the medium...
437                *
438                * RO[11:0] is volume label, RO[15:12] is size of
439                * directory in records
440                *
441                *****
442 F43F6 D0      =INITIL A=0   A
443 F43F8 7BCE      GOSUB  SEEKA      Seek to first record
444 F43FC 400      RTNC
445 F43FF 7A76      GOSUB  Mtyl       I am going to send data
446 F4403 400      RTNC
447 F4406 7B26      GOSUB  DdlWrt     Set the drive to write mode
448 F440A 400      RTNC
449 F440D 20        P=      0
450 F440F 3108      LCHEX  80        Disc ID (LIF standard)
451 F4413 22        P=      2
452 F4415 7E56      GOSUB  Putdx     ID is two bytes long
453 F4419 400      RTNC
454                *
455                * Now output volume name (currently in RO[11:0])
456                *
457 F441C AF1        B=0    W
458 F441F 118        C=RO
459                *
460                * Following 4 lines added 10/20/83 to gain 10 nibbles to fix
461                * a bug (DDI6 bug, below) by replacing the 5 lines commented
462                * out 10 lines down from here
463                *
464 F4422 8AE        ?C#0   A      Is the name zeroes?
465 F4425 80         GOYES  INIT05   No...continue
466 F4427 8E00      GOSUBL =BLANKC  Yes...use blanks
467                00
467 F442D          INIT05
468                *
469 F442D 2B         P=      11
470 F442F A95        B=C    WP      B[11:0] is now volume label
471 F4432 AF9        C=B    W
472                *
473                * ?C#0   WP      Is the name zeroes?
474                * GOYES  INIT05   No...continue
475                * P=      0
476                * LCASC  \      \   Yes...set to blanks!
477                * INIT05
478                *
479 F4435 8E00      GOSUBL =PRMSGR  Send the name (6 bytes)
480                00
480 F443B 400      RTNC
481                *
482                * Directory start address
483                *
484 F443E D2        C=0    A      Clear C[B]
```

```
485 F4440 23          P=      3
486 F4442 7136       GOSUB  Putdx      Put first 3 bytes of dir start
487 F4446 400        RTNC
488 F4449 3120       LC(2)  2          Fourth byte of dir start is 2
489 F444D 7026       GOSUB  Putd       (Start of directory is record 2)
490 F4451 400        RTNC
491                  *
492                  * Next four bytes required for compatibility (with 3000!!!)
493                  * by the LIF standard
494                  *
495 F4454 3101       LCHEX  10
496 F4458 26         P=      6
497                  *
498                  * Also output first two bytes of length of directory (zeros)
499                  *
500 F445A 7916       GOSUB  Putdx
501 F445E 400        RTNC
502                  *
503                  * Now get the non-zero part of directory length
504                  *
505 F4461 118        C=RO
506 F4464 7336       GOSUB  Cslc4      C[A] is number of records needed
507                  *
508                  * Output the last two bytes of directory length
509                  *
510 F4468 DA         A=C      A          Save low byte in A[B]
511 F446A F6         CSR      A
512 F446C F6         CSR      A          High byte first
513 F446E 7FF5       GOSUB  Putd       Send high byte
514 F4472 D6         C=A      A
515                  *
516                  * Output the last byte of directory length,
517                  * two bytes for version number, and two
518                  * required zero bytes
519                  *
520                  *****
521                  *
522                  * Now set version number and version 1 information...
523                  * (Version 1 info: words 12-17, physical attributes;
524                  * words 18-20, volume time stamp)
525                  *
526                  * Physical attributes:
527                  * Word:           10  11  12  13  14  15  16  17
528                  * For tape, write: 0001 0000 0000 0002 0000 0001 0000 0100
529                  *
530                  * Volume time stamp:
531                  * Word:                   18  19  20
532                  * For all mass mem, write:  Y Y M M D D H H M M S S
533                  *
534                  *****
535                  *
536 F4474 22         P=      2
537 F4476 7DF5       GOSUB  Putdx      Output last byte of dir length
538                  * and high byte of version number
539 F447A 400        RTNC
```

```

540 F447D 301          LCHEX  1          (This is LIF version 1)
541 F4480 23          P=      3
542 F4482 71F5        GOSUB  Putdx      Output version num + zero word
543 F4486 400          RTNC
544                  *
545                  * Determine if drive talks DDT6 here, and use that value for
546                  * device information
547                  *
548 F4489 7F95        GOSUB  D1=SCR      Set D1 @ SCRCH for area to write
549 F448D 73B3        GOSUB  Ytml
550 F4491 400          RTNC
551                  *
552                  * Following 3 lines added 10/20/83 to fix a bug with extended-
553                  * Acc ID=16 protocol devices (DDT was forgotten); adds 9 nibbles
554                  * here (pack above saves 10 nibbles...1 filler nibble added at
555                  * ChkEOT, below)
556                  *
557 F4494 20           P=      =ImpByt     Send implementation bytes
558 F4496 78B5        GOSUB  Ddt
559 F449A 400          RTNC
560                  *
561 F449D 3500        LC(6)  (=MSDA)+12  Read 12 bytes...
                    0000
562 F44A5 AFA         A=C      W
563 F44A8 8E00        GOSUBL  =PUTE      ...send message to drive
                    00
564 F44AE 400          RTNC
565 F44B1 7983        GOSUB  Getd
566 F44B5 534         GONC   INIT10     No carry = device did send value
567                  *
568                  * Error from GETD means either EOT or ???
569                  *
570 F44B8 7D20        GOSUB  ChkEOT     Check if EOT
571 F44BC 400          RTNC      No...unexpected
572                  *
573                  * Fill in the correct default values for HP82161A
574                  *
575 F44BF AF2         C=0      W          Clear area first
576 F44C2 1557        DAT1=C  W          Clear first 16 nibbles...
577 F44C6 17F         D1=D1+ 16
578 F44C9 15D7        DAT1=C  8          ...and last 8...
579 F44CD E6          C=C+1   A          ...set C[0]=1...
580 F44CF 173         D1=D1+  4
581 F44D2 15D0        DAT1=C  1          Write # records per track
582 F44D6 1C5         D1=D1-  6          Position to # surfaces/medium
583 F44D9 15D0        DAT1=C  1          Write it
584 F44DD 1C7         D1=D1-  8          Position to # tracks/surface
585 F44E0 E6          C=C+1   A          Set C[0]=2
586 F44E2 15D0        DAT1=C  1          Write it!
587 F44E6 5B1         GONC   INIT20     Go always
588                  *
589                  *
590 F44E9 80FF        ChkEOT  CPEX   15      Now P is FRAME value
591 F44ED 880         ?P#    =pEOT      Did I get an EOT?
592 F44F0 20          GOYES  ChkEOT

```



```
593 F44F2 80FF ChkEot CPEX 15
594 F44F6 01          RTN
595                *-
596                *-
597 F44F8 0          CON(1) =FIXSPC      1 nibble available here
598                *-
599                *-
600                *
601                * Device did respond...C[B] is data byte (READI3 writes it
602                * at D1, increments D1 by 2, then jumps to READIT)
603                *
604 F44F9 8E00 INIT10 GOSUBL =READI3      ...into =SCRTCH (enter READIT)
        00
605 F44FF 400          RTNC              Error
606                *
607                * Device volume information is now in SCRTCH (12 bytes)
608                *
609 F4502 7625 INIT20 GOSUB D1=SCR        Reset D1 to =SCRTCH...
610                *
611                * First set me back as talker
612                *
613 F4506 7375          GOSUB Mtyl
614 F450A 400          RTNC
615                *
616                * Write volume information from =SCRTCH (12 bytes)
617                *
618 F450D D2           C=0   A
619 F450F 30C          LC(1) 12
620 F4512 DA           A=C   A          Count in A[A]
621 F4514 7645          GOSUB Writit      Send the data!
622 F4518 400          RTNC
623                *
624                * Save D0, D[A] in R2 (YMDHMS uses A-D,D0,D1,R0,R1,ST[7:0])
625                *
626 F451B 136          CDOEX
627 F451E 7675          GOSUB Cslc5
628 F4522 DB           C=D   A
629 F4524 10A          R2=C
630                *
631                * Get creation date (current time)
632                *
633 F4527 7F75          GOSUB Ymdhms      C[11:0] is value
634                *
635                * Save time and date in R2, restore D0, D[A]
636                *
637 F452B 12A          CR2EX
638 F452E D7           D=C   A
639 F4530 7555          GOSUB Csrc5
640 F4534 13A          DO=C
641                *
642                * Recover the time from R2 and continue
643                *
644 F4537 112          A=R2
645 F453A 8E00          GOSUBL =ASLC4      A[15:4] is value now
        00
```

```
646 F4540 26          P=      6          Send 6 characters!
647 F4542 8E00       GOSUBL =PUTALR     Send from A, start with A[15:14]
                   00
648 F4548 400       RTNC
649 F454B D2        C=0    A
650 F454D 316D     LCHEX  D6          Number of bytes left to clear
651 F4551 DA       A=C    A          ...into A[A] for CLLOOP
652 F4553 76CD     GOSUB  CLLOOP     Clear this many bytes
653 F4557 400       RTNC
654 F455A 7ABD     GOSUB  CLEARN     Clear record 1 (must be 0 for LIF)
655 F455E 400       RTNC
656                *
657                * Set the first directory entry to logical end of directory
658                * (B[W] is zero from CLEARN - PUTDIR will not check status)
659                *
660 F4561 7DA4     GOSUB  F->SCR     Put "FFF"s into SCRATCH
661 F4565 8E9D     GOSUBL PUTDIR     Write a directory entry from D1
                   RO
662 F456B 400       RTNC
663                *
664                * Fall through into ENDTAP!!!
665                *
666                *****
667                *****
668                **
669                ** Name:          ENDTAP - Clean up the loop after mass mem action
670                **
671                ** Category:     PILUTL
672                **
673                ** Purpose:
674                **   Check status of a drive, rewind it, and unaddress all
675                **   talkers and listeners
676                **
677                ** Entry:
678                **   D[X] is device address
679                **   DO points to the mailbox
680                **
681                ** Exit:
682                **   Carry clear:
683                **     P=0, all OK
684                **   Carry set:
685                **     Error...P, C[0] are error code
686                **
687                ** Calls:         TSTAT,MTYL,DDL,<UTLEND>
688                **
689                ** Uses.....
690                ** Exclusive: C[W],P,ST[3:0]
691                ** Inclusive: C[W],P,ST[3:0]
692                **
693                ** Stk lvls:     3 (TSTAT)
694                **
695                ** History:
696                **
697                **   Date      Programmer      Modification
698                **   -----
```

```

699      ** 11/19/82    NZ          Added documentation
700      **
701      ****
702      ****
703      *
704      * Code above falls into this code!!!
705      *
706 F456E 712D =ENDTAP GOSUB  TSTAT      Check status of drive to finish
707 F4572 400      RTNC
708 F4575 7405     GOSUB  Mtyl
709 F4579 400      RTNC
710 F457C 2F       P=      15          Set to ignore any data sent to it
711 F457E 75B4     GOSUB  Ddl
712 F4582 400      RTNC
713 F4585 20       P=      =Rewind
714 F4587 7CA4     GOSUB  Ddl          Rewind (hone) the medium
715 F458B 400      RTNC
716 F458E 8C00     GOLONG =UTLEND      Clean up the loop
      OO

717      ****
718      ****
719      **
720      ** Name:          READRW - Read a record from mass mem into RAM
721      **
722      ** Category:     PILI/O
723      **
724      ** Purpose:
725      **      Read a specific record number
726      **
727      ** Entry:
728      **      D1 points to the destination buffer
729      **      A[3:0] contains the record number
730      **      D[X] contains the drive address
731      **      D0 points to the mailbox
732      **
733      ** Exit:
734      **      Carry clear: OK (P=0)
735      **      Carry set: Error (P, C[0] are error code)
736      **
737      ** Calls:        TSTAT,SEEKA,DdtRd,DDT,READSU,<TSTAT>
738      **
739      ** Uses.....
740      ** Exclusive:    C[W], P
741      ** Inclusive:   A[W],C[W],D1,P,ST[3:0]
742      **
743      ** Stk lvls:    3 (TSTAT)
744      **
745      ** Note: This routine will always read the device status first
746      **      and ignore any device error that is reported initially
747      **
748      ** History:
749      **
750      **      Date          Programmer          Modification
751      **      -----          -----          -----
752      **      08/09/83      NZ          Changed final TSTAT to TSTAT

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753      ** 04/29/83      NZ      Added two buffer exchanges (cost=
754      **                                          9 bytes, makes media reads faster
755      **                                          and more efficient)
756      ** 04/04/83      SC      Ignore initial device error
757      ** 11/19/82      NZ      Added documentation
758      **
759      ****
760      ****
761 F4594 7BFC =READRW GOSUB TSTAT      Check device status (ignore carry)
762 F4598 7B2D      GOSUB SEEKA      Seek to that record
763 F459C 400      RTNC
764 F459F 7A94      GOSUB DdtRd      Read that record
765 F45A3 400      RTNC
766 F45A6 20        P=      =XchgT
767 F45A8 76A4      GOSUB Ddt      Exchange buffers 0 and 1
768 F45AC 400      RTNC
769 F45AF 20        P=      =Read1
770 F45B1 7D94      GOSUB Ddt      Send data from buffer 1
771 F45B5 400      RTNC
772 F45B8 3500      LC(6) (=nSDA)+#100 #100 bytes = 1 record
       0000
773      *
774      * Read one record from the drive to the buffer (D1)
775      *
776 F45C0 77A4      GOSUB Readsu      Read from drive to (D1)
777 F45C4 400      RTNC
778 F45C7 20        P=      =XchgT
779 F45C9 7584      GOSUB Ddt      Exchange buffers 0 and 1 back
780 F45CD 400      RTNC
781      *
782      * When here, all 256 bytes have been read
783      *
784 F45D0 69CC      GOTO TSTATATA      Check final device status
785      ****
786      ****
787      **
788      ** Name:      WRITW - Write to a specific record
789      **
790      ** Category:  PILI/O
791      **
792      ** Purpose:
793      **      Write to a specific record on a mass mem device
794      **
795      ** Entry:
796      **      D1 points to the input buffer
797      **      A[3:0] contains the record number to be written
798      **      D[X] contains the drive address
799      **      D0 points to the mailbox
800      **
801      ** Exit:
802      **      Carry clear if OK (P=0)
803      **      Carry set if error (P, C[0] are error code)
804      **
805      ** Calls:      TSTAT,SEEKA,MTYL,DdlWrt,DDL,WRITIT
806      **

```

```

807      ** Uses.....
808      ** Exclusive: A[A],          P
809      ** Inclusive: A[A],C[W],D1,P,ST[8],ST[3:0]
810      **
811      ** Stk lvls:   3 (TSTAT)
812      **
813      ** Note: This routine always reads the device status first and
814      **           ignores any initial device error.
815      **
816      ** History:
817      **
818      **      Date          Programmer          Modification
819      **      -----          -
820      **      04/04/83      SC              Ignore initial device error
821      **      11/19/82      NZ              Added documentation
822      **
823      ** *****
824      ** *****
825 F45D4 7BBC =WRITE# GOSUB TSTAT          Check device status (ignore carry)
826 F45D8 7BEC          GOSUB SEEK#
827 F45DC 400          RTNC
828 F45DF 7A94          GOSUB Mtyl
829 F45E3 400          RTNC
830 F45E6 7B44          GOSUB DdlWrt          Set drive to write mode
831 F45EA 400          RTNC
832 F45ED D0            A=0      A
833 F45EF B24          A=A+1  XS          A[A]=#00100 (1 record)
834      *
835      * Transfer 256 bytes (one record)
836      *
837 F45F2 7864          GOSUB Writit
838 F45F6 400          RTNC
839 F45F9 2F           P=      15          DDL15 = Ignore data!
840 F45FB 7834          GOSUB Ddl          (Ignore data)
841 F45FF 400          RTNC
842 F4602 609C          GOTO  TSTAT          Check status, exit
843      ** *****
844      ** *****
845      **
846      ** Name:          MOVEFL - Move a file between two HPIL devices
847      **
848      ** Category:     PILI/O
849      **
850      ** Purpose:
851      **           Move a block of "records" from one HPIL device to
852      **           another
853      **
854      ** Entry:
855      **           R1[A] = device addr of destination device (from FILSPx)
856      **           R2[A] = device addr of source device (from FILSPx)
857      **           R3[A] = record address of destination if mass mem
858      **           B[A] = record address of source if mass mem
859      **           R3[9:5] = number of records to copy
860      **
861      ** Exit:

```

```
862      **      PH0!
863      **      Carry clear: OK
864      **      Carry set: error (P, C[0] are error code)
865      **
866      ** Calls:      CSLC5,D1=AVE,CSRC10,CSLC10,START,GETDev,SEEKA,
867      **              CHKBIT,DdtRd,READSU,D1@AVS,CSRC5,MTYL,DDL,ASRC10,
868      **              WRITIT,hCPY5s,ASRC5,YTML
869      **
870      ** Uses.....
871      ** Exclusive: A[W],C[W],D[A],R3[14:10],R4,D0,D1,P,ST[4:0]
872      ** Inclusive: A[W],C[W],D[W],R3[14:10],R4,D0,D1,P,ST[8],ST[4:0]
873      **
874      ** Stk lvls:   3 (SEEKA)(hCPY5s)
875      **
876      ** Detail:
877      **      COUNT# is R3[14:10] - # of records this transfer
878      **      COUNTD is R4[9:5]   - # of records already finished
879      **      COUNTR is R4[14:10] - # of records remaining
880      **      COUNT  is R3[9:5]   - # of records to move (total)
881      **
882      ** History:
883      **
884      **      Date      Programmer      Modification
885      **      -----      -
886      **      08/29/83      NZ      Changed where I set up A[A] for
887      **                                     the source so that the call to
888      **                                     START doesn't destroy # records
889      **      08/19/83      NZ      Added checks for device mode and
890      **                                     changed calls to FNDMB+ to START
891      **      05/25/83      NZ      Added checks for mass mem...if not
892      **                                     mass mem, then just move bytes
893      **      01/14/83      NZ      Fixed several bugs!
894      **      01/10/83      NZ      Added documentation
895      **
896      ****
897      ****
898 F4606      =MOVEFL
899 F4606 11B      C=R3
900 F4609 D2      C=0  A
901 F460B 7984      GOSUB  Cslc5      Save # of records in R4[14:10]
902 F460F 10C      R4=C      Save record count in R4[9:5]!
903      *
904      * R4[9:5] is the count of how many records I have moved,
905      * R4[14:10] is # of records remaining
906      *
907 F4612 8E00 MOVEF1 GOSUBL =D1=AVE      Set D1=AVMEME
908      00
909 F4618 147      C=DAT1 A
910 F461B 104      D1=D1- 5      Point to AVMEMS
911 F461E AFO      A=0  W      Clear high nibs for ASRB
912 F4621 143      A=DAT1 A
913 F4624 131      D1=A      Set D1 @ AVMEMS
914      *
915      * AVMEME in C[A], AVMEMS in A[A]
916      *
```

```

916 F4627 E2          C=C-R  A          C[A] is # nibbles available
917 F4629 DA          A=C    A
918 F462B 81C        ASRB
919 F462E F4          ASR    A          A[A] is # bytes available
920 F4630 F4          ASR    A          A[A] is # records available
921 F4632 20          P=     =eNORAM
922 F4634 8A8        ?A=0  A
923 F4637 00          RTNYES          Error...memory too small
924                  *
925                  * A[A] is # of records to copy at a chunk, D1 @ AVMEMS
926                  *
927 F4639 11C        C=R4
928 F463C 7554       GOSUB  Csrc10          Now C[A] is # of records left
929 F4640 8AE        ?C#0  A
930 F4643 40        GOYES  MOVEF2          Not done...continue
931 F4645 03        RTNCC          Done...return, carry clear
932                  *-
933                  *-
934 F4647 E2        MOVEF2  C=C-R  A
935 F4649 560       GONC   MOVEF3          If no carry, not done
936 F464C CA        A=A+C  A          Set A=old C (A+(C-A) = C)
937 F464E D2        C=0    A          Set remaining count = 0
938 F4650 7444     MOVEF3  GOSUB  Cslc5
939                  *
940                  * Pause here to set COUNT# (R3[14:10]) to COUNTA(A[A])
941                  *
942 F4654 12B        CR3EX
943 F4657 7A34       GOSUB  Csrc10
944 F465B D6         C=A    A          Copy COUNTA to COUNT#
945 F465D 8E00       GOSUBL =CSLC10
          00
946 F4663 12B        CR3EX          Restore C, R3 (with new value)
947                  *
948                  * Now continue on...(C[A] is number of records done)
949                  *
950 F4666 7E24       GOSUB  Cslc5
951 F466A 10C        R4=C          Write the counts back out
952                  *
953                  * Copy the nibbles...need to call SETUP every time...
954                  *   increment position by # records moved
955                  *
956 F466D 11A        C=R2          Get source address
957 F4670 D7         D=C    A
958 F4672 7D04       GOSUB  Start          Set up for src, find that mailbox
959 F4676 400        RTNC          Not found...error!
960                  *
961                  * Set A[A] to the number of records done
962                  *
963 F4679 114        A=R4
964 F467C 8E00       GOSUBL =ASRC5          A[A]=# records done
          00
965                  *
966                  * First check if in device mode (if so, just send data)
967                  *
968 F4682 8E00       GOSUBL =GETDev          Check if device mode

```

```

00
969 F4688 412      GOC   MOVEd1      Device mode...just send data
970                *
971                * Check if this is a mass mem or other device
972                *
973 F468B 7F7C      GOSUB  CHKBIT      If mass mem, carry set
974 F468F 4A0       GOC   MOVEF,      Mass mem...Seek, Read
975 F4692 7EA1      GOSUB  Ytm1        Not mass mem...just make me talker
976 F4696 6010      GOTO   MOVEF4      Check carry, continue
977                *-
978                *-
979                *
980                * A[A] is # records offset to file data
981                *
982 F469A C0        MOVEF,  A=A+B  A      Get source record #
983 F469C 7AA3      GOSUB  Seeka      Go to that record
984 F46A0 400       RTNC
985 F46A3 7693      GOSUB  DdtRd      Read the data from the drive
986 F46A7 400      MOVEF4  RTNC
987 F46AA 11B      MOVEd1  C=R3      Now get COUNT# back from R3[14:10]
988 F46AD 74E3      GOSUB  Csrc10
989 F46B1 F2        CSL   A
990 F46B3 F2        CSL   A      Convert COUNT# to BYTES
991 F46B5 8E00      GOSUBL =hCPY5s   Set up for SDA/SFC message
00
992 F46BB 7CA3      GOSUB  Readsu     Read after set-up
993 F46BF 400       RTNC      Error!
994                *
995                * Now have the data in RAM, starting at AVMEMS!
996                *
997 F46C2 8E00      GOSUBL =D1@AVS   Set D1 to (AVMEMS)
00
998 F46C8 119      C=R1      Get the destination address
999 F46CB D7        D=C   A
1000 F46CD 72B3     GOSUB  Start      Find the destination mailbox
1001 F46D1 400       RTNC
1002 F46D4 8E00      GOSUBL =GETDev   Check if device mode
00
1003 F46DA 413      GOC   MOVEF6      Yes...just send data
1004 F46DD 7D2C     GOSUB  CHKBIT     Check if mass storage
1005 F46E1 551      GONC   MOVEF5     Not mass storage...skip Seek
1006 F46E4 11C      C=R4
1007 F46E7 7E93     GOSUB  Csrc5      Now COUNTD is in C[A]
1008 F46EB 113      A=R3      A[A] is dest address
1009                *
1010                * Now C[A] is COUNTD (done), A[A] is dest address
1011                *
1012 F46EE CA        A=A+C  A      A[A] is desired address!
1013 F46F0 7653     GOSUB  Seeka      Seek to that record
1014 F46F4 400       RTNC
1015 F46F7 7283     MOVEF5  GOSUB  Mty1      I am talker now
1016 F46FB 400       RTNC
1017 F46FE 7C0C     GOSUB  CHKBIT     Check again if mass storage
1018 F4702 590      GONC   MOVEF6     Not mass storage...skip Write
1019 F4705 7C23     GOSUB  Dd1Wrt

```



```

1074      ** Exclusive: R,B,C,          D1,P,          ST[5]
1075      ** Inclusive: R,B,C,D[15:5],D1,P,SCRATCH[63:0],ST[5:0]
1076      **
1077      ** Stk lvs:   5 (GETDR!)
1078      **
1079      ** History:
1080      **
1081      **      Date      Programmer      Modification
1082      **      -----      -
1083      **      10/07/83      NZ          Updated documentation
1084      **      05/25/83      NZ          Added check for mass storage, not
1085      **                                     Acc ID=16 (if true, RTNSXM)
1086      **      05/12/83      NZ          Removed call to CHKMAS, replaced
1087      **                                     with call to CHKBIT (checks bits
1088      **                                     from FILSPx); removed CONWUC call
1089      **      02/11/83      NZ          Added ST(Loop?)
1090      **      11/19/82      NZ          Added documentation
1091      **
1092      ** *****
1093      ** *****
1094 F4734 850 =FINDFL ST=1 =sLoop?   LOOP is allowed for FINDFL
1095 F4737 6600      GOTO   FINDf+
1096      * _
1097      * _
1098 F473B 840 =FINDf+ ST=0 =sLoop?   LOOP not allowed for FINDf+
1099 F473E      FINDf+
1100 F473E 120      AROEX      Save first 8 chars in R0
1101 F4741 101      R1=R      Save last 2 chars in R1
1102 F4744 7B33     GOSUB Start      Set up the transfer!
1103 F4748 400      RTNC          Error...return!
1104 F474B 96B      ?D=0 B        Is this "LOOP"?
1105 F474E 56      GOYES FINDf1   Yes...just read 32 bytes, check
1106      *
1107 F4750 7ABB     GOSUB CHKBIT    Check if Acc ID=16 bit set
1108 F4754 427     GOC   FINDfx    Mass storage...continue
1109      *
1110      * If here, need to check sLoop?...if NOT set, then error!
1111      *
1112 F4757 7AAB     GOSUB CHKMAre   Set up device type error...
1113 F475B 860      ?ST=0 =sLoop?  ...check if needed!
1114 F475E 00      RTNYES          Error!!! (Set up by CHKMAre)
1115      *
1116      * Device is OK here...just read in the directory info!
1117      *
1118 F4760 70E0     GOSUB Ytml      Device is talker
1119 F4764 400      RTNC
1120 F4767 3500     LC(6) (=MSDA)+32 Directory length is 32 bytes
1121      0000
1121 F476F 79B2 FIND12 GOSUB D1=SCR
1122 F4773 74F2     GOSUB Readsu    Save length in A[A], read data
1123 F4777 400      RTNC          Error if carry!
1124      *
1125      * Now check if the name is OK or not...
1126      *
1127 F477A 110      A=R0          Recall first 8 chars

```

```

1128 F477D 1D00      D1=(2) =SCRTCH      Move to name field
1129 F4781 1577      C=DAT1 W            Pre-read name
1130 F4785 17F       D1=D1+ 16           Move to 9th and 10th char of name
1131 F4788 D1        B=0 A              Clear directory pointer first!
1132 F478A 8A8       ?A=0 A             Name specified?
1133 F478D 51        GOYES FIND14        No...accept it regardless of value
1134 F478F 976       ?A#C W             Different name?
1135 F4792 71        GOYES FINDfn        Yes...error (Names don't match)
1136 F4794 111       A=R1               No...check last 2 chars
1137 F4797 D6        C=A A              (Copy C[4])
1138 F4799 15F3      C=DAT1 4           Read last 2 chars
1139 F479D 8A6       ?A#C A             Last 2 chars match?
1140 F47A0 90        GOYES FINDfn        No...error (Names don't match)
1141 F47A2 173 FIND14 D1=D1+ 4       Yes...position to TYPE
1142 F47A5 67A0      GOTO FINDF4        Set up exit conditions and exit
1143                *_-
1144                *_-
1145 F47A9 75FF FINDfn GOSUB FIND14      Set up R,C (P=0 before call)
1146 F47AD 02        RTNSC              P#0 if too big, else bad name
1147                *_-
1148                *_-
1149 F47AF 20 FINDle P= =eDSPEC          Device spec error (LOOP)
1150 F47B1 02        RTNSC
1151                *_-
1152                *_-
1153 F47B3 860 FINDF1 ?ST=0 =sLoop?       Is LOOP allowed?
1154 F47B6 9F        GOYES FINDle        No...error!
1155 F47B8 D2        C=0 A
1156 F47BA 3102      LC(2) 32           Read 32 bytes from Diamond
1157 F47BE 8E00      GOSUBL =hCPY5s     Set for frame count/SDA
1158                00
1158 F47C4 5AA      GONC FIND12        Go always
1159                *_-
1160                *_-
1161                *
1162                * Find the file on the mass storage device
1163                *
1164 F47C7 840 =FINDFx ST=0 =sLoop?       If here, this cannot be LOOP!
1165 F47CA 7E90      GOSUB GETDR!       Get directory start, first entry
1166 F47CE 400      RTNC              Error
1167                *
1168                * Entry name in A[W], D1 points to last 2 chars
1169                *
1170 F47D1 173 FINDFO D1=D1+ 4       Skip last 2 chars
1171                *
1172                * Both the EOD mark (#FFFF) and PURGED file type (#0000) are
1173                * symmetric bitwise, so I can speed up the search and save
1174                * code by just reading the value straight from RAM (not swapping
1175                * the bytes as I normally should)
1176                *
1177 F47D4 15F3      C=DAT1 4           Read in the type
1178 F47D8 23        P= 3
1179 F47DA B16       C=C+1 WP          Check for end of directory
1180 F47DD 415       GOC FINDFn        File not found!
1181 F47E0 A1E       C=C-1 WP          Check for purged file

```

```

1182 F47E3 91A          ?C=0  WP
1183 F47E6 F1          GOYES FINDF1      PURGED!
1184                  *
1185                  * Now check if names match
1186                  *
1187 F47E8 118          C=RO
1188 F47EB 976          ?A#C  W           Check first 8 chars
1189 F47EE 71          GOYES FINDF1
1190 F47F0 1C3          D1=D1- 4
1191 F47F3 15F3         C=DAT1 4
1192 F47F7 173          D1=D1+ 4           Leave D1 @ type!
1193 F47FA 121          AR1EX           Now check last 2 chars
1194 F47FD 912          ?A=C  WP
1195 F4800 A4          GOYES FINDF3      MATCH!
1196 F4802 121          AR1EX           Get back directory information
1197 F4805              FINDF1
1198                  *
1199                  * This is NOT the file! Get directory ptr from B[3:0]...
1200                  *
1201 F4805 78A2         GOSUB  NXTEN+     Get next entry (carry if new rec)
1202 F4809 D5           B=C  A           Store back in B[3:0]
1203 F480B 5A1         GONC  FINDF2     Not new record...read next entry
1204                  *
1205                  * Next record needed...check if reached physical EOD yet
1206                  *
1207 F480E AFB          C=D  W
1208 F4811 7472         GOSUB  Csrc5     Directory length in C[3:0]
1209 F4815 23           P= 3
1210 F4817 A1E          C=C-1 WP        Decrement record count...
1211 F481A 91A          ?C=0  WP        More records?
1212 F481D 21           GOYES FINDFn     No...file not found (EOD)
1213 F481F 7572         GOSUB  Cslc5     Yes...read next record
1214 F4823 AF7          D=C  W           Save count back in D[8:5]
1215                  *
1216                  * Now read next entry, loop back
1217                  *
1218 F4826 7B80 FINDF2 GOSUB  GETDIR     Read next entry after status!
1219 F482A 56A          GONC  FINDFO     (Can pack this by GOTO, move
1220                  *                               FINDFO up one line)
1221 F482D 02           RTNSC           Error!
1222                  *
1223                  *
1224 F482F              FINDFn
1225                  *
1226                  * File not found
1227                  *
1228 F482F 20           P= 0
1229 F4831 300          LC(1) =eNFILE    File not found...
1230 F4834 20           P= =eTAPE        ...drive error!
1231 F4836 02           RTNSC
1232                  *
1233                  *
1234 F4838 8C00 Getzer GOLONG =GETZER    Read 4 bytes, check first two=0
1235                  *

```

```
1236      *  
1237 F483E 8C00 Getd    GOLONG =GETD  
          00  
1238      *  
1239      *  
1240 F4844 8C00 Ytml    GOLONG =YTML  
          00  
1241      *  
1242      *  
1243 F484A 121  FIndF3  AR1EX          Save last 2 chars of name again  
1244      *  
1245      * Found the file (D1 is at file type)  
1246      *  
1247 F484D 173  FIndF4  D1=D1+ 4          Skip to start address field  
1248 F4850 74EF          GOSUB  Getzer          Read 4 bytes, check first two=0  
1249 F4854 431          GOC    FIndFe          Error (First two bytes # 0)  
1250 F4857 DR          A=C    A          Save start address in A[3:0]  
1251      *  
1252      * Now get the length in records  
1253      *  
1254 F4859 7BDF          GOSUB  Getzer          Read 4 bytes, check first two=0  
1255 F485D 4A0          GOC    FIndFe          Error (First two bytes # 0)  
1256 F4860 1CF          D1=D1- 16          Move back to start address...  
1257 F4863 1C3          D1=D1- 4          ...and back to file type  
1258 F4866 03          RTNCC          Done!  
1259      *  
1260      *  
1261 F4868          FIndFe  
1262      *  
1263      * Argument out of range  
1264      *  
1265 F4868 20          P=    =eRANGE  
1266 F486A 02          RTNSC  
1267      *****  
1268      *****  
1269      **  
1270      ** Name:      GETDR! - Get first directory entry from drive  
1271      ** Name:      GETDIR - Get the next directory entry from drive  
1272      ** Name:      GETDR" - Get the next directory entry @ B[3:0]  
1273      ** Name:      GETDR# - Get the next directory entry @ A[3:0]  
1274      ** Name:      GETDR+ - Get the next directory entry @ A[S]  
1275      **  
1276      ** Category:  FILUTL  
1277      **  
1278      ** Purpose:  
1279      **      GETDR!: Get the first entry in an LIF directory  
1280      **      GETDR": Get the B[3:0]th entry in an LIF directory  
1281      **      GETDR#: Get the A[3:0]th entry in an LIF directory  
1282      **      GETDR+: Get the A[S] entry in the current record  
1283      **      GETDIR: Get the next entry in an LIF directory  
1284      **  
1285      ** Entry:  
1286      **      D[X] is the drive address  
1287      **      DO points to the mailbox  
1288      **      GETDIR: Drive is addressed as talker, me as listener
```

```

1289      **      GETDR": B[3:0] is the directory entry #
1290      **      GETDR#: A[3:0] is the directory entry #
1291      **      GETDR+: A[S] is the directory offset nibble in record
1292      **
1293      ** Exit:
1294      **      Carry clear:
1295      **      Directory entry in =SCRCH[32]
1296      **      A[W] is first 8 chars of filename
1297      **      D1 points past first 8 chars of filename
1298      **      Carry set:
1299      **      Error (P, C[0] are error code)
1300      **
1301      ** Calls:      GDIRST,SEEKA,DDT,MTYL,PUTD,YTML,TSTATA,READSC,
1302      **              D1=SCR
1303      **
1304      ** Uses.....
1305      ** Exclusive: A, C,      P
1306      ** Inclusive: A,B,C,D[15:5],P,SCRCH[63:0],ST[4:0]
1307      **
1308      ** Stk lvls:   GETDR!: 4 (GDIRST)
1309      ** Stk lvls:   GETDR": 3 (SEEKA)(TSTATA)
1310      ** Stk lvls:   GETDR#: 3 (SEEKA)(TSTATA)
1311      ** Stk lvls:   GETDR+: 3 (TSTATA)
1312      ** Stk lvls:   GETDIR: 3 (TSTATA)
1313      **
1314      ** History:
1315      **
1316      **      Date      Programmer      Modification
1317      **      -----      -
1318      **      11/19/82      NZ      Added documentation
1319      **
1320      *****
1321      *****
1322 F486C 7860 =GETDR! GOSUB GDIRST      Get directory start
1323 F4870 400      RTNC
1324 F4873 D4      =GETDR" A=B      A
1325 F4875 814      =GETDR# ASRC      Save BP value in A[S]
1326 F4878 ADO      A=O      M      Clear high nibble for SEEK
1327 F487B 784A      GOSUB SEEKA      Go to that record
1328 F487F 400      RTNC
1329 F4882 77B1      GOSUB DdtRd      Read that record (Drive is talker)
1330 F4886 400      RTNC
1331 F4889 948      ?A=O      S      Is the BP to be zero?
1332 F488C 92      GOYES GETDIR      Yes...skip setting it!
1333 F488E 7BE1 =GETDR+ GOSUB Mtyl      I must be talker for this!
1334 F4892 400      RTNC
1335 F4895 20      P=      =SetBP
1336 F4897 7C91      GOSUB Ddl      Set byte pointer command
1337 F489B 400      RTNC
1338 F489E 810      ASLC      Get pointer in A[0]
1339 F48A1 D6      C=A      A      Copy A[0] to C[0]
1340 F48A3 F2      CSL      A      Entry * 16
1341 F48A5 C6      C=C+C      A      Entry * 32
1342 F48A7 76C1      GOSUB Putd      Send the Byte pointer value
1343 F48AB 400      RTNC

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```
1344 F48AE 729F      GOSUB Ytnl      I am listener!
1345 F48B2 400      RTNC
1346                *
1347                * Drive should already be talker for GETDIR!
1348                *
1349 F48B5 71E9 =GETDIR GOSUB TSTATATA      Check if successful read!
1350 F48B9 400      RTNC
1351 F48BC 3500      LC(6) (=nSDA)+32      Length of one directory entry
                        0000
1352 F48C4 7F91      GOSUB Readsc    Read into scratch RAM!
1353 F48C8 400      RTNC            Error!
1354 F48CB 7D51      GOSUB D1=SCR    Go back to SCRATCH...
1355 F48CF 1537      A=DAT1 W        Read the first 8 chars of name...
1356 F48D3 17F      D1=D1+ 16       Skip name field...
1357 F48D6 03       RTNCC           And return!
1358                *****
1359                *****
1360                **
1361                ** Name:      GDIRST - Get directory start and information
1362                **
1363                ** Category:  FILUTL
1364                **
1365                ** Purpose:
1366                **      Locate the start of directory (and length) on mass mem
1367                **      and return both to the caller
1368                **
1369                ** Entry:
1370                **      D[X] contains the drive address
1371                **      DO points to the mailbox
1372                **
1373                ** Exit:
1374                **      Carry clear:
1375                **      B[W] contains:
1376                **      Directory start pointer in [3:0], [15:12]
1377                **      Start of data area in [7:4]
1378                **      Zero in [11:8]
1379                **      D[W] contains:
1380                **      Drive address in [A] (No change)
1381                **      Number of directory records in [8:5]
1382                **      Address of LAST data record + 1 [12:9]
1383                **      Zero in [15:13]
1384                **      Carry set:
1385                **      Error (P, C[0] are error code)
1386                **
1387                ** Calls:      SEEKA, DdtRd, READSC, D1=SCR, GETALR, ASLC9, ASRC4,
1388                **      GETZER, (GDIRSM), ASRC9, CSRC8, ASRC3, ASLC3, CSLC4
1389                **
1390                ** Uses.....
1391                **      Exclusive: A,B,C,D[15:5],D1,P
1392                **      Inclusive: A,B,C,D[15:5],D1,P,SCRATCH[63:0],ST[3:0]
1393                **
1394                ** Stk lvls:   3 (SEEKA)(GDIRSB)
1395                **
1396                ** History:
1397                **
```

```

1398      **      Date      Programmer      Modification
1399      **      -----      -----      -----
1400      **      11/19/82      NZ      Added documentation
1401      **
1402      *****
1403      *****
1404 F48D8 D0 =GDIRST A=0 A
1405 F48DA 79E9 GOSUB SEEKA (Leaves drive as talker)
1406 F48DE 400 RTNC
1407 F48E1 7851 GOSUB DdtRd Read medium at current record
1408 F48E5 400 RTNC
1409 F48E8 20 P= 0
1410 F48EA 3500 LC(6) (=MSDA)+24 Read LIF ID, label, start addr,
      0000
1411 * length, version #, Secondary ID
1412 F48F2 7171 GOSUB Readsc
1413 F48F6 400 RTNC Error...bad read
1414 F48F9 7F21 GOSUB D1=SCR Reset D1 to start of data
1415 F48FD 22 P= 2
1416 F48FF 8E00 GOSUBL =GETALR Get LIF ID
      00
1417 *
1418 * Check if this is an LIF format medium (LIF ID=#8000)
1419 *
1420 F4905 3300 LCHEX 8000
      08
1421 F490B 23 P= 3
1422 F490D 916 ?A#C WP
1423 F4910 F1 GOYES GDIRSe Not LIF...error
1424 F4912 17B GDIRS1 D1=D1+ 12 Skip volume label (ignore)
1425 F4915 AF0 A=0 W
1426 F4918 24 P= 4
1427 F491A 8E00 GOSUBL =GETALR Get start address of directory
      00
1428 F4920 958 ?A=0 M If any but low 3 nibs#0, error!
1429 F4923 11 GOYES GDIRS3 OK!
1430 F4925 20 GDIRSE P= =eTSIZE Error!
1431 F4927 80F0 GDIRsE CPEX 0
1432 F492B 20 P= =eTAPE Drive error (Size of File)
1433 F492D 02 RTNSC
1434 *_-
1435 *_-
1436 F492F GDIRSe
1437 F492F 20 P= =eNOLIF Not LIF!
1438 F4931 45F GOC GDIRsE Go always
1439 *_-
1440 *_-
1441 F4934 8E00 GDIRS3 GOSUBL =ASLC9
      00
1442 *
1443 * A=[<--000--> <--Directory start address--> <--000-->]
1444 * 15.....12,11.....9,8.....0
1445 *
1446 *
1447 * Now read number of records in the directory

```



```
1448 *
1449 F493A 177      D1=D1+ 8      Skip unneeded info in header
1450 F493D 15B3     A=DAT1 4      Read first two bytes of length
1451 F4941 173      D1=D1+ 4      Skip past then...
1452 F4944 8AC      ?#0  A
1453 F4947 ED       GOYES  GDIRSE  Too big!
1454 F4949 22       P= 2          Read 2 bytes...
1455 F494B 8E00     GOSUBL =GETALR Read the last two bytes of length
      00

1456 *
1457 * A=[<--Dir start address--> <--0000--> <--Dir length-->]
1458 * 15.....13,12.....4,3.....0
1459 *
1460 F4951 7F41     GOSUB  Asrc4
1461 *
1462 * A=[<--Dir length-->,<--Dir start address-->,<--000-->]
1463 * 15.....12,11.....9,8.....0
1464 *
1465 * Now get the extension field...if extension > 0, read it!
1466 *
1467 F4955 D2       C=0  A        Clear high nibble...
1468 F4957 15F3     C=DAT1 4      ...Read in the extension...
1469 F495B 8AE      ?#0  A        ...is it zero (no extensions)?
1470 F495E A0       GOYES  GDIRS4  No...read it.
1471 *
1472 * Extension field=0...fill in the default value for tape end
1473 *
1474 F4960 3200     LC(3) #200    First record past tape
      2
1475 F4965 5C3     GONC  GDIRS8  Go always!
1476 *
1477 *
1478 F4968 3500    GDIRS4 LC(6) (=MSDA)+12  Send 12 bytes from here...
      0000
1479 F4970 73F0     GOSUB  Readsc  ...to SCRATCH!
1480 F4974 400      RTNC          Error!
1481 *
1482 * READSC uses A[5:0] only
1483 *
1484 F4977 1E00     D1=(4) (=SCRATCH)+16
      00
1485 F497D 77BE     GOSUB  Getzer
1486 F4981 491      GOC   GDIRS7  Too big...use #FFFF
1487 *
1488 * Put # of records per track into A[A]
1489 *
1490 F4984 DA       A=C  A
1491 *
1492 * A[3:0] is # of records per track, A[4]=0
1493 *
1494 F4986 1CF      D1=D1- 16     Point to surfaces/medium
1495 *
1496 * Call subroutine to get surfaces/medium and multiply times
1497 * records per track (result in A[3:0])
1498 *
```

```

1499 F4989 7060      GOSUB  GDIRSM
1500 F498D 4D0      GOC    GDIRS7      Too big...use #FFFF
1501                *
1502                * A is now (records/track) * (surfaces/medium)
1503                *
1504 F4990 7890      GOSUB  D1=SCR      Tracks/surface
1505                *
1506                * Get tracks/surface, multiply times (records/track *
1507                *                               surfaces/medium)
1508                *
1509 F4994 7550      GOSUB  GDIRSM
1510                *
1511                * Now A[3:0] is tracks/medium! (= last rec #)
1512                *
1513                * A=[<-Dir length->,<-Dir start addr->,<-0->,X,<-last rec #->]
1514                *   15.....12,11.....9,8...5,4,3.....0
1515                *
1516 F4998 5B0      GONC   GDIRS9      All OK if no carry
1517 F499B D2      GDIRS7  C=0   A      More than I can do...use #FFFF!
1518 F499D 23      P=     3
1519 F499F A1E      C=C-1  WP      Default value! (#FFFF)
1520 F49A2 DA      GDIRS8  A=C   A      C[3:0] is # of records in dir
1521 F49A4          GDIRS9
1522 F49A4 8E00      GOSUBL =ASRC9      Roll to correct fields for return
      00
1523                *
1524                * A=[<-0->,<-last rec #->,<-dir length->,<-dir start addr->]
1525                *   15.11,10.....7,6.....3,2.....0
1526                *
1527 F49AA AF2      C=0    W
1528 F49AD AB6      C=A    X      C[X] is dir start address
1529 F49B0 F2      CSL   A      Set record pntr to zero (first)
1530 F49B2 D5      B=C    A      Set PTRC to Directory start
1531 F49B4 8E00      GOSUBL =CSRC8      Shift directory start to [11:8]
      00
1532                *
1533                * PTRF area is now in C[3:0]...
1534                *
1535 F49BA AB6      C=A    X      Copy directory start to C[3:0]
1536 F49BD 8E00      GOSUBL =ASRC3      Rotate directory length to A[3:0]
      00
1537 F49C3 23      P=     3
1538 F49C5 A12      C=C+A  WP      Now C[3:0] is PTRF initial value
1539 F49C8 8E00      GOSUBL =ASLC3      Rotate A[W] back where it belongs
      00
1540 F49CE 79C0      GOSUB  Cslc4
1541 F49D2 A99      C=B    WP      Copy PTRC (set up) to C[3:0]...
1542 F49D5 AF5      B=C    W      ...and finish setting all PTRs
1543                *
1544                * Now set PFC, Dlen1, NEW, PhEOD, and Tendr
1545                *
1546 F49D8 AF6      C=A    W      Directory length and medium end...
1547 F49DB BF2      CSL   W      ...shift...
1548 F49DE BF2      CSL   W      ...to C[8:5]...
1549 F49E1 2C      P=    12

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```

1550 F49E3 DB          C=D   A          ...copy D[A] to C[A]...
1551 F49E5 AF3        D=0   W          ...clear high nibbles of D...
1552                  *          ... (PFC, NEW, PhEOD)...
1553 F49E8 A97        D=C   WP         ...and copy it all to D!
1554                  *
1555                  * Done with initialization!
1556                  *
1557 F49EB 03          RTNCC
1558                  *
1559                  *
1560                  *
1561                  * This is the routine to get from RAM & multiply by A[3:0]
1562                  * (Uses A[A], C[A], D1, P!!) (P is NOT zero on return!)
1563                  *
1564 F49ED 774E GDIRSM GOSUB Getzer      Read 2 bytes=0, 2 more into C[A]
1565 F49F1 400          RTNC           Error if not zero
1566                  *
1567                  * Use D1 as a temporary holding area for multiplicand
1568                  *
1569 F49F4 131          D1=A
1570 F49F7 D0          A=0   A          Clear product area
1571                  * D1 is multiplicand, C[A] is multiplier, A[A] is zero
1572 F49F9 137          CD1EX
1573                  * D1 is multiplier, C[A] is multiplicand, A[A] is zero
1574 F49FC 1C0 GDIRSM  D1=D1- 1        Decrement multiplier...
1575 F49FF 490          GOC   GDIRSM    ...End of loop!
1576 F4A02 CA          R=R+C   A          Add multiplicand to product...
1577 F4A04 57F          GONC   GDIRSM    If no carry, repeat loop!
1578 F4A07 02          RTNSC          If carry, WAY too big!
1579                  *
1580                  *
1581                  *
1582                  * Now product in A[A], multiplicand in C[A]
1583                  *
1584 F4A09 24 GDIRSM  P=   4          ...point to high nibble...
1585 F4A0B 90C          ?A#0  P          ...and check if product too big.
1586 F4A0E 00          RTNYES          TOO big!
1587                  *
1588                  * Return with C[3:0] = multiplicand, A[3:0] = product
1589                  *
1590 F4A10 03          RTNCC           Size is OK!
1591                  *****
1592                  *****
1593                  **
1594                  ** Name:      F->SCR - Write "FFF"s to SCRATCH ram
1595                  **
1596                  ** Category:  LOCAL
1597                  **
1598                  ** Purpose:
1599                  **      Write 64 nibbles of "FFF" into SCRATCH RAM
1600                  **
1601                  ** Entry:
1602                  **      None
1603                  **
1604                  ** Exit:

```

```

1605      **      Carry clear, D1 @ =SCRCH+64,P=15
1606      **
1607      ** Calls:      D1=SCR
1608      **
1609      ** Uses.....
1610      ** Inclusive: C[W],D1,P,SCRCH[63:0]
1611      **
1612      ** Stk lvls:   1 (D1=SCR)
1613      **
1614      ** History:
1615      **
1616      **      Date      Programmer      Modification
1617      **      -----      -----      -----
1618      **      02/18/83      NZ      Added call to D1=SCR to pack code
1619      **      01/06/83      NZ      Added routine and documentation
1620      **
1621      **
1622      **
1623 F4R12 7610 =F->SCR GOSUB D1=SCR
1624 F4R16 AF2      C=0 W
1625 F4R19 A7E      C=C-1 W      C="FFFFFFFFFFFFFFF"
1626 F4R1C 23      P= 3      Write out 64 nibbles (4*16)
1627 F4R1E 1557 F->SC! DAT1=C W
1628 F4R22 17F      D1=D1+ 16
1629 F4R25 0D      P=P-1      Decrement counter
1630 F4R27 56F      GONC F->SC! Not done...continue
1631 F4R2A 03      RTNCC      Done...carry clear!
1632      * _
1633      * _
1634 F4R2C 1F00 =D1=SCR D1=(5) =SCRCH
      000
1635 F4R33 01      RTN
1636      * _
1637      * _
1638 F4R35 20 DdlWrt P= =Write
1639 F4R37 8C00 Ddl GOLONG =DDL
      00
1640      * _
1641      * _
1642 F4R3D 20 =DdtRd P= =Read
1643 F4R3F 7F00      GOSUB Ddt
1644 F4R43 400      RTNC
1645 F4R46 6358 Tstata GOTO TSTATR
1646      * _
1647      * _
1648 F4R4A 6C78 Seeka GOTO SEEKR
1649      * _
1650      * _
1651 F4R4E 6448 Tstat GOTO TSTAT
1652      * _
1653      * _
1654 F4R52 8C00 Ddt GOLONG =DDT
      00
1655      * _
1656      * _

```

```
1657 F4A58 8C00 Putc    GOLONG =PUTC
      00
1658          *-
1659          *-
1660 F4A5E 840  Writit  ST=0  =LoopOK      Do not abort out with ONE ATTN
1661 F4A61 8C00          GOLONG =WRITIT
      00
1662          *-
1663          *-
1664 F4A67 71CF Readsc  GOSUB  D1=SCR
1665 F4A6B 8C00 Readsu  GOLONG =READSU
      00
1666          *-
1667          *-
1668 F4A71 8C00 Putd    GOLONG =PUTD
      00
1669          *-
1670          *-
1671 F4A77 8C00 Putdx   GOLONG =PUTDX
      00
1672          *-
1673          *-
1674 F4A7D 8C00 Mtyl    GOLONG =MTYL
      00
1675          *-
1676          *-
1677 F4A83 8C00 Start   GOLONG =START
      00
1678          *-
1679          *-
1680 F4A89 816  Csrc5   CSRC
1681 F4A8C          Csrc12
1682 F4A8C 816  Csrc4   CSRC
1683 F4A8F 8C00 Csrc3   GOLONG =CSRC3
      00
1684          *-
1685          *-
1686 F4A95          Csrc10
1687 F4A95 812  Csrc6   CSLC
1688 F4A98 812  Csrc5   CSLC
1689 F4A9B          Csrc12
1690 F4A9B 812  Csrc4   CSLC
1691 F4A9E          Csrc13
1692 F4A9E 8C00 Csrc3   GOLONG =CSLC3
      00
1693          *-
1694          *-
1695 F4AA4 8C00 Asrc4   GOLONG =ASRC4
      00
1696          *-
1697          *-
1698 F4AAA 8D00 Yndhms  GOVLNG =YMDHMS
      000
1699          *****
1700          *****
```

```

1701      **
1702      ** Name:      NXTENT - Move to next directory entry
1703      ** Name:      LSTENT - Move to previous directory entry
1704      **
1705      ** Category:   PILUTL
1706      **
1707      ** Purpose:
1708      **      Increment/decrement to next/last directory entry
1709      **
1710      ** Entry:
1711      **      C[3:0] is the current entry
1712      **
1713      ** Exit:
1714      **      C[3:0] is next/last entry
1715      **      P=0
1716      **      Carry set if crossed record boundary, else clear
1717      **
1718      ** Calls:      None
1719      **
1720      ** Uses.....
1721      **      Inclusive: C[3:0],P
1722      **
1723      ** Stk lvls:   0
1724      **
1725      ** History:
1726      **
1727      **      Date      Programmer      Modification
1728      **      -----      -
1729      **      12/08/82      NZ          Added routine and documentation
1730      **
1731      *****
1732      *****
1733 F4AB1 D9  =NXTEN+ C=B   A
1734 F4AB3 23  =NXTENT P=    3
1735 F4AB5 0B          CSTEX
1736 F4AB7 853        ST=1  3          Set high bit to propagate carry
1737 F4ABA 0B          CSTEX
1738 F4ABC B16        C=C+1 WP          Increment counter
1739 F4ABF 0B          CSTEX
1740 F4AC1 863        ?ST=0 3          Is this zero (Nibble is zero)?
1741 F4AC4 11          GOYES LSTEN1     Yes...set carry
1742 F4AC6 5E0        GONC  LSTEN1     Go always...clear carry
1743      * _
1744      * _
1745 F4AC9 23  =LSTENT P=    3
1746 F4ACB A1E        C=C-1 WP
1747 F4ACE 0B          CSTEX
1748 F4AD0 873        ?ST=1  3          >??
1749 F4AD3 20          GOYES LSTEN1     Yes...set carry
1750 F4AD5 843 LSTEN1 ST=0  3          Clear unconditionally!
1751 F4AD8 0B          CSTEX
1752 F4ADA 20          P=    0          Always set P=0!!!
1753 F4ADC 01          RTN          Carry set if new entry,else clear
1754      *****
1755      *****

```

```
1756      **
1757      ** Name:          NEWFIL,NEWFI+ - create a file on mass memory
1758      **
1759      ** Category:    FILUTL
1760      **
1761      ** Purpose:
1762      **      Create a new file on a medium, given a pointer to the
1763      **      file data and all info needed to create the directory
1764      **      entry. If NEWFIL is called by CREATE, the file will be
1765      **      initialized according to its create code.
1766      **
1767      ** Entry:
1768      **      ST[=sOVERW]=1 if overwrite existing file, 0 if error on
1769      **      existing file
1770      **      D[X] is device address (D[B]=0 if LOOP)
1771      **      R0 is first 8 chars of name
1772      **      R4[15:12] is last 2 chars of name
1773      **      R1[5:0] is new file size in bytes
1774      **      R1[9:6] is new file type
1775      **      R1[14:10] is new file data start (RAM address)
1776      **      (If zero, don't copy any file...check CCode)
1777      **      R1[15] = 0 if called by COPY with device spec,
1778      **      "F" if called by COPY with LOOP or non-mass storage
1779      **      device (D[B]#0 means non-mass storage device)
1780      **      create code if called by CREATE
1781      **      R2[7:0] is data for implementation bytes ([B] is first
1782      **      byte of implementation field...byte 28)
1783      **      (R2[B] is FIRST byte of implementation info)
1784      **      NEWFIL:
1785      **      DO points to the mailbox
1786      **
1787      ** Exit:
1788      **      Carry clear:
1789      **      P=0, R3 is file information (B[W] internally):
1790      **      [3:0]: Current directory pointer (of no value)
1791      **      [7:4]: Pointer to start of data area for file
1792      **      [11:8]: Pointer to old directory location (if found)
1793      **      [15:12]: Pointer to new directory location of file
1794      **      R1 is unchanged from entry conditions
1795      **      (If R1[S]="F" and R1[B]#"00" then R1[5:2] has been
1796      **      incremented, R1[B]=0)
1797      **      The file has been created on the mass storage medium
1798      **      Carry set:
1799      **      Error (P,C[0] are error code)
1800      **
1801      ** Calls:          START,CHKBIT,GDIRST,SEEKA,DdtRd,READSC,GT2BYT,
1802      **                  NXTENT,PT2BYT,YMDHMS,MTYL,<ENDTAP>,I/DFND,PURFIB,
1803      **                  FTYPF#,CHKSEC,CHKSIZ,PUGFIB,NEWF80,NEWF84,NEWF90,
1804      **                  NEWF.0,GETMBX,D1=SCR,F->SCR
1805      **                  CSRC3;4;5;8;9;12,ASRC4,CSLC3;4;5;8;12
1806      **
1807      ** NEWF80 -->v ASRC4;8,CSRC2;3;12,CSLC3,YMDHMS,PT2BYT,Dd1Pwr,
1808      **                  SEEKA,MTYL,DDL,PUTD,PUTC,D1=SCR
1809      ** NEWF84 -->v PT2BYT,CSLC2;6,MTYL,GT2BYT,CSRC13
1810      ** PUTDR# -->v SEEKA,MTYL
```

```
1811      ** NEWF90 -->v Dd1Pwr,DDL,PUTD
1812      ** PUTDIR ---> DDL,D1=SCR,<NEWF.3>
1813      **
1814      ** NEWF.0 -->v CSRC4;10,SEEKA,MTYL,DDL,<INITFL>
1815      ** NEWF.3 ---> WRITIT,GETST,PUTC,<TSTAT>
1816      **
1817      ** Uses.....
1818      ** Exclusive: A,B,C,D,R0,R2,R3,R4,D0,D1,P
1819      ** Inclusive: A,B,C,D,R0,R2,R3,R4,D0,D1,P,SCRCH[63:0],ST[8,4:0]
1820      **
1821      ** Stk lvls: 5 (PUGFIB)(Only if deleting FIB entry:file existed
1822      ** Stk lvls: 4 (GDIRST)(NEWF80;YMDHMS)
1823      **
1824      ** Detail:
1825      **     Consolidates into one pass through the directory the
1826      **     following actions for mass storage:
1827      **     1. Find the file on the medium (if present)
1828      **     2. Find a space on the medium sufficient to hold
1829      **        the file, giving preference to the place
1830      **        it was before (if found in 1.)
1831      **     3. Purge the old directory entry, if not using
1832      **        same entry for new file
1833      **     4. Write the new directory entry
1834      **     5. Copy the file to the data area of the medium
1835      **
1836      ** Algorithm:
1837      **     0: Get directory information
1838      **     Initialize PTRC,PTRD,PTRF,PTRL,PTRN,PFC
1839      **     (PTRC is current directory entry <== dir_start
1840      **     PTRD is "hole" in directory space <== dir_start
1841      **     PTRF is "hole" in file space <== 0
1842      **     PTRL is old directory entry <== 0
1843      **     NEW is new directory entry flag <== 0
1844      **     PFC is count of purged files <== 0
1845      **     )
1846      **     Seek to the start of the directory space
1847      **     --
1848      **     1: Read a directory entry @ PTRC into =SCRCH
1849      **     --
1850      **     -- Check if done with medium directory
1851      **     --
1852      **     IF ((end of directory) THEN 5:
1853      **     --
1854      **     -- Check if have enough information already
1855      **     --
1856      **     1.2: IF (PTRL#0 AND NEW#0) THEN 5:
1857      **     --
1858      **     -- Check if in_file is purged
1859      **     --
1860      **     1.3: IF (in_file_type = 0) THEN 2:
1861      **     --
1862      **     -- Check if names match (found old file)
1863      **     --
1864      **     IF (in_file_name # new_file_name) THEN 3:
1865      **     --
```



```
1866      **      -- Check if overwrite is permitted
1867      **      --
1868      **      IF (ST[sOVERW]=0) THEN ERROR (File Exists)
1869      **      --
1870      **      IF (old file is secure) THEN ERROR (File protect)
1871      **      --
1872      **      Mark FIB entry to be purged if old file is open
1873      **      --
1874      **      -- Check if room for new file in old file
1875      **      --
1876      **      IF (in_file_space < new_file_size) THEN 1.5:
1877      **      --
1878      **      -- It fits here...use this entry!
1879      **      --
1880      **      PTRF <= in_file_start
1881      **      PTRD <= PTRC
1882      **      --
1883      **      Write new_file_implementation into SCRTCH directory entry
1884      **      Write new_file_type into SCRTCH directory entry
1885      **      --
1886      **      Get current time and date from mainframe
1887      **      --
1888      **      GOSUB 8.4: -- Write time&date, output entry @ PTRD
1889      **      --
1890      **      GOTO 7:    -- Transfer file data to PTRF, exit cleanly
1891      **      -----
1892      **      --
1893      **      -- Found old file, file won't fit here...mark as purged
1894      **      --
1895      **      1.5: PTRL <= PTRC
1896      **      --
1897      **      -- Count a purged file, get the next directory entry
1898      **      --
1899      **      2: PFC <= PFC + 1
1900      **      GOTO 4:
1901      **      -----
1902      **      3: --
1903      **      -- Names don't match...check if found new space yet
1904      **      -- (If found new space, continue to look for old name)
1905      **      --
1906      **      IF (NEW#0) THEN 4:
1907      **      --
1908      **      -- Check if this file terminates a purged block AND
1909      **      -- the file would fit here
1910      **      --
1911      **      IF (PFC#0 AND ((in_file_start - PTRF)>=new_file_size))
1912      **      THEN NEW <= 1 @ GOTO 4:
1913      **      --
1914      **      -- Won't fit OR not termination of purged block
1915      **      --
1916      **      3.4: PFC <= 0
1917      **      PTRF <= in_file_start + in_file_length
1918      **      PTRD <= PTRC + 1
1919      **      --
1920      **      -- Fall through to code to loop back for next entry
```

```
1921      **      --
1922      **      4: PTRC <= PTRC + 1
1923      **      IF (NOT End_of_directory) THEN 1:
1924      **      --
1925      **      PhEOD <= 1 -- Set Physical End of directory flag...
1926      **      --
1927      **      -- ...and fall through to End_of_directory code
1928      **      --
1929      **      5: --
1930      **      -- Check why we are done...end_of_file or finished
1931      **      --
1932      **      IF (NEW=0) THEN 6:
1933      **      --
1934      **      5.5: GOSUB 8:  -- Purge the old file, create new directory
1935      **      --
1936      **      GOTO 7:  -- Copy the data to (PTRF), exit cleanly
1937      **      -----
1938      **      6: --
1939      **      -- Check physical end_of_directory and no purged files
1940      **      --
1941      **      IF (PhEOD AND PFC=0) THEN ERROR ("Directory Full")
1942      **      --
1943      **      -- Check if room at end of medium for new_file
1944      **      --
1945      **      6.2: IF (NOT (room at end)) THEN ERROR ("End of Medium")
1946      **      --
1947      **      GOSUB 8:  -- Purge the old file, create new directory
1948      **      --
1949      **      -- Check if room for logical end_of_directory mark
1950      **      --
1951      **      IF ((PTRD + 1) = physical_end_of_directory) THEN GOTO 7:
1952      **      --
1953      **      -- Write an End of Directory mark to the medium
1954      **      --
1955      **      6.7: Set SCRATCH="FF...FF" -- Set up EOD mark in RAM
1956      **      --
1957      **      GOSUB 9:  -- Write the directory entry here
1958      **      --
1959      **      7: GOSUB #:  -- Copy the data to the medium
1960      **      --
1961      **      -- Delete the FIB entry marked to be deleted (if any)
1962      **      --
1963      **      GOSUB Purge_marked_FIB_entry (PUGFIB)
1964      **      --
1965      **      IF (device is mass storage) THEN GOTO Rewind&status
1966      **      --
1967      **      -- Destination is LOOP/non-mass storage
1968      **      --
1969      **      7.5: IF (device is LOOP) THEN GOTO send ETO
1970      **      --
1971      **      GOTO untalk_unlisten_end
1972      **      -----
1973      **      -----
1974      **      --
1975      **      -- Subroutine to write the directory to the medium
```



```

2031      ** 07/18/83      NZ      Added status bit for overwriting
2032      **                                     file
2033      ** 05/12/83      NZ      Changed CHKMAS call to use bits
2034      **                                     that are set by FILSPx
2035      ** 03/02/83      NZ      Added sending nENDM to Diamond
2036      ** 02/05/83      NZ      Added CHKMAS in NEWFI+
2037      ** 02/04/83      NZ      Added LOOP check in several spots
2038      ** 02/03/83      NZ      Rearranged order of copy...now
2039      **                                     writes directory entry BEFORE
2040      **                                     writing the data
2041      ** 11/19/82      NZ      Added documentation
2042      **
2043      ****
2044      ****
2045 F4ADE 71AF =NEWFI+ GOSUB Start      Set up the loop
2046 F4AE2 400      RTNC      Error???          <<<<
2047      *
2048      * Now check if mass storage device...if not, check R1[S]:
2049      *      If R1[S]=0, set R1[S]="F" (not mass storage)
2050      *      If R1[S]#0, this is a create...error!
2051      *
2052 F4AE5 96B      ?D=0  B      "LOOP"?
2053 F4AE8 90      GOYES NEWF++      Yes...set R1[S]
2054      *
2055      * Check if bit "4" of D[3] is set...if so, then mass storage
2056      *
2057 F4AEA 7028      GOSUB  CHKBIT      Check mass storage bit
2058 F4AEE 4B0      GOC    NEWFIL      Mass storage...continue on!
2059 F4AF1 119      NEWF++ C=R1
2060 F4AF4 A4E      C=C-1 S
2061 F4AF7 109      R1=C      Set for "LOOP" or not MS
2062 F4AFA 119      =NEWFIL C=R1      Check if LOOP or Non-MS device
2063 F4AFD B46      C=C+1 S
2064 F4B00 590      GONC  NEWF01      Not LOOP
2065 F4B03 AF1      B=0  W      LOOP...set all pointers=0, enter
2066 F4B06 6082      GOTO  NEWF55      at a later entry point
2067      *
2068      *
2069 F4B0A 7ACD      NEWF01 GOSUB  GDIRST      Get directory start, etc
2070      *
2071      * 0: Initialization
2072      *
2073      * GDIRST leaves start of directory (Dstrt) in A[X], length of
2074      * directory (Dleng) in A[6:3], address of next record after
2075      * the last one on the medium (Tlast) in A[10:7]
2076      *
2077      * Now initialize my internal pointers
2078      *
2079      * Name Value Register nibs Description:
2080      * -----
2081      * PTRC: Dstrt B[3:0] 4 Current directory pointer
2082      * PTRD: Dstrt B[15:12] 4 Directory pointer (new space)
2083      * PTRF: Dend B[7:4] 4 File pointer (to data area)
2084      * PTRL: 0 B[11:8] 4 Pointer to old name (Last) entry
2085      * NEW: 0 D[S] 1 Flag- indicates PTRD is new entry

```

```

2086 * PFC: 0 D[14] 1 Purged file currently found
2087 * PhEOD: 0 D[13] 1 Physical end_of directory reached
2088 * MName:given R0,R4[15:12] New file name (20 nibbles)
2089 * NSize:given R1[5:0] 6 New file size (bytes)
2090 * NType:given R1[9:6] 4 New file type
2091 * NData:given R1[14:10] 5 New file data start (in RAM)
2092 * CCode:given R1[15] 1 Create code (if not zero,F)
2093 * NImpl:given R2[7:0] 8 New file implementation bytes
2094 * Dlenl:Dleng D[8:5] 4 Directory records left to process
2095 * (includes current record)
2096 * Tendr:Tlast D[12:9] 4 Medium end (address of next record)
2097 *
2098 * All directory pointers are of the form [3 nibs][1 nib];
2099 * The [3 nibs] field is the directory record number.
2100 * The [1 nib] field is the entry number within the record.
2101 *
2102 * If carry, check what the error is...if "New Medium", try again
2103 *
2104 F4B0E 5A1 GONC NEWF05 OK...continue
2105 *
2106 * Check for "New Medium" error ...close files, continue
2107 *
2108 F4B11 880 ?P# =eTAPE
2109 F4B14 00 RTNYES Error during status
2110 F4B16 80F0 CPEX 0
2111 F4B1A 880 ?P# =eNEWTR New medium?
2112 F4B1D 20 GOYES NEWF03
2113 F4B1F 80F0 NEWF03 CPEX 0 Carry: not "New Medium"
2114 F4B23 400 RTNC If carry, return the error
2115 F4B26 53E GONC NEWF01 Go always...try again!
2116 *
2117 *
2118 *
2119 * Seek the first record of the directory...in A[X]
2120 *
2121 F4B29 ADO NEWF05 A=0 M Clear high nibbles
2122 F4B2C 7A1F GOSUB Seeka Seek to that record
2123 F4B30 400 RTNC Error with medium or loop
2124 F4B33 760F GOSUB DdtRd Read command
2125 F4B37 400 RTNC Error
2126 *
2127 * 1: Read in an entry (at PTRC)
2128 *
2129 F4B3A 20 NEWF10 P= 0
2130 F4B3C 3500 LC(6) (=mSDA)+32 Read 32 bytes...
0000
2131 F4B44 7F1F GOSUB Readsc ...into =SCRATCH!
2132 F4B48 400 RTNC Error!
2133 F4B4B 1D00 D1=(2) (=SCRATCH)+20 Type!
2134 F4B4F 15F3 C=DAT1 4
2135 F4B53 23 P= 3
2136 F4B55 B16 C=C+1 WP If carry, then End of directory
2137 F4B58 560 GONC NEWF12 Not end of directory
2138 F4B5B 6622 NEWF11 GOTO NEWF50 End of directory!
2139 *

```

```

2140      * _
2141 F4B5F 94B NEWF12 ?D=0 S      Is NEW=0?
2142 F4B62 B1  GOYES NEWF13      Yes...continue
2143 F4B64 AF9  C=B W
2144 F4B67 8E00 GOSUBL =CSRC8      Get PTRL into C[3:0]
      00
2145 F4B6D 91A      ?C=0 WP      Is PTRL=0? (P is 3)
2146 F4B70 D0  GOYES NEWF13      Yes...continue
2147      *
2148      * PTRL#0 and NEW#0...call it end of directory
2149      *
2150 F4B72 58E      GONC NEWF11      Go always!
2151      * _
2152      * _
2153 F4B75 6751 NEWF2. GOTO NEWF20      Jump (out of range)
2154      * _
2155      * _
2156 F4B79 6F51 NEWF3. GOTO NEWF30      Jump (out of range)
2157      * _
2158      * _
2159 F4B7D      NEWF13
2160      *
2161      * Check if in_type=0
2162      *
2163 F4B7D 15F3      C=DAT1 4      Reread type from SCRCH+#20
2164 F4B81 91A      ?C=0 WP      Purged file?
2165 F4B84 1F  GOYES NEWF2.      Yes...process it
2166      *
2167      * This is not a purged file...check if names match
2168      *
2169 F4B86 1C3      D1=D1- 4      Set D1<-last 2 characters of name
2170 F4B89 15B3     A=DAT1 4      Read them into A[3:0] for now
2171 F4B8D 1CF      D1=D1- 16     First 8 characters of name
2172 F4B90 1577     C=DAT1 W      Read them!
2173 F4B94 120     AROEX        First 8 chars in A[W], C[W]
2174 F4B97 976     ?A#C W
2175 F4B9A 20      GOYES NEWF14     Sets carry if no match
2176 F4B9C 120     NEWF14 AROEX     Swap name back into R0, A[3:0]
2177 F4B9F 49D     GOC NEWF3.      Not a match...continue
2178      *
2179      * First 8 chars match...check if last 2 also match
2180      *
2181 F4BA2 11C      C=R4
2182 F4BA5 72FE     GOSUB Csrc12     Get last 2 chars in C[3:0]
2183 F4BA9 912      ?A=C WP
2184 F4BAC 50      GOYES NEWF1a     Match...check room
2185 F4BAE 5AC     GONC NEWF3.      Go always...Not match
2186      * _
2187      * _
2188      *
2189      * Names match...check if overwrite permitted (if not, error)
2190      *
2191 F4BB1 20      NEWF1a P= 0
2192 F4BB3 300     LC(1) =eEFILE     File exists
2193 F4BB6 860     ?ST=0 =sOVERW     Overwrite it?

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2194 F48B9 92          GOYES  NEWF1d      No...error (Duplicate file)
2195                  *
2196                  * Overwrite permitted...check if file is secure
2197                  *
2198 F48BB 1D00        D1=(2) (=SCRATCH)+20  Point to type field
2199 F48BF AF9         C=B      W          Save B in R3 temporarily!
2200 F4BC2 10B         R3=C
2201                  *
2202                  * FTFPF# destroys R0, but the name is also in SCRATCH[15:0]
2203                  *
2204 F4BC5 7925        GOSUB  GT2BYO      Read file type
2205 F4BC9 DA          A=C      A          File type is in A[A] now
2206 F4BCB 8E00        GOSUBL =FTFPF#    Get file type #
                OO
2207 F4BD1 541        GONC   NEWF1c      Not found...OK (continue)
2208                  *
2209                  * Found...check if secure
2210                  *
2211 F4BD4 8E00        GOSUBL =CHKSEC    If secure, returns with carry set
                OO
2212 F4BDA 5B0        GONC   NEWF1c      Not secure...OK to continue
2213                  *
2214                  * File is secure...error!
2215                  *
2216 F4BD0 20         =fPROT P=      0          Set up "File Protected" error
2217 F4BDF 300        LC(1) =efPROT    File Protected!
2218 F4BE2 20         NEWF1d P=      =eTAPE
2219 F4BE4 02         RTNSC
2220                  *
2221                  *
2222                  *
2223                  * Not secure...kill the FIB entry (if any) for the file!
2224                  *
2225 F4BE6            NEWF1c
2226                  *
2227                  * First build the FIB file data pointer
2228                  *
2229 F4BE6 DB          C=D      A
2230 F4BE8 1F00        D1=(5) (=SCRATCH)+28  Start address (third byte)
                OOO
2231 F4BEF 7105        GOSUB  GT2BYT      Read two bytes!
2232 F4BF3 77AE        GOSUB  Cslc3
2233 F4BF7 3200        LC(3)  =bFIB
                0
2234 F4BFC 8E00        GOSUBL =i/OFND    Find the FIB buffer
                OO
2235 F4C02 798E        GOSUB  Csrc3      Now C[6:0] is pointer!
2236                  *
2237                  * D1 @ FIB buffer, C[6:0] is address of file
2238                  *
2239 F4C06 8E00        GOSUBL =PURFIB    Find and mark the FIB entry
                OO
2240                  *
2241                  * Restore R0 from SCRATCH and B[W] from R3
2242                  *

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2243 F4C0C 7C1E      GOSUB  D1=SCR
2244 F4C10 1577      C=DAT1 W
2245 F4C14 108       RO=C           Restore RO[W] from SCRTCH
2246 F4C17 11B       C=R3
2247 F4C1A AF5       B=C      W           Restore B[W] from R3
2248
2249      * Registers are restored...check if room for new file here
2250      *
2251 F4C1D 111         A=R1           Get file length (given)
2252 F4C20 1D00       D1=(2) (=SCRTCH)+36 Length of file field @ 3rd byte
2253      *
2254      * NOTE: if length of existing file is > 2^16 sectors, this
2255      * code will treat it as if it were (size modulo 2^16)
2256      *
2257 F4C24 7CC4       GOSUB  GT2BYT   ...Read 2 bytes, start at D1
2258 F4C28 F2         CSL    A
2259 F4C2A 25         P=     5
2260 F4C2C B92       CSL    WP       Now C[5:0] is length in bytes
2261 F4C2F 99A       ?A<=C  WP       Does it fit?
2262 F4C32 60         GOYES  NEWF1b   Yes...set it up!
2263 F4C34 6680      GOTO   NEWF15   No...continue
2264      *-
2265      *-
2266      *
2267      * New file will fit in space for the old file (already on medium)
2268      *
2269      * Copy start address to PTRF
2270      *
2271 F4C38 1CB       NEWF1b D1=D1- 12   Point to start address @ 3rd byte
2272 F4C3B 75B4      GOSUB  GT2BYT   Read 2 bytes into C[3:0]
2273 F4C3F 785E      GOSUB  Cslc4    ...shift to C[7:4]...
2274 F4C43 23        P=     3
2275 F4C45 A99       C=B     WP       ...copy PTRC to C[3:0]...
2276 F4C48 27        P=     7
2277 F4C4A A95       B=C     WP       ...and set PTRF<=in_start
2278 F4C4D 7B3E      GOSUB  Csrc4    Shift PTRC to C[15:12]
2279 F4C51 2B        P=    11
2280 F4C53 A99       C=B     WP
2281 F4C56 10B      R3=C           Copy PTRC=>PTRD! (save B in R3)
2282 F4C59 112       A=R2           Get implementation bytes into A
2283 F4C5C 1D00      D1=(2) (=SCRTCH)+56 (Implementation bytes)
2284 F4C60 1597      DAT1=A 8       Write out the 4 bytes!
2285      *
2286      * Update the file type to the "new" type
2287      *
2288 F4C64 119        C=R1           Get type from R1[9:6]
2289 F4C67 712E      GOSUB  Csrc4    Get to C[5:2]
2290 F4C6B 1D00      D1=(2) (=SCRTCH)+20 Point to type field
2291 F4C6F 7894      GOSUB  PT2BYT   Output 2 bytes from C[5:2] to D1
2292      *
2293      * Now B[W] in R3; Save R1[W] in R2; D[A] in R4[9:5]
2294      * (YMDHMS uses A-D,P,DO,D1,RO,R1,ST[7:0])
2295      *
2296 F4C73 119        C=R1
2297 F4C76 10A       R2=C           R1 in R2

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2298 F4C79 DB          C=D   A
2299 F4C7B 791E       GOSUB  Cslc5
2300 F4C7F 10C        R4=C           D[A] in R4[9:5]
2301 F4C82 742E       GOSUB  Ymdhms
2302                  *
2303                  * Now C[11:0] is date info
2304                  *
2305 F4C86 AF5        B=C   W           Save date info in B temporarily
2306 F4C89 11C        C=R4
2307 F4C8C 79FD       GOSUB  Csrc5
2308 F4C90 D7         D=C   A           Restore D[A]
2309 F4C92 7000       GOSUB  =Getmbx      Restore D0
2310 F4C96 1F00       D1=(5) (=SCRATCH)+56
      000
2311 F4C9D 15F7       C=DAT1 8          Recall impl bytes (for NEWF84)
2312 F4CA1 12A        CR2EX          Restore R2, fetch R1 value
2313 F4CA4 109        R1=C           Restore R1
2314 F4CA7 11B        C=R3           Recall B[W] value
2315 F4CAA AFD        BCEX   W          Restore B[W], fetch date info
2316 F4CAD 1C2        D1=D1- 3        Position to where NEWF84 expects
2317 F4CB0 7EF2       GOSUB  NEWF84     Write the date, vol label, impl
2318 F4CB4 400        RTNC           Error somewhere!
2319 F4CB7 6E61       GOTO   NEWF70     Copy file to (PTRF), exit cleanup
2320                  *-
2321                  *-
2322                  *
2323                  * 1.5: Found the old file, new file won't fit there
2324                  *
2325 F4CBB          NEWF15
2326                  *
2327                  * Found old file, but it's too small now...consider it purged
2328                  *
2329 F4CBB D9         C=B   A           Set PTRL<==PTRC
2330 F4CBD 8E00       GOSUBL =CSLC8
      00
2331 F4CC3 27         P=    7
2332 F4CC5 A99        C=B   WP
2333 F4CC8 2B         P=    11
2334 F4CCA A95        B=C   WP           Now PTRL=PTRC
2335                  *
2336                  * 2: Mark a purged file and loop back
2337                  *
2338 F4CCD 2E         NEWF20 P=    14
2339 F4CCF B07       NEWF25 D=D+1 P           Make PFC non-zero
2340 F4CD2 4CF        GOC   NEWF25      If carry, wrap around!
2341 F4CD5 6080      NEWF4. GOTO  NEWF40  Increment to next entry, loop back
2342                  *-
2343                  *-
2344                  *
2345                  * 3: Names don't match, non-purged file...check if found a
2346                  * place for the file yet (if so, continue looking for the
2347                  * old file on the medium)
2348                  *
2349 F4CD9 94F       NEWF30 ?D#0 S           Is NEW#0?
2350 F4CDC 9F        GOYES  NEWF4.       Yes...continue looking for old

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2351      *
2352      * Check if (PFC#0) AND ((Start-PTRF) >= new_size)
2353      *
2354      * First check PFC=0 (If zero, skip)
2355      *
2356 F4CDE 2E      P=      14
2357 F4CE0 90B     ?D=0   P      Is PFC zero?
2358 F4CE3 D3     GOYES  NEWF34   Yes...reset PTRF, PTRD and cont
2359      *
2360      * Now check if enough room!
2361      *
2362 F4CE5 1D00     D1=(2) (=SCRATCH)+28  In_file_start (Start@ third byte)
2363 F4CE9 7704     GOSUB  GT2BYT         Read 2 bytes,start @ D1,to C[3:0]
2364      *
2365      * C[A] is now In_file_start...get PTRF, check if file fits.
2366      *
2367 F4CED 7900     GOSUB  CHKSIZ        Check if fits (carry if not)
2368 F4CF1 4E2     GOC    NEWF34        Doesn't fit...continue
2369      *
2370      * The new file WILL fit at PTRF
2371      *
2372 F4CF4 B47     D=D+1  S      NEW <= 1 (PTRD is location)
2373 F4CF7 5E5     GONC   NEWF40        Go always
2374      *
2375      *
2376 F4CFA AF4     CHKSIZ  A=B    W      Get PTRF into A[3:0]
2377 F4CFD 73AD     GOSUB  Asrc4
2378 F4D01 23      P=      3
2379 F4D03 B12     C=C-A  WP      Compute (In_file_start - PTRF)
2380      *
2381      * Get NSize next, convert to records (Use next integer record)
2382      *
2383 F4D06 111     A=R1      A[5:0] is size in bytes
2384 F4D09 822     SB=0      Use the Sticky Bit to check if
2385 F4D0C BF4     ASR      W      any bits were shifted off the
2386 F4D0F BF4     ASR      W      end of A!
2387 F4D12 832     ?SB=0     Any bits lost?
2388 F4D15 40      GOYES  CHKSIZ     No...skip increment statement
2389      *
2390      * NOTE: if file size is ever > #FFFFFF00, this won't work
2391      *
2392 F4D17 E4      A=A+1  A      Increment A[3:0]
2393      *
2394      * Now C[3:0] is (In_file_start - PTRF), A[3:0] is NSize(Recs)
2395      *
2396 F4D19 996     CHKSIZ  ?A>C  WP      Does it fit?
2397 F4D1C 00      RTNYES
2398 F4D1E 03      RTNCC
2399      *
2400      *
2401 F4D20      NEWF34
2402      *
2403      * File won't fit OR no purged files before it
2404      *
2405 F4D20 2E      P=      14

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2406 F4D22 A83          D=0    P          PFC <= 0
2407                  *
2408                  * Set PTRF <= In_file_start + In_file_length
2409                  *
2410 F4D25 1000         D1=(2) (=SCRATCH)+28  Back to In_file_start...
2411 F4D29 77C3         GOSUB  GT2BYT         Read In_file_start into C[3:0]
2412 F4D2D DA          A=C    A          Save In_file_start in A[3:0]
2413 F4D2F 173         D1=D1+ 4          Move to In_file_length + 4
2414 F4D32 7EB3         GOSUB  GT2BYT         Read In_file_length into C[3:0]
2415                  *
2416                  * Now A[3:0] is In_file_start, C[3:0] is In_file_length
2417                  *
2418 F4D36 23          P=     3          Set up for C=B WP below
2419                  *
2420                  * NOTE: if in_file(start+length)>#FFFF, this will be incorrect!
2421                  *
2422 F4D38 C2           C=C+A  A          C[3:0] is in_file(start + length)
2423 F4D3A 7D5D         GOSUB  Cslc4         Shift to C[7:4]
2424 F4D3E A99         C=B    WP
2425 F4D41 27          P=     7
2426 F4D43 A95         B=C    WP          Copy to B[7:4]!
2427                  *
2428                  * Now set PTRD <= PTRC + 1
2429                  * (PTRC is in C[3:0] NOW!)
2430                  *
2431 F4D46 796D         GOSUB  NXTENT         Increment to next entry
2432 F4D4A 7E3D         GOSUB  Csrc4         Now C[3:0] is PTRC+1...
2433 F4D4E 2B          P=    11         ...move to C[15:11]...
2434 F4D50 A99         C=B    WP
2435 F4D53 AF5         B=C    W          ...and copy to PTRD!
2436                  *
2437                  * Fall through to...
2438                  *
2439                  * 4: Code to loop back for next entry
2440                  *
2441 F4D56             NEWF40
2442                  *
2443                  * Increment PTRC, loop back if not record carry...else check
2444                  * for end-of-directory, decrement record count
2445                  *
2446 F4D56 775D         GOSUB  NXTEN+        C=PTRC, Increment to next entry
2447 F4D5A D5          B=C    A          Store back in PTRC
2448 F4D5C 460         GOC    NEWF45        Wrap!...Decrement record count
2449 F4D5F 6ADD NEWF1. GOTO  NEWF10        Loop back for next entry
2450                  *
2451                  *
2452                  *
2453                  * Check for physical end of directory
2454                  *
2455 F4D63 AFB NEWF45  C=D    W
2456 F4D66 7F1D         GOSUB  Csrc5         Get Dlen1 into C[3:0]
2457                  *
2458                  * By the definition of Dlen1, this can't borrow (I check zero
2459                  * every time I decrement and original value is > 0)
2460                  *

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2461 F4D6A CE          C=C-1  A          Decrement C[3:0] (Can't borrow)
2462 F4D6C 23          P=      3          Check C[3:0]
2463 F4D6E 91A        ?C=0   WP          Done?
2464 F4D71 C0          GOYES  NEWF48       Yes...Physical end of directory
2465 F4D73 712D        GOSUB  Cslc5
2466 F4D77 AF7        D=C     W          Store back into Dlenl
2467 F4D7A 54E        GONC   NEWF1.      Go always
2468                  *_-
2469                  *_-
2470 F4D7D 2D          NEWF48 P=      13          Point to PhEOD...
2471 F4D7F B07        D=D+1  P          ...and set it true
2472                  *
2473                  * 5: Reached end of file...process it now
2474                  *
2475 F4D82             NEWF50
2476                  *
2477                  * First check if have a space for the new file
2478                  *
2479 F4D82 94B          ?D=0   S          NEW=0?
2480 F4D85 D0          GOYES  NEWF60       Yes...no room yet
2481                  *
2482                  * Have room for it...process it here
2483                  *
2484 F4D87 72E0        NEWF55 GOSUB  NEWF80       Purge old, create new file entry
2485 F4D88 400          RTNC
2486 F4D8E 6790        GOTO   NEWF70       Error during write
2487                  *_-
2488                  *_-
2489                  *
2490                  * 6: End of directory, no space found for file yet
2491                  *
2492 F4D92             NEWF60
2493                  *
2494                  * If (PFC=0 AND physical End_of_directory) THEN Error!
2495                  *
2496                  * Check PFC=0 first
2497                  *
2498 F4D92 2E          P=      14
2499 F4D94 90F          ?D#0   P
2500 F4D97 A1          GOYES  NEWF62       Need to check if room on medium
2501                  *
2502                  * Now check Physical End_of_directory
2503                  *
2504 F4D99 2D          P=      13          Point to PhEOD...
2505 F4D9B 90B          ?D=0   P          ...check if reached PhEOD
2506 F4D9E 31          GOYES  NEWF62       Not physical end_of_directory
2507 F4DA0 20          P=      0          Is physical end_of_directory...
2508 F4DA2 300          LC(1)  =eDIRFL      Directory is full!
2509 F4DA5 20          NEWFeT P=      =eTAPE      (Medium error)
2510 F4DA7 02          RTNSC
2511                  *_-
2512                  *_-
2513 F4DA9 20          NEWF61 P=      0
2514 F4DAB 300          LC(1)  =eEOTAP      End of medium
2515 F4DAE 46F          GOC    NEWFeT      Go always

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```
2516      *  
2517      *  
2518      *  
2519      * Not physical end_of_directory...check if room for file @ end  
2520      *  
2521 F4DB1  NEWF62  
2522      *  
2523      * PTRD points to the directory entry to be used...if room!  
2524      *  
2525      * First check if room at end of medium for this file.  
2526      *  
2527      * IF ((Tendr - PTRF) >= NSize) THEN room at end  
2528      *  
2529      * Get Tendr first...  
2530      *  
2531 F4DB1  AFB          C=D    W  
2532 F4DB4  8E00        GOSUBL =CSRC9      Shift into C[3:0]  
          00  
2533      *  
2534      * Now check if the file will fit here  
2535      *  
2536 F4DBA  7C3F        GOSUB  CHKSIZ      Check if room for file  
2537 F4DBE  4AE         GOC    NEWF61      No...End of medium error  
2538      *  
2539      * Room for the file...write it here!  
2540      *  
2541 F4DC1  78A0        GOSUB  NEWF80      Purge old, create new dir entry  
2542 F4DC5  400        RTNC          Error during write  
2543      *  
2544      * Check if room for the end_of_directory mark here  
2545      *  
2546      * If got here by logical end_of_directory and PTRC is at the  
2547      * last directory entry before physical EOD, then set PhEOD for  
2548      * the following test!  
2549      *  
2550 F4DC8  75EC        GOSUB  NXTEN+     Increment to next entry  
2551 F4DCC  562        GONC   NEWF67     Not new record...continue on  
2552      *  
2553      * New record...check if this was the LAST one  
2554      *  
2555 F4DCF  AFB          C=D    W  
2556 F4DD2  73BC        GOSUB  Csrc5      Get Dlen1 into C[3:0]  
2557 F4DD6  CE          C=C-1  R          Can't carry by its definition  
2558 F4DD8  23          P=      3  
2559 F4DDA  91A        ?C=0   WP          Physical end of directory?  
2560 F4DDD  90          GOYES  NEWF66     Yes...no more records in directory  
2561      *  
2562      * If physical end_of_directory is false, then there IS room  
2563      * for the end_of_directory mark. If physical, then check if  
2564      * PFC>1...if so, room for end_of_directory mark.  
2565      *  
2566      * Check first for physical end_of_directory  
2567      *  
2568 F4DDF  2D          P=      13  
2569 F4DE1  90B        ?D=0   P          Is this physical EOD?
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2570 F4DE4 F0          GOYES  NEWF67          No...OK to write EOD mark
2571 F4DE6          NEWF66
2572          *
2573          * Have reached physical end of directory...check if any purged
2574          * directory entries available to write the logical EOD mark
2575          *
2576 F4DE6 2E          P=      14          Check # of purged files
2577 F4DE8 A0F        D=D-1  P          (Decrement PFC)
2578 F4DEB 4A3        GOC    NEWF70          If PFC was zero, no room for EOD
2579 F4DEE 90B        ?D=0   P          More than one purged entry?
2580 F4DF1 53          GOYES  NEWF70          No...no room for EOD mark
2581          *
2582          * Write the end_of_directory mark
2583          *
2584 F4DF3 AF9  NEWF67  C=B      W          Get PTRD into C[15:12]...
2585 F4DF6 71AC       GOSUB  Csrc12        ...Move to C[3:0]...
2586 F4DFA 75BC       GOSUB  NXTENT        ...increment to next entry!
2587 F4DFE DA         A=C      A          Copy the pointer to A[3:0]
2588 F4E00 788C       GOSUB  Cslc12        ...move back to C[15:12]...
2589 F4E04 AF5        B=C      W          ..and copy back to B (Rest is OK)
2590 F4E07 814        ASRC                    Entry # in A[S], record in A[X]
2591 F4E0A ADO        A=O      M          (Clear unused nibbles)
2592 F4E0D 793C       GOSUB  Seeka         Go to that record
2593 F4E11 400        RTNC                    Error during seek
2594 F4E14 756C       GOSUB  Mtyl          I send data to the medium
2595 F4E18 400        RTNC                    Error
2596          *
2597          * Write "FFF"s to SCRATCH (For the end_of_directory mark)
2598          *
2599 F4E1B 73FB        GOSUB  F->SCR        Write 64 nibs of "F" to SCRATCH
2600 F4E1F 77F1        GOSUB  NEWF90        Read the record, update, write
2601 F4E23 400        RTNC                    If carry, error writing EOD
2602          *
2603          * 7: Copy the data to the medium
2604          *
2605 F4E26 7532  NEWF70  GOSUB  NEWF.0        Copy the data to the medium
2606 F4E2A 400        RTNC
2607          *
2608          * Fall into clean-up code...(rewind device, etc)
2609          *
2610 F4E2D 20          P=      0
2611 F4E2F AF9        C=B      W
2612 F4E32 10B        R3=C                    Put B[W] into R3!
2613          *
2614          * Now delete the FIB buffer marked by PURFIB (if any)
2615          *
2616 F4E35 DB          C=D      A
2617 F4E37 10A        R2=C                    Save D[A] in R2
2618 F4E3A 8F00       GOSBVL =PUGFIB        Delete first FIB marked as purged
2619          000
2619 F4E41 7000       GOSUB  =Getmbx        Get D0 back to the mailbox
2620 F4E45 11A        C=R2
2621 F4E48 D7         D=C      A
2622 F4E4A 11B        C=R3                    Check if LOOP
2623          *

```

```

2624 F4E4D 97A      ?C=0  W      LOOP?
2625 F4E50 80      GOYES NEWF75  Yes...don't rewind!
2626 F4E52 8CA1    GOLONG ENDTAP Carry = result
      7F

2627      *-
2628      *-
2629 F4E58 96F NEWF75 ?D#0  B      Is this "LOOP"?
2630 F4E5B C0      GOYES Utlend No...clean up
2631 F4E5D 3100    LC(2) =mENDM Yes...set ETO
2632 F4E61 8C00    GOLONG =PUTC+
      00

2633      *-
2634      *-
2635 F4E67 8C00 =Utlend GOLONG =UTLEND  Unt, Unl, END
      00

2636      *-
2637      *-
2638      *
2639      * 8: Subroutine to write the new directory entry to the medium
2640      *
2641 F4E6D      NEWF80
2642      *
2643      * First check if found the old file (If found and writing
2644      * somewhere else, purge this first)
2645      *
2646      * IF (PTRL#0 AND PTRL#PTRD) THEN PTRL_file_type <= 0
2647      *
2648      * First check PTRL#0
2649      *
2650 F4E6D AF4      A=B  W      Get PTRL into A[11:8]...
2651 F4E70 8E00    GOSUBL =ASRC8 ...move to A[3:0]...
      00

2652 F4E76 23      P= 3
2653 F4E78 91C    ?A#0  WP      ...and check if non-zero
2654 F4E7B 60      GOYES NEWF8! Non-zero...check PTRL#PTRD
2655 F4E7D 6E60 NEWF8.  GOTO  NEWF82 Zero...continue
2656      *-
2657      *-
2658      *
2659      * Now check PTRL#PTRD...Use A to fetch PTRD
2660      *
2661 F4E81 AF9 NEWF8!  C=B  W      Get PTRD into C[15:12]...
2662 F4E84 731C    GOSUB Csrc12 ...shift into C[3:0]...
2663 F4E88 912    ?A=C  WP      ...and check for equality
2664 F4E8B 2F      GOYES NEWF8.  EQUAL...skip purge
2665      *
2666      * Need to purge the file here (PTRL is in A[3:0])
2667      *
2668      * If this purge were to be done when it is FOUND, there will
2669      * be less medium wear, but the file would be purged even if an
2670      * error occurs while trying to create the new file
2671      *
2672 F4E8D 814      ASRC      Shift PTRL - get record # in A[X]
2673      *
2674      * Now A[X] is the record #, A[S] is the directory entry #

```

```

2675          *
2676 F4E90 A80          A=0    P          (P is still 3 from above stmts)
2677 F4E93 73BB        GOSUB  Seeka      Go to that record
2678 F4E97 400         RTNC          Error
2679 F4E9A 7FDB        GOSUB  Mtyl       Send DDL to the drive
2680 F4E9E 400         RTNC
2681          *
2682          * Read the record into buffer zero of the drive
2683          *
2684 F4EA1 8E00        GOSUBL =DdlPwr     Send partial write mode, MTYL
                00
2685 F4EA7 400         RTNC          Error
2686          *
2687          * Set the drive mode back to WRITE mode (NOT partial write)
2688          *
2689 F4EAA 778B        GOSUB  DdlWrt     Write mode (Sets Byte pointer=0)
2690 F4EAE 400         RTNC
2691          *
2692          * Now buffer 0 contains the record...modify the file type
2693          * at PTRL (set to zero) and write the record out to the medium
2694          *
2695 F4EB1 20           P=      =SetBP     Set byte pointer
2696 F4EB3 708B        GOSUB  Ddl
2697 F4EB7 400         RTNC
2698 F4EBA 810         ASLC          Move entry # to A[0]
2699 F4EBD F0          ASL    A        Shift into the B field (*16)
2700 F4EBF C4          A=A+A    A        Double it (*32)
2701 F4EC1 31A0        LC(2)  10       Byte # within entry of file type
2702 F4EC5 A62         C=C+A    B        Now C[B] points to the file type
2703 F4EC8 75AB        GOSUB  Putd     Send it!
2704 F4ECC 400         RTNC
2705          *
2706 F4ECF 746B        P=      =Write0    (Write0 is 0, P is already 0)
2707 F4ED3 400         GOSUB  Ddl     Set WRITE mode
2708          RTNC
2709 F4ED6 D2          C=0    A        Clear C[B]
2710 F4ED8 759B        GOSUB  Putd     Send first byte of type (PURGED)
2711 F4EDC 400         RTNC
2712 F4EDF 3300        LC(4)  =mENDf    Send last byte as an END frame
                00
2713 F4EE5 7F6B        GOSUB  Putc
2714 F4EE9 400         RTNC
2715 F4EEC          NEWF82
2716          *
2717          * Now ready to write the new entry (Create it in SCRTCH first)
2718          *
2718 F4EEC 7C3B        GOSUB  D1=SCR     Name...
2719 F4EF0 110         A=RO          (First 8 chars)
2720 F4EF3 1517        DAT1=A W      (Write first 8 chars)
2721 F4EF7 17F        D1=D1+ 16
2722          *
2723          * At this point, save the contents of R1 @=(=SCRTCH)+#10, B[W]
2724          * @=(=SCRTCH)+#20, DO @=(=SCRTCH)+#30, and D[A,15:13] @=(=SCRTCH)
2725          * +#35 so that I can call YMDHMS, which uses DO,D1,A-D,RO,R1
2726          *
2727 F4EFA 119         C=R1

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```

2728 F4EFD 1557      DAT1=C W           Save R1 @ (=SCRATCH)+#10
2729 F4F01 17F      D1=D1+ 16
2730 F4F04 AF9      C=B W
2731 F4F07 1557      DAT1=C W           Save B @ (=SCRATCH)+#20
2732 F4F0B 17F      D1=D1+ 16
2733 F4F0E 136      CDOEX
2734 F4F11 145      DAT1=C A           Save D0 @ (=SCRATCH)+#30
2735 F4F14 174      D1=D1+ 5
2736 F4F17 AFB      C=D W
2737 F4F1A 708B     GOSUB Cslc3
2738 F4F1E 15D7     DAT1=C 8           Save D[A,15:13] @ (=SCRATCH)+#35
2739 *
2740 * Now I am ready to call YMDHMS
2741 *
2742 F4F22 748B     GOSUB Ymdhms       Returns with info in C[11:0]
2743 *
2744 * Registers A,B,D,D0,D1,R0,R1 are NOT defined now!
2745 *
2746 * Restore registers and write out the info
2747 *
2748 F4F26 AF7      D=C W             Save time in D[W] for now
2749 F4F29 11C      C=R4
2750 F4F2C 7B6B     GOSUB Csrc12       Get last 2 chars in C[3:0]
2751 F4F30 1F00     D1=(5) (=SCRATCH)+16 Point to filename
                000
2752 F4F37 1537     A=DAT1 W          Read in R1 from =SCRATCH+#10
2753 F4F3B 101      R1=A              Restore it
2754 F4F3E 15D3     DAT1=C 4          Write out last two chars of name
2755 F4F42 173      D1=D1+ 4
2756 F4F45 7B5B     GOSUB Asrc4
2757 F4F49 AF6      C=A W
2758 F4F4C 7BB1     GOSUB PT2BYT      Output file type
2759 F4F50 AF2      C=0 W
2760 F4F53 15D7     DAT1=C 8          Clear out start address field
2761 F4F57 177      D1=D1+ 8          Move to B[W] save area
2762 *
2763 * Set start address <== PTRF
2764 *
2765 F4F5A 1577     C=DAT1 W          PTRF is in C[7:4]...
2766 F4F5E AF5      B=C W             ...(restore B[W])...
2767 F4F61 8E00     GOSUBL =CSRC2     ...shift into C[5:2]...
                00
2768 F4F67 1C3      D1=D1- 4          ...position to START field...
2769 F4F6A 7D91     GOSUB PT2BYT     ...Put 2 bytes, D1=D1+ 4
2770 *
2771 * D1 now points @ (=SCRATCH)+ #20 (LENGTH field)
2772 *
2773 F4F6E AF2      C=0 W
2774 F4F71 15D3     DAT1=C 4          Clear first 2 bytes of LENGTH
2775 F4F75 173      D1=D1+ 4          Skip to second half!
2776 *
2777 * Set length field <== (NSize + 255) DIV 256
2778 *
2779 F4F78 119      C=R1              NSize is in C[5:0]!
2780 F4F7B 96A      ?C=0 B           Is this an even # of records?

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2781 F4F7E 61          GOYES NEWF8,      Yes...continue
2782 F4F80 B26        C=C+1 XS         No...add 1 to it!
2783 F4F83 550        GONC  NEWF83     If carry, propagate into C[M]
2784 F4F86 B56        C=C+1 M
2785 F4F89 97D NEWF83 ?B#0 W         Loop?
2786 F4F8C 80         GOYES NEWF8,     No...continue
2787 F4F8E AE2        C=0 B           Yes...
2788 F4F91 109        R1=C           ...set length=# recs * 256
2789 F4F94          NEWF8,
2790                *
2791                * Now C[5:2] is length in records
2792                *
2793 F4F94 7371        GOSUB PT2BYT     Put 2 bytes, increment D1 by 4
2794                *
2795                * D1 is now @ (=SCRCH)+ #28 (time of creation field)
2796                *
2797 F4F98 177        D1=D1+ 8        Skip to saved D0
2798 F4F9B 147        C=DAT1 A
2799 F4F9E 147        C=DAT1 A        Read in D0...
2800 F4FA1 134        D0=C           ...restore it
2801 F4FA4 174        D1=D1+ 5
2802 F4FA7 15F7       C=DAT1 8        Read in D stuff...
2803 F4FAB 70EA       GOSUB Csrc3     ...rotate to correct place...
2804 F4FAF AFF        CDEX W         ...and put in D[W], fetch time
2805 F4FB2 1CC NEWF84 D1=D1- 13      Back up to start of time field
2806                *
2807                * Output it in the proper order!
2808                *
2809 F4FB5 2A          P= 16-6        Increment P until carry...6 times
2810 F4FB7 7ADA       GOSUB Cslc6     Move to C[B],C[15:6]
2811 F4FBB 14D NEWF85 DAT1=C B        Write this byte...
2812 F4FBE 171        D1=D1+ 2        ...move to next byte...
2813 F4FC1 8E00       GOSUBL =CSLC2   ...shift in next byte...
                00
2814 F4FC7 0C        P=P+1          ...increment count...
2815 F4FC9 51F       GONC  NEWF85     ...if no carry, continue!
2816                *
2817                * Now output volume number, END flag
2818                *
2819 F4FCC 22          P= 2
2820 F4FCE 3310       LCHEX 8001      Volume 1, END
                08
2821 F4FD4 7331       GOSUB PT2BYT     Put 2 bytes from C[5:2]
2822                *
2823                * D1 is now at the implementation bytes
2824                *
2825 F4FD8 11A        C=R2           Get NImpl from R2[7:0]
2826 F4FDB 15D7       DAT1=C 8        Write them out!
2827 F4FDF 97D        ?B#0 W         LOOP or non-MS device?
2828 F4FE2 01         GOYES NEWF87     No...continue
2829 F4FE4 96B        ?D=0 B         LOOP?
2830 F4FE7 66         GOYES NEWF97     Yes...skip addressing!
2831                *
2832                * Non-mass storage...address me as talker, device as Listener
2833                *

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2834 F4FE9 709A      GOSUB Mtyl      Controller...address me as talker
2835 F4FED 5F5      GONC NEWF97    Go if no error
2836 F4FF0 02      RTNSC          Return with error
2837                *
2838                *
2839                *
2840                * Now entry is created in SCRTCH...write it to the medium
2841                *
2842 F4FF2 1F00 NEWF87 D1=(5) (=SCRTCH)+36
                000
2843 F4FF9 75F0      GOSUB GT2BY0    Read 2 bytes (size in records)
2844 F4FFD 10A      R2=C           Save size of file in R2[A]
2845                *
2846 F5000 AF9       C=B           W           Copy PTRD into C[15:12]...
2847 F5003 D2       C=0          A           ...clear nibbles "above" PTRD...
2848 F5005 759A     GOSUB Csrc13   ...shift into C[2:0], C[S]...
2849 F5009 AFA     =PUTDRW A=C     W           ...save all in A[W]...
2850 F500C 7A3A     GOSUB Seeka   ...goto the correct record
2851 F5010 400      RTNC
2852 F5013 766A     GOSUB Mtyl     Make me talker, drive as listener
2853 F5017 400      RTNC
2854 F501A          NEWF90
2855 F501A 8E00     GOSUBL =DdlPwr Partial write mode, check status
                00
2856 F5020 400      RTNC
2857                *
2858                * Set back to write mode before sending data to drive
2859                *
2860 F5023 7E0A     GOSUB DdlWrt   Write mode
2861 F5027 400      RTNC
2862                *
2863                * Set byte pointer to current position
2864                *
2865 F502A 20       P=           =SetBP
2866 F502C 770A     GOSUB Ddl     Set byte pointer
2867 F5030 400      RTNC
2868 F5033 810     ASLC         Get entry number back to A[0]
2869 F5036 AE6     C=A         B
2870 F5039 F2      CSL         A           C[B] is now entry number * 16...
2871 F503B C6      C=C+C      A           ...* 32...
2872 F503D 703A     GOSUB Putd    ...Send to the drive
2873 F5041 400      RTNC
2874                *
2875                * Set back to WRITE mode
2876                *
2877 F5044          =PUTDIR
2878                *
2879                * Entry to write a directory entry from SCRTCH
2880                *
2881 F5044 20       P=           =Write0    Write mode (resume)
2882 F5046 7DE9     =PUTDR" GOSUB Ddl
2883 F504A 400      RTNC
2884                *
2885                * Now send the entry to the drive
2886                *

```

```

2887 F504D      NEWF97
2888 F504D 7BD9      GOSUB  D1=SCR      Point to the entry...
2889 F5051 D2        C=0    A
2890 F5053 20        P=     0          P could be non-zero from jump in
2891 F5055 31F1      LC(2)  31          Send all but the last byte.
2892 F5059 DA        A=C    A
2893 F505B 6160      GOTO   NEWF.3     (WRITIT,ENDf, check drive status)
2894           * _
2895           * _
2896 F505F 119      NEWF.0 C=R1          Get NData into C[14:10]
2897 F5062 25        P=     5
2898 F5064 91E      ?C#0  WP          Is the file size zero?
2899 F5067 40        GOYES  NEWF.1     No...seek to the data area?
2900 F5069 03      NEWF.c RTNCC          Yes...don't seek to the data area
2901           * _
2902           * _
2903 F506B 762A     NEWF.1 GOSUB  Csrc10      Shift to C[4:0]
2904 F506F 8AE      ?C#0  A          Is NData zero? (no copy)
2905 F5072 F0        GOYES  NEWF.2     No...continue on
2906           *
2907           * NData is zero...no data address to copy (check if CREATE)
2908           *
2909 F5074 25        P=    15-10      Point at R1[S]
2910 F5076 90A      ?C=0  P          Is this a COPY?
2911 F5079 0F        GOYES  NEWF.c     Yes...don't seek to the data area
2912 F507B B06      C=C+1 P          Is this a non-mass storage device?
2913 F507E 4AE      NEWF.C GOC    NEWF.c     Yes...don't seek!
2914 F5081 135     NEWF.2 D1=C          Set D1 <= start of data
2915 F5084 979      ?B=0  W          LOOP?
2916 F5087 02        GOYES  NEWF98     Yes...skip SEEK
2917 F5089 AF9      C=B    W
2918 F508C 7CF9     GOSUB  Csrc4      Get PTRF into C[3:0]...
2919 F5090 DA        A=C    A          ...Copy to A[3:0]...
2920 F5092 74B9     GOSUB  Seeka      ...and SEEK to that record
2921 F5096 400      RTNC
2922 F5099 70E9     GOSUB  Mtyl       I must be talker to do DDLs
2923 F509D 400      RTNC
2924 F50A0 7199     GOSUB  DdlWrt     Write mode...
2925 F50A4 400      RTNC
2926 F50A7 111     NEWF98 A=R1          Copy NSize to A[A]...
2927 F50AA CC        A=A-1  A          ...leave 1 byte to END...
2928 F50AC 948      ?A=0  S          Called by COPY?
2929 F50AF E0        GOYES  NEWF.3     If so, copy it
2930 F50B1 B44      A=A+1  S          LOOP?
2931 F50B4 480      GOC    NEWF.3     Yes...copy it
2932 F50B7 8C00     GOLONG =INITFL    Initialize file if CCode#0
                00
2933           * _
2934           * _
2935 F50BD 7D99     NEWF.3 GOSUB  Writit  Send (NSize) bytes to the device
2936 F50C1 400      RTNC
2937           *
2938           * Because the ENDf message is a SEND message, make sure I am
2939           * active talker first (otherwise will get Invalid Mode error)
2940           *

```

```

2941 F50C4 8E00 NEWF.. GOSUBL =GETST      Get status...(sets P=0)
      00
2942 F50CA 400      RTNC
2943 F50CD 0B      CSTEM
2944 F50CF 860      ?ST=0 =sTALKR      Talker active?
2945 F50D2 20      GOYES NEWF.,      (Set carry if not)
2946 F50D4 0B NEWF., CSTEM
2947 F50D6 4DE      GOC NEWF..      Not talker active...wait!
2948 F50D9 3300     LC(4) =mENDf      End frame
      00
2949 F50DF 14F      C=DAT1 B        Read value of last data byte
2950 F50E2 7279     GOSUB Putc      Send the last frame as an END
2951 F50E6 400      RTNC
2952 F50E9 979      ?B=0 W         LOOP?
2953 F50EC 29      GOYES NEWF.C   Yes...return, carry clear
2954 F50EE 6F59     GOTO Tstat     Check drive status! (carry=status)
2955 *****
2956 *****
2957 **
2958 ** Name:      GETBYT - Read bytes from RAM (most sig. first)
2959 **
2960 ** Category:  LOCAL
2961 **
2962 ** Purpose:
2963 **   Read "P" bytes from RAM into C from D1 (Bytes are high
2964 **   bytes first)
2965 **
2966 ** Entry:
2967 **   P= # of bytes to read - 1
2968 **   D1 points to first byte
2969 **
2970 ** Exit:
2971 **   P=0
2972 **   Carry clear
2973 **   C contains (P+1) bytes of data
2974 **   D1 points to the next byte (first one NOT used)
2975 **
2976 ** Calls:     None
2977 **
2978 ** Uses.....
2979 ** Inclusive: C[W],D1,P (Unused nibbles of C shifted left)
2980 **
2981 ** Stk lvls:  0
2982 **
2983 ** History:
2984 **
2985 **   Date      Programmer      Modification
2986 **   -----      -----      -----
2987 **   11/19/82      NZ          Added documentation
2988 **
2989 *****
2990 *****
2991 F50F2 D2      =GT2BY0 C=0   A        Clear C[A] first
2992 F50F4 21      =GT2BYT P=    1        Read 2 bytes
2993 F50F6 BF2     =GETBYT CSL   W        Preshift C over one byte

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```

2994 F50F9 BF2      CSL      W
2995 F50FC 14F      C=DAT1 B
2996 F50FF 171      D1=D1+ 2
2997 F5102 0D      P=P-1          Is this the end?
2998 F5104 51F      GONC  GETBYT   No...get another
2999 F5107 20      P=      0       Set P=0
3000 F5109 03      RTNCC
3001 *****
3002 *****
3003 **
3004 ** Name:      PT2BYT - Write 2 bytes, high byte first, to RAM
3005 **
3006 ** Category:  LOCAL
3007 **
3008 ** Purpose:
3009 **      Output 2 bytes at D1 from C[5:2] (C[5:4] first, then
3010 **      C[3:2])
3011 **
3012 ** Entry:
3013 **      C[5:2] contains the two bytes
3014 **      D1 points to destination RAM
3015 **
3016 ** Exit:
3017 **      D1 points to first byte following the written data
3018 **      Carry clear
3019 **
3020 ** Calls:      CSRC4
3021 **
3022 ** Uses.....
3023 ** Exclusive:  D1
3024 ** Inclusive: C[W],D1 (C[W] is shifted right circular 4 nibs)
3025 **
3026 ** Stk lvls:  1 (CSRC4)
3027 **
3028 ** History:
3029 **
3030 **      Date      Programmer      Modification
3031 **      -----      -
3032 **      11/19/82      NZ          Added documentation
3033 **
3034 *****
3035 *****
3036 F510B 15D3 =PT2BYT DAT1=C 4      Write the low byte first...
3037 F510F 7979      GOSUB  Csrc4      ...get the high byte into C[B]...
3038 F5113 14D      DAT1=C  B         ...write the high byte
3039 F5116 173      D1=D1+ 4         Increment D1 past data...
3040 F5119 03      RTNCC            ...and return with carry clear
3041 F511B      END

```


=F->SCR	Abs	1002002	#F4A12	-	1623	660	2599						
=FINDF+	Abs	1001275	#F473B	-	1098								
FINDF0	Abs	1001425	#F47D1	-	1170	1219							
FINDF1	Abs	1001477	#F4805	-	1197	1183	1189						
FINDF2	Abs	1001510	#F4826	-	1218	1203							
FINDF3	Abs	1001546	#F484A	-	1243	1195							
FINDF4	Abs	1001549	#F484D	-	1247	1142							
=FINDFL	Abs	1001268	#F4734	-	1094								
FINDFe	Abs	1001576	#F4868	-	1261	1249	1255						
FINDF1	Abs	1001395	#F47B3	-	1153	1105							
FINDFn	Abs	1001519	#F482F	-	1224	1180	1212						
=FINDFx	Abs	1001415	#F47C7	-	1164	1108							
FINDf+	Abs	1001278	#F473E	-	1099	1095							
FINDfn	Abs	1001385	#F47A9	-	1145	1135	1140						
FIND12	Abs	1001327	#F476F	-	1121	1158							
FIND14	Abs	1001378	#F47A2	-	1141	1133	1145						
FIND1e	Abs	1001391	#F47AF	-	1149	1154							
FIXSPC	Ext			-	597								
FORM10	Abs	1000257	#F4341	-	312	302							
FORM20	Abs	1000280	#F4358	-	328	326							
FORM30	Abs	1000332	#F438C	-	365	350							
FORM50	Abs	1000353	#F43A1	-	380	358							
FORM60	Abs	1000367	#F43AF	-	391	381							
FORM65	Abs	1000390	#F43C6	-	412	403							
FORM70	Abs	1000394	#F43CA	-	416	408							
=FORMAT	Abs	1000230	#F4326	-	301	307							
Format	Ext			-	429								
GDIRS1	Abs	1001746	#F4912	-	1424								
GDIRS3	Abs	1001780	#F4934	-	1441	1429							
GDIRS4	Abs	1001832	#F4968	-	1478	1470							
GDIRS7	Abs	1001883	#F499B	-	1517	1486	1500						
GDIRS8	Abs	1001890	#F49A2	-	1520	1475							
GDIRS9	Abs	1001892	#F49A4	-	1521	1516							
GDIRSE	Abs	1001765	#F4925	-	1430	1453							
GDIRSM	Abs	1001965	#F49ED	-	1564	1499	1509						
=GDIRST	Abs	1001688	#F48D8	-	1404	1322	2069						
GDIRSe	Abs	1001775	#F492F	-	1436	1423							
GDIRSh	Abs	1001980	#F49FC	-	1574	1577							
GDIRsE	Abs	1001767	#F4927	-	1431	1438							
GDIRsM	Abs	1001993	#F4A09	-	1584	1575							
GETALR	Ext			-	1416	1427	1455						
=GETBYT	Abs	1003766	#F50F6	-	2993	2998							
GETD	Ext			-	1237								
=GETDIR	Abs	1001653	#F48B5	-	1349	1218	1332						
=GETDR'	Abs	1001580	#F486C	-	1322	1165							
=GETDR''	Abs	1001587	#F4873	-	1324								
=GETDR#	Abs	1001589	#F4875	-	1325								
=GETDR+	Abs	1001614	#F488E	-	1333								
GETDev	Ext			-	968	1002							
GETST	Ext			-	2941								
GETZER	Ext			-	1234								
=GT2BYO	Abs	1003762	#F50F2	-	2991	2204	2843						
=GT2BYT	Abs	1003764	#F50F4	-	2992	2231	2257	2272	2363	2411	2414		
GTYP	Ext			-	169								
Getd	Abs	1001534	#F483E	-	1237	56	349	373	565				

Getnbx	Ext	-	2309	2619							
Getzer	Abs	1001528 #F4838	-	1234	1248	1254	1485	1564			
INIT05	Abs	1000493 #F442D	-	467	465						
INIT10	Abs	1000697 #F44F9	-	604	566						
INIT20	Abs	1000706 #F4502	-	609	587						
INITFL	Ext		-	2932							
=INITIL	Abs	1000438 #F43F6	-	442							
ImpByt	Ext		-	557							
LSTEN1	Abs	1002197 #F4AD5	-	1750	1741	1742	1749				
=LSTENT	Abs	1002185 #F4AC9	-	1745							
LoopOK	Ext		-	1660							
MOVEF,	Abs	1001114 #F469A	-	982	974						
MOVEF1	Abs	1000978 #F4612	-	907	1035						
MOVEF2	Abs	1001031 #F4647	-	934	930						
MOVEF3	Abs	1001040 #F4650	-	938	935						
MOVEF4	Abs	1001127 #F46A7	-	986	976						
MOVEF5	Abs	1001207 #F46F7	-	1015	1005						
MOVEF6	Abs	1001228 #F470C	-	1021	1003	1018					
=MOVEFL	Abs	1000966 #F4606	-	898							
MOVED1	Abs	1001130 #F46AA	-	987	969						
MTYL	Ext		-	1674							
MaxRec	Ext		-	334							
Mtyl	Abs	1002109 #F4A7D	-	1674	107	427	445	613	708	828	1015
				1333	2594	2679	2834	2852	2922		
NEWF++	Abs	1002225 #F4AF1	-	2059	2053						
NEWF.,	Abs	1003732 #F50D4	-	2946	2945						
NEWF..	Abs	1003716 #F50C4	-	2941	2947						
NEWF.0	Abs	1003615 #F505F	-	2896	2605						
NEWF.1	Abs	1003627 #F506B	-	2903	2899						
NEWF.2	Abs	1003649 #F5081	-	2914	2905						
NEWF.3	Abs	1003709 #F50BD	-	2935	2893	2929	2931				
NEWF.C	Abs	1003646 #F507E	-	2913	2953						
NEWF.c	Abs	1003625 #F5069	-	2900	2911	2913					
NEWFO1	Abs	1002250 #F4B0A	-	2069	2064	2115					
NEWFO3	Abs	1002271 #F4B1F	-	2113	2112						
NEWFO5	Abs	1002281 #F4B29	-	2121	2104						
NEWF1.	Abs	1002847 #F4D5F	-	2449	2467						
NEWF10	Abs	1002298 #F4B3A	-	2129	2449						
NEWF11	Abs	1002331 #F4B5B	-	2138	2150						
NEWF12	Abs	1002335 #F4B5F	-	2141	2137						
NEWF13	Abs	1002365 #F4B7D	-	2159	2142	2146					
NEWF14	Abs	1002396 #F4B9C	-	2176	2175						
NEWF15	Abs	1002683 #F4CBB	-	2325	2263						
NEWF1a	Abs	1002417 #F4BB1	-	2191	2184						
NEWF1b	Abs	1002552 #F4C38	-	2271	2262						
NEWF1c	Abs	1002470 #F4BE6	-	2225	2207	2212					
NEWF1d	Abs	1002466 #F4BE2	-	2218	2194						
NEWF2.	Abs	1002357 #F4B75	-	2153	2165						
NEWF20	Abs	1002701 #F4CCD	-	2338	2153						
NEWF25	Abs	1002703 #F4CCF	-	2339	2340						
NEWF3.	Abs	1002361 #F4B79	-	2156	2177	2185					
NEWF30	Abs	1002713 #F4CD9	-	2349	2156						
NEWF34	Abs	1002784 #F4D20	-	2401	2358	2368					
NEWF4.	Abs	1002709 #F4CD5	-	2341	2350						
NEWF40	Abs	1002838 #F4D56	-	2441	2341	2373					

NEWF45	Abs	1002851	#F4D63	-	2455	2448														
NEWF48	Abs	1002877	#F4D7D	-	2470	2464														
NEWF50	Abs	1002882	#F4D82	-	2475	2138														
NEWF55	Abs	1002887	#F4D87	-	2484	2066														
NEWF60	Abs	1002898	#F4D92	-	2492	2480														
NEWF61	Abs	1002921	#F4DA9	-	2513	2537														
NEWF62	Abs	1002929	#F4DB1	-	2521	2500	2506													
NEWF66	Abs	1002982	#F4DE6	-	2571	2560														
NEWF67	Abs	1002995	#F4DF3	-	2584	2551	2570													
NEWF70	Abs	1003046	#F4E26	-	2605	2319	2486	2578	2580											
NEWF75	Abs	1003096	#F4E58	-	2629	2625														
NEWF81	Abs	1003137	#F4E81	-	2661	2654														
NEWF81	Abs	1003412	#F4F94	-	2789	2781	2786													
NEWF81	Abs	1003133	#F4E7D	-	2655	2664														
NEWF80	Abs	1003117	#F4E6D	-	2641	2484	2541													
NEWF82	Abs	1003244	#F4EEC	-	2714	2655														
NEWF83	Abs	1003401	#F4F89	-	2785	2783														
NEWF84	Abs	1003442	#F4F82	-	2805	2317														
NEWF85	Abs	1003451	#F4F8B	-	2811	2815														
NEWF87	Abs	1003506	#F4FF2	-	2842	2828														
NEWF90	Abs	1003546	#F501A	-	2854	2600														
NEWF97	Abs	1003597	#F504D	-	2887	2830	2835													
NEWF98	Abs	1003687	#F50A7	-	2926	2916														
=NEWFI+	Abs	1002206	#F4ADE	-	2045															
=NEWFIL	Abs	1002234	#F4AFA	-	2062	2058														
NEWFeT	Abs	1002917	#F4DA5	-	2509	2515														
=NXTEN+	Abs	1002161	#F4AB1	-	1733	1201	2446	2550												
=NXTENT	Abs	1002163	#F4AB3	-	1734	2431	2586													
PRMSG	Ext			-	479															
=PT2BYT	Abs	1003787	#F510B	-	3036	2291	2758	2769	2793	2821										
PUGFIB	Ext			-	2618															
PURFIB	Ext			-	2239															
PUTALR	Ext			-	647															
PUTC	Ext			-	1657															
PUTC+	Ext			-	2632															
PUTD	Ext			-	1668															
=PUTDIR	Abs	1003588	#F5044	-	2877	661														
=PUTDR"	Abs	1003590	#F5046	-	2882															
=PUTDR#	Abs	1003529	#F5009	-	2849															
PUTDX	Ext			-	1671															
PUTE	Ext			-	54	347	563													
Putc	Abs	1002072	#F4A58	-	1657	2712	2950													
Putd	Abs	1002097	#F4A71	-	1668	115	118	489	513	1342	2703	2709								
				-	2872															
Putdx	Abs	1002103	#F4A77	-	1671	452	486	500	537	542										
READI3	Ext			-	604															
=READR#	Abs	1000852	#F4594	-	761															
READSU	Ext			-	1665															
Read	Ext			-	1642															
Read1	Ext			-	769															
Readsc	Abs	1002087	#F4A67	-	1664	1352	1412	1479	2131											
Readsu	Abs	1002091	#F4A6B	-	1665	776	992	1122												
Rewind	Ext			-	713															
Rtncc	Abs	1000195	#F4303	-	174															
SCRCH	Ext			-	1128	1484	1634	2133	2198	2230	2252	2283								

Input Parameters

Source file name is NZ&CAS::MS

Listing file name is NZ/CAS:TI:ML::-1

Object file name is NZXCAS:TI:MS::-1

Initial flag settings are
111111
0123456789012345

Errors

None

Saturn Assembler News

```
1      *
2      *      N  N  ZZZZ  &      H  H  N  N  D  DD
3      *      N  N      Z  & &    H  H  N  N  D  D
4      *      NN N      Z  & &    H  H  NN N  D  D
5      *      N N N      Z  &      HHHHH N N N  D  D
6      *      N NN  Z      & & &  H  H  N  NN  D  D
7      *      N  N  Z      &  &    H  H  N  N  D  D
8      *      N  N  ZZZZ  && &    H  H  N  N  DDDD
9      *
10     *
11     *      TITLE  POLL HANDLERS <840106.0805>
12 F511B      ABS    #F511B          TIXHP6 address (fixed)
13           RDSYMB  TIXEQU
```

```
14          STITLE DATA FILE HANDLERS
15          *
16          *****
17          *****
18          **
19          ** Name:      hVER$ - Handler for the VER$ poll
20          **
21          ** Category:  POLL
22          **
23          ** Purpose:
24          **      Add HPIL info to the VER$ string
25          **
26          ** Entry:
27          **      P=0, R2[A] is AVMEMS, R3[A] is current end of VER$
28          **      string
29          **
30          ** Exit:
31          **      P=0, XM set, R3 updated to new location
32          **
33          ** Calls:     None
34          **
35          ** Uses.....
36          **      Inclusive: A[W],C[W],D1,R3[A]
37          **
38          ** Stk lvls:  0
39          **
40          ** History:
41          **
42          **      Date      Programmer      Modification
43          **      -----      -
44          **      10/20/83    NZ          Changed first instruction from
45          **                  CR3EX to C=R3 to fix bug with
46          **                  insufficient memory for my response
47          **                  destroying R3 pointer
48          **      03/30/83    NZ          Changed to just RTNSXM (carry=?)
49          **      11/22/82    NZ          Added code and documentation
50          **
51          *****
52          *****
53 F511B 11B =hVER$ C=R3          Get D1 pointer
54 F511E 135          D1=C          Put in D1
55 F5121 112          A=R2          Get AVMEME
56 F5124 1CF          D1=D1- 16     Subtract length I'm adding
57 F5127 137          CD1EX        Now check if there is room!
58 F512A 8B6          ?A>C A
59 F512D 42          GOYES hVER$1  No room...clear carry, exit
60 F512F 135          D1=C          Room...update D1, R3
61 F5132 10B          R3=C
62 F5135 3F02        LCASC \ HPIL: \ (Last 2 filled in by PILVER)
        02A3
        C494
        0584
        02
63 F5147 3300        LC(4) =PILVER
        00
```

```

64 F514D 1557          DAT1=C W          Write it out!
65 F5151             hVER$1
66 F5151 00          RTNSXM          Set XM (say not handled)
67 *****
68 *****
69 **
70 ** Name:          hFINDF - Find file handler (pFINDF poll)
71 **
72 ** Category:     POLL
73 **
74 ** Purpose:
75 **   Handle the POLL of (pFINDF), find a specified file
76 **   in the given mass memory device for HPIL devices
77 **
78 ** Entry:
79 **   R0: First 8 chars of file name
80 **   R1[3:0]: Last 2 chars of file name
81 **   D[A]: Device address as returned from FILSPx handler
82 **   D[S]: Device type from FILSPx
83 **
84 ** Exit:
85 **   Carry clear: (file found, no errors)
86 **   R0[3:0]: starting record number
87 **   R0[6:4]: device address
88 **   R0[10:7]: 0000
89 **   R0[14:11]: file type
90 **   R0[15]: 8 (HPIL)
91 **   R1[0]: entry # in the directory record (0-7)
92 **   R1[3:1]: record # of the directory entry
93 **   R1[5:4]: 00
94 **   R1[9:6]: length of file in sectors
95 **   Carry set:
96 **   Error (C[3:0] are the error number)
97 **
98 ** Calls:         CKBITL,START,FINDFx,CSLC5,DATSTR,ENDTAP,<ERROR>
99 **
100 ** Uses:
101 ** Exclusive:     C,          R0,R1,          P
102 ** Inclusive:     A,B,C,D[15:5],R0,R1,DO,D1,P,SCRATCH[63:0],ST[5:0]
103 **
104 ** Stk lvls:     6 (FINDFx)
105 **
106 ** History:
107 **
108 **   Date         Programmer          Modification
109 **   -----         -
110 **   10/14/83      NZ          Updated documentation
111 **   04/01/83      SC          Wrote routine
112 **
113 *****
114 *****
115 F5153 7D26 =hFINDF GOSUB CKBITL          Check if HPIL and mass memory
116 F5157 500          RTNNC          No...don't handle (XM set by CKBITL)
117 F515A 7DC2          GOSUB Start          Set up the loop, DO
118 F515E 4E2          GOC hFNFer          Error!
    
```

```
119 F5161 8E00      GOSUBL =FINDFx      Find the file on the device
      00
120 F5167 452      GOC      hFNFer      Error (either not found or loop err)
121      *
122      * If no carry, then C[3:0] is number of records, B[3:0] is the
123      * directory pointer for the file, A[3:0] is then starting record
124      * of the file on the device, and D1 points to the file type in
125      * the directory entry (which is in SCRTCH[63:0])
126      *
127 F516A 7143      GOSUB Cslc5        C[8:5]=number of records
128 F516E D2        C=0      A
129 F5170 BF2      CSL      W        C[9:6]=number of records
130 F5173 23        P=       3
131 F5175 A99      C=B      WP       C[3:0]=directory pointer for file
132 F5178 20        P=       0
133 F517A 109      R1=C          R1 is set up for exit conditions
134 F517D 7010     GOSUB DATSTR      Set up R0 exit conditions in C[W]
135 F5181 108      R0=C          Put into R0 for exit
136 F5184 8EE9     GOSUBL Endtap     Rewind device, unaddress all
      R0
137 F518A 500      RTNNC          If carry clear, done!
138 F518D 6250     hFNFer GOTO ERror Error...set up C[3:0], RTNSC
139      *****
140      *****
141      **
142      ** Name:      DATSTR, DATST+ - Set up data from FINDFx in C[W]
143      **
144      ** Category: LOCAL
145      **
146      ** Purpose:
147      **      Set up the data from FINDFx for single register return
148      **
149      ** Entry:
150      **      DATSTR:
151      **      P=0
152      **      D1 points to the file type in RAM (high byte first)
153      **      DATST+:
154      **      D[X]=device address
155      **      A[3:0]=file start address (record number)
156      **
157      ** Exit:
158      **      P=0
159      **      Carry clear
160      **      C[15]=8, C[14:11]=file type, C[6:4]=device address,
161      **      C[3:0]=file start record number
162      **
163      ** Calls:      GT2BYT,CSLC7,CSLC4
164      **
165      ** Uses.....
166      ** Exclusive: C[W], P
167      ** Inclusive: C[W],D1,P
168      **
169      ** Stk lvls:  1 (GT2BYT)(CSLC7)(CSLC4)
170      **
171      ** History:
```



```

172 **
173 **   Date      Programmer      Modification
174 **   -----      -----      -----
175 **   10/14/83      NZ          Added documentation
176 **
177 *****
178 *****
179 F5191 AF2  DATSTR C=0  W
180 F5194 308          LC(1) 8          Will end up in C[S] (HPIL device)
181 F5197 8E4C      GOSUBL Gt2byt      Read file type from SCRTCH
      RO
182 F519D 8E00      GOSUBL =CSLC7      C[11]=8, C[10:7]=file type
      OO
183 F51A3 ABB  DATST+ C=D  X          C[6:3]=0000, C[X]=device address
184 F51A6 7803      GOSUB  Cslc4
185 F51AA 23          P= 3
186 F51AC A96      C=A  WP          Copy file start addr from A[3:0]
187 F51AF 20          P= 0
188 F51B1 03          RTNCC
189 *****
190 *****
191 **
192 ** Name:          hCREAT - Handle POLL for pCREAT (HPIL device)
193 **
194 ** Category:     POLL
195 **
196 ** Purpose:
197 **   Creates a new file in a mass memory device
198 **
199 ** Entry:
200 **   D[X]=device address
201 **   D[S]=device type (if HPIL, 8)
202 **   STMTR0=first 8 chars of the file name
203 **   STMTR1[3:0]=last 2 chars of the file name
204 **   STMTR1[6:5]=offset to data (from file type table)
205 **   STMTR1[13:10]=file type
206 **   STMTR1[14]=create code
207 **
208 **   R2[A]=first parameter for CREATE:
209 **
210 **   Code  Format Implied  Meaning of this parameter
211 **   ----  -
212 **   0     Executable     Data length in nibbles
213 **   1     DATA (fixed length)  Number of records
214 **   2     SDATA (41C data)      Number of (8-byte) registers
215 **   4     TEXT (variable len)   File length in bytes
216 **   8     External type        File length in bytes
217 **
218 **   R3[A]=second parameter for CREATE:
219 **
220 **   Code  Format Implied  Meaning of this parameter
221 **   ----  -
222 **   1     DATA (fixed length)  Record length in bytes
223 **   (any) (not DATA)          (ignored)
224 **

```

```

225      ** Exit:
226      **      P=0
227      **      Carry clear:
228      **          File created on device, initialized if copy code#0
229      **          R3[7:4]=start of data area for file
230      **          R3[15:12]=directory entry pointer for the file
231      **      Carry set:
232      **          Error (C[3:0] is the error number)
233      **
234      ** Calls:      CKHPIL, START, CHKMAS, ASLC3, CSRC4, CSLC4, A-MULT,
235      **              CSLC6, NEWFIL
236      **
237      ** Uses:
238      ** Exclusive: A, C, R0-R4, D1,P,          ST[8]
239      ** Inclusive: A,B,C,D,R0-R4,D0,D1,P, SCRTCH[63:0], ST[8,4:0]
240      **
241      ** Stk lvls:  5 (NEWFIL) (File does not exist currently)
242      **
243      ** History:
244      **
245      **      Date      Programmer      Modification
246      **      -----      -
247      **      10/14/83      NZ          Updated documentation
248      **      04/01/83      SC          Wrote routine
249      **
250      ****
251      ****
252 F51B3      =hCREAT
253 F51B3 76D5      GOSUB CKHPIL      Check if device=8
254 F51B7 500      RTNNC          Not HPIL
255 F51BA 7D62      GOSUB Start      Set up mailbox, etc
256 F51BE 412      GOC Error       Error starting up
257 F51C1 96B      ?D=0 B         Is this LOOP or NULL?
258 F51C4 B0      GOYES CRTFO0     Yes...exit, don't handle
259 F51C6 8E00      GOSUBL =CHKMAS   Check acc ID
260          00
260 F51CC 560      GONC CRTFO1     Filbert...continue
261 F51CF 6DE2 CRTFO0 GOTO hCPYXM     Not Filbert...don't handle!
262          *_
263          *_
264 F51D3 AF0      CRTFO1 A=0 W
265 F51D6 11A      C=R2
266 F51D9 8AE      ?C#0 A         File size specified?
267 F51DC 80      GOYES CRTFO5     If so, continue
268 F51DE 20      P= =eRANGE     Error...file size not specified
269 F51E0 6344 ERror GOTO hCPYer     Jump to "GOTO Error"
270          *_
271          *_
272 F51E4 DA      CRTFO5 A=C A         A= First parm (# sectors/bytes)
273 F51E6 1F00      D1=(5) (=STMTR1)+5 Position to offset to data
274          000
274 F51ED D2      C=0 A
275 F51EF 14F      C=DAT1 B       C[A] = Offset to data
276 F51F2 137      CD1EX          Subtract 5 (length of length field)
277 F51F5 1C4      D1=D1- 5
    
```

```

278 F51F8 137          CD1EX
279 F51FB 178          D1=D1+ 9
280 F51FE 1574         C=DAT1 S           C[S] = Create code of the file
281                    *
282                    * Look at the create code and implementation field to compute
283                    * the total file length in bytes
284                    *
285 F5202 94E          ?C#O  S
286 F5205 01          GOYES CRTF10
287                    *
288                    * Mainframe executable file (Create code zero)
289                    *
290 F5207 CA          A=A+C  A           Length is requested + subheader
291                    *
292                    * Implementation field for create code zero is length in nibs
293                    *
294 F5209 102          R2=A           Implementation field in directory
295 F520C E4          A=A+1  A
296 F520E 81C          ASRB           Convert to bytes (round up)
297 F5211 6860 CRTF4. GOTO  CRTF40      Continue create (A[A] is # bytes)
298                    *
299                    *
300 F5215 A46 CRTF10  C=C+C  S
301 F5218 48F          GOC  CRTF4.      Create code 8...R2, R3 are set up
302 F521B A46          C=C+C  S
303 F521E 5B0          GONC  CRTF20      Not create code 4 (check further)
304                    *
305                    * Variable length record file (LIF1 type) (Create code 4)
306                    *
307 F5221 AF2          C=0    W
308 F5224 10A          R2=C           Implementation field in directory
309 F5227 425          GOC  CRTF40      Go always (A[A] is # bytes)
310                    *
311                    *
312 F522A A46 CRTF20  C=C+C  S
313 F522D 542          GONC  CRTF30      Not create code 2...must be 1
314                    *
315                    * HP41C data file
316                    *
317                    * The bytes of the implementation field in the directory are:
318                    *
319                    *   BYTE #      MEANING
320                    *   -----
321                    *   28          High order byte of size (in registers)
322                    *   29          Low order byte of size
323                    *   30          Protection field (0=unsecured, 1=secured)
324                    *   31          Unused
325                    *
326 F5230 AF2          C=0    W
327 F5233 AE6          C=A    B
328 F5236 F2          CSL   A
329 F5238 F2          CSL   A
330 F523A 814          ASRC
331 F523D 814          ASRC
332 F5240 AE6          C=A    B

```

```
333 F5243 10A          R2=C          Implementation field in directory
334 F5246 8E00        GOSUBL =ASLC3 A[A]=file length in nibbles
      00
335 F524C 81C          ASRB          A[A]=file length in bytes
336 F524F 4A2          GOC CRTF40    Go always
337          *_
338          *_
339          *
340          * FIXED LENGTH RECORD DATA FILE
341          *
342 F5252 AF6 CRTF30 C=A W          C[3:0]= # of logical records
343 F5255 8E00        GOSUBL =CSRC4
      00
344 F525B 113          A=R3
345 F525E 8AC          ?A#0 A        Logical record length specified?
346 F5261 50          GOYES CRTF35 Yes...use it
347 F5263 B24          A=A+1 XS      No...default to 256 bytes
348 F5266 23 CRTF35 P= 3
349 F5268 A96          C=A WP        C[3:0]=Logical record length
350 F526B 20          P= 0
351 F526D 7142        GOSUB Cslc4
352 F5271 12A          CR2EX         R2[7:4]=Rec length,R2[3:0]=# recs
353 F5274 8E00        GOSUBL =A-MULT Compute file length
      00
354          *
355          * Now R2 = implementation field, A[A] = file length in bytes
356          * Put the file size, file type and create code into R1
357          * Put the file name into R0 and R4[15:12]
358          *
359 F527A 1C3 CRTF40 D1=D1- 4
360 F527D AF2          C=0 W
361 F5280 15F3        C=DAT1 4      C[3:0] = file type
362 F5284 8E00        GOSUBL =CSLC6 (into C[9:6])
      00
363 F528A 25          P= 5
364 F528C A96          C=A WP        Copy all 6 nibs
365 F528F 173          D1=D1+ 4
366 F5292 1574        C=DAT1 S      C[S] = Create code
367 F5296 109          R1=C
368 F5299 AF2          C=0 W
369 F529C 1CD          D1=D1- 14
370 F529F 15F3        C=DAT1 4      C[3:0] = Last 2 chars of filename
371 F52A3 8E00        GOSUBL =CSRC4
      00
372 F52A9 10C          R4=C          R4[15:12]= Last 2 chars of name
373 F52AC 1CF          D1=D1- 16
374 F52AF 1577        C=DAT1 W
375 F52B3 108          R0=C          R0=First 8 characters of filename
376 F52B6 840          ST=0 =sOVERW Do NOT overwrite an existing file!
377 F52B9 7000        GOSUB =NEWFIL Create the file on the tape
378 F52BD 500          RTNNC         If no carry, no error...done
379 F52C0 6363        GOTO hCPYer  Error...set it up
380          *****
381          *****
382          **
```

```

383      ** Name:      hRDCBF - Read current record into FIB buffer
384      **
385      ** Category:  POLL
386      **
387      ** Purpose:
388      **      Read the current record of the FIB pointed to by STMTD1
389      **      into its FIB buffer
390      **      (FAST POLL)
391      **
392      ** Entry:
393      **      STMTD1 contains the FIB address for the file
394      **
395      ** Exit:
396      **      Carry clear, XM=0
397      **      Current record has been read into FIB buffer
398      **      A[W],D[W], and D1 are restored from SNAPBF (SNAPRS)
399      **      If error, jumps directly to BSERR after setting up error
400      **
401      ** Calls:      STBUF+,START,WRTADR,READR#,CSLC9,UTLEND,ACES=0,
402      **              <SNAPRS>,<ERRORX>
403      **
404      ** Uses:
405      **      Inclusive: A,B,C,D,DO,D1,P,ST[4:0]
406      **
407      ** Stk lvls:   3 (READR#)(START) {1 level saved during these}
408      **
409      ** Detail:
410      **      STBUF+ saves a stack level in D[11:7], RSTORE restores
411      **      it to the RSTK
412      **
413      ** History:
414      **
415      **      Date      Programmer      Modification
416      **      -----      -
417      **      10/14/83      NZ          Updated documentation
418      **      04/01/83      SC          Wrote routine
419      **
420      **
421      **
422 F52C4 7CC0 =hRDCBF GOSUB STBUF+      Check if HPIL, set up D[X],D1;
423      *          *          *          save RSTK level in D[11:7] if HPIL
424 F52C8 500      RTNMC          Not HPIL
425 F52CB 7C51      GOSUB Start      Set up the mailbox, DO
426 F52CF 4C2      GOC Errorx      Error exit
427 F52D2 7B31      GOSUB WRTADR      Compute current record
428      *
429      * A[3:0] is the record number of the current record
430      *
431 F52D6 8E00      GOSUBL =READR#      Read the record to the buffer @ D1
432      00
433 F52DC 4F1      RSTOR+ GOC Errorx      Error exit
434      *
435      * Restore the RSTK saved in D[11:7]
436      * Set access mode in FIB to zero (not modified)
437      * Exit through SNAPRS to restore A,D,DO, and D1 from SNAPSV

```

```
437          *
438 F52DF AFB  RSTORE C=D  W          Restore one RSTK level...
439 F52E2 8E00      GOSUBL =CSLC9      ...from D[11:7]
          00
440 F52E8 06          RSTK=C
441          *
442 F52EA 7000      GOSUB  =Utlend      Clean up the loop (unaddress all)
443 F52EE 4D0      GOC   Errorx        Error exit
444 F52F1 7D00      GOSUB  ACES=0      Set access code to zero (clean)
445 F52F5 8D00 =sNAPRS GOVLNG =SNAPRS  Restore A, D, DO, D1
          000
446          *_-
447          *_-
448 F52FC 8C00 Errorx GOLONG =ERRORX
          00
449          *_-
450          *_-
451          *
452          * ACES=0 sets the access code of the current FIB to zero
453          *
454 F5302 7B21  ACES=0 GOSUB  d0=FIB
455 F5306 16A          DO=DO+ =oACCSb      Position to the access code in FIB
456 F5309 D2          C=0   A
457 F530B 15C0      DATO=C 1          Write out a zero (not modified)
458 F530F 6F64      GOTO   RtnXMO        Return with XM=0, carry clear
459          *****
460          *****
461          **
462          ** Name:          hWRCBF - Write current record to mass mem device
463          **
464          ** Category:    POLL
465          **
466          ** Purpose:
467          **      Flush the current record for this FIB entry out to
468          **      the mass memory device (buffer contents, current
469          **      position, and record address are not changed by this
470          **      operation)
471          **      (FAST POLL)
472          **
473          ** Entry:
474          **      STMTD1 contains the FIB address for the file
475          **
476          ** Exit:
477          **      Carry clear, XM=0
478          **      Current record has been flushed out to mass mem device
479          **      A[W],D[W],DO, and D1 are restored from SNAPSV (SNAPRS)
480          **      If error, jumps directly to BSERR after setting up error
481          **
482          ** Calls:          STBUF+,START,WRTADR,WRITE#,<RSTOR+>
483          **
484          ** Uses:
485          **      Inclusive: A,B,C,D,DO,D1,P,ST[8,4:0]
486          **
487          ** Stk lvls:      3 (START)(WRITE#) {a level is saved in D for these
488          **
```

```

489      ** History:
490      **
491      **      Date      Programmer      Modification
492      **      -----      -
493      **      10/14/83      NZ          Updated documentation
494      **      04/01/83      SC          Wrote routine
495      **
496      ****
497      ****
498 F5313 7D70 =hWRCBF GOSUB STBUF+      Check if HPIL, set up D[X],D1;
499      *                               save RSTK level in D[11:7] if HPIL
500 F5317 500      RTNNC          Not HPIL
501 F531A 7D01      GOSUB Start          Set up the mailbox, DO
502 F531E 4DD      GOC Errorx          Error exit
503 F5321 7CE0      GOSUB WRTADR          Compute current record
504 F5325 8E00      GOSUBL =WRITE#        Write the buffer to mass mem device
      OO
505 F532B 60BF      GOTO RSTOR+          Restore RSTK level, exit
506      ****
507      ****
508      **
509      ** Name:      hRDNBF - Flush current FIB buffer, read next
510      **
511      ** Category:  POLL
512      **
513      ** Purpose:
514      **      Flush the current FIB buffer out to the mass memory
515      **      device (if altered), read the next record into the FIB
516      **      buffer, and update the current position
517      **      (FAST POLL)
518      **
519      ** Entry:
520      **      STMTD1 contains the FIB address for the file
521      **
522      ** Exit:
523      **      Successful:
524      **      Carry clear, XM=0
525      **      Next record is read into the FIB buffer
526      **      Current position in FIB is set to start of next record
527      **      File access nibble in FIB is set to zero
528      **      Error:
529      **      Direct jump to BSERR after setting up the error code
530      **
531      ** Calls:      STBUF+, START, WRTADR, WRITE#, STUPBF, GETMBX, READR#,
532      **              ACES=0, <RSTORE>
533      **
534      ** Uses:
535      **      Inclusive: A,B,C,D,DO,D1,P,ST[8,4:0]
536      **
537      ** Stk lvls:   3 (START)(WRITE#)(READR#) {1 level saved in D}
538      **
539      ** History:
540      **
541      **      Date      Programmer      Modification
542      **      -----      -
  
```

```
543      ** 10/14/83      NZ      Updated documentation
544      ** 04/01/83      SC      Wrote routine
545      **
546      *****
547      *****
548 F532F 7160 =hRDNBF GOSUB STBUF+      Check if HPIL, set up D[X], DO;
549      *                               save RSTK level in D[11:7] if HPIL
550 F5333 500      RTNCC      Not HPIL
551 F5336 71F0      GOSUB Start      Set up mailbox, DO
552 F533A 41C      GOC      Errorx      Error exit
553 F533D 70D0      GOSUB WRTADR      Compute current record
554 F5341 2C      P= 12      Check access (set up by STBUF+)
555 F5343 90B      ?D=0 P      Is access nibble = 0?
556 F5346 D0      GOYES RDNB10      Yes...just read next record
557 F5348 20      P= 0      No...
558 F534A 8E00      GOSUBL =WRITE#      Write FIB buffer to mass memory
      00
559 F5350 4BA      GOC      Errorx      Error exit
560      *
561 F5353 20      RDNB10 P= 0
562 F5355 7E50      GOSUB STUPBF      Set up D1 to start of FIB buffer
563 F5359 78C0      GOSUB Getmbx      Set DO back to mailbox
564 F535D E4      A=A+1 A      Select next record...
565 F535F 8E00      GOSUBL =READR#      ...read next record
      00
566 F5365 469      GOC      Errorx      Error exit
567 F5368 769F      GOSUB ACES=0      Set access code=0 (not modified)
568 F536C 16E      DO=DO+ (oDBEGb)-(oACCSb)+5
569 F536F 16D      DO=DO+ (oCPOSb)-(oDBEGb)-5      Position to current position
570 F5372 146      C=DAT0 A      Read current position into C[A]
571      *
572      * The current position is the number of nibbles from data start
573      * for the file
574      *
575 F5375 81E      CSRB      Turn nibbles into bytes (forces
576 F5378 816      CSRC      the current position to be at an
577 F537B 816      CSRC      even byte boundary when done)
578 F537E E6      C=C+1 A      Increment to next record number
579 F5380 812      CSLC
580 F5383 812      CSLC
581 F5386 A76      C=C+C W      Convert back to nibbles
582 F5389 144      DAT0=C A      Write out updated current position
583 F538C 7590      GOSUB Getmbx      Set DO back to the mailbox
584 F5390 6E4F      GOTO RSTORE      Clean up the loop, restore A,D,DO,D1
585      *****
586      *****
587      **
588      ** Name:      STBUF+,STUPBF - Set to read/write current recrd
589      ** Name:      WRTADR - Write device addr into FIB, <STUPBF>
590      **
591      ** Category:  LOCAL
592      **
593      ** Purpose:
594      **      STBUF+:
595      **      Check if HPIL...if not, RTNCC,XM=1
```



```

596      **      Save one RSTK level in D[11:7]
597      **      STUPBF:
598      **      Set D[12] to the access nibble for buffer, D1 to the
599      **      FIB buffer, D[A] to the device address, A[3:0] to
600      **      the current record position
601      **
602      **      Entry:
603      **      STMTD1 contains the FIB address of this file
604      **
605      **      Exit:
606      **      Carry clear:
607      **      Not HPIL...XM=1
608      **      Carry set:
609      **      D[12] is the access nibble for this buffer
610      **      D[11:7] is the RSTK value of the caller's caller
611      **      P=0
612      **      D[A] is the device address
613      **      A[3:0] is the current record number
614      **
615      **      Calls:      DO=FIB,CKHPI+,CSRC9,I/OFND,CHKASN
616      **
617      **      Uses.....
618      **      Inclusive: A[W],B[W],C[W],D[W],DO,D1,P
619      **
620      **      Stk lvls:  2 (CHKASN) {RSTK level already saved for this}
621      **
622      **      History:
623      **
624      **      Date      Programmer      Modification
625      **      -----      -
626      **      10/14/83      NZ      Added documentation
627      **
628      **      *****
629      **      *****
630 F5394 7990 STBUF+ GOSUB d0=FIB      Set DO to the start of the FIB
631 F5398 16B   DO=DO+ =oDEVcB      Skip to device type
632 F539B 1564 C=DATO S
633 F539F 7DE3 GOSUB CKHPI+      Check if HPIL
634 F53A3 500   RTNNC           No...return, carry clear (XM=1)
635 F53A6 07   C=RSTK           .....
636 F53A8 07   D=C      A      .....
637 F53AA 07   C=RSTK           .. Save caller's caller RSTK value
638 F53AC 8E00 GOSUBL =CSRC9     .. in D[11:7]
639           00
639 F53B2 AFF   CDEX      W      .....
640 F53B5 06   RSTK=C      .....
641
642 F53B7 7670 STUPBF GOSUB d0=FIB      Set DO at FIB entry
643 F53BB 16A   DO=DO+ =oACCsb     Position to access nibble
644 F53BE 2C   P=      12
645 F53C0 1560 C=DATO P           Read access nibble into C[12]...
646 F53C4 A87   D=C      P           ...and save it in D[12]
647 F53C7 20   P=      0
648 F53C9 188   DO=DO- (oACCsb)-(oFBF#b)
649 F53CC 146   C=DATO A           Read the FIB buffer number([X])

```

```

650 F53CF 8E00      GOSUBL =i/OFND
      00
651 F53D5 4B0      GOC   STUP10      Found the buffer
652 F53D8 300      LC(1) =eSYSer    Not found..."System Error" (HPIL)
653 F53DB 20       P=     =ePIL      This is an HPIL message
654 F53DD 6E1F     GOTO   Errorx     Error exit
655                *-
656                *-
657 F53E1 167     STUP10 DO=DO+ (oCOPYb)-(oFBF#b)
658 F53E4 16E     DO=DO+ (oDBEGb)-(oCOPYb)+4
659 F53E7 15E6    C=DATO 7          C[6:0] is device address info
660 F53EB 8E00    GOSUBL =CHKASN   Set up for START to get the addr
      00
661 F53F1 D7      D=C   A           (Info for START into D[3:0])
662                *
663 F53F3 183     STUP20 DO=DO- 4   Position DO to data begin
664 F53F6 15A3    A=DATO 4          A[3:0]=data start record number
665 F53FA 163     DO=DO+ 4
666 F53FD 16E     DO=DO+ (oCPOSb)-(oDBEGb)-4
667 F5400 AF2     C=0   W
668 F5403 146     C=DATO A          C[A]=current position (in nibbles)
669 F5406 81E     CSRb                    Convert nibble position to byte
670 F5409 F6      CSR   A
671 F540B F6      CSR   A          C[A] is number of records offset
672 F540D CA      A=A+C  A          A[A] is current record number
673 F540F 02      RTNSC                    Carry set=set up for HPIL
674                *-
675                *-
676 F5411 7C10    WRTADR GOSUB  dO=FIB
677 F5415 16C     DO=DO+ (oFBEGb)
678 F5418 16B     DO=DO+ (oDBEGb)-(oFBEGb)+4
679 F541B DB      C=D   A
680 F541D 1543    DATO=C X          Store device address into FIB
681 F5421 7ECF    GOSUB  STUP20    Set A[3:0] to current record #
682 F5425 8C00    =Getnbx GOLONG =GETMBX Set DO back to the mailbox
      00
683                *-
684                *-
685 F542B 8C00    Start  GOLONG =START
      00
686                *-
687                *-
688 F5431 8D00    dO=FIB GOVLNG =DO=FIB
      000

689                *****
690                *****
691                **
692                ** Name:      hPRICL - Print class poll handler for HPIL
693                **
694                ** Category:  POLL
695                **
696                ** Purpose:
697                **      Respond to the PRINT class poll, if this is "OUTPUT"
698                **      or "PLOT" (and the device is HPIL!)
699                **

```

```

700      ** Entry:
701      **      P=0, HEXMODE, DO @ =MLFFLG
702      **      If this is HPIL and (OUTPUT or PLOT):
703      **      STMTR1[8:2] is the 7 nibble device specifier
704      **      STMTR1[10:9] is the position for OUTPUT/PLOT
705      **      STMTR1[12:11] is the length for OUTPUT/PLOT
706      **      STMTR0[0] is either OUTPTt or PLOTt
707      **
708      ** Exit:
709      **      Carry clear, P=0, HEXMODE
710      **      XM=0:
711      **      Entry conditions for STMTRx are maintained
712      **      STMTR0[5:1] is the address of PRASCI
713      **      STMTR0[10:6] is the address of STMTR1+9
714      **      XM=1: NOT handled by me!
715      **
716      ** Calls:      TSAVD1, CSLC5, CSLC3, TSAV2C, PRTIS+, TRES2C, CSRC3, CSRC
717      **
718      ** Uses.....
719      ** Exclusive:  C, DO,P
720      ** Inclusive: A,B,C,D,DO,P,FUNCD0,FUNCD1,FUNCR1
721      **
722      ** Stk lvls:   3 (PRTIS+) {2 RSTK levels saved first}
723      **
724      ** NOTE: Must NOT use D1, status bits!
725      **
726      ** History:
727      **
728      **      Date      Programmer      Modification
729      **      -----      -
730      **      12/15/82      NZ              Added documentation
731      **
732      ****
733      ****
734 F5438      =hPRTCL
735      *
736      * DO @ MLFFLG now
737      *
738 F5438 D2          C=0      A
739 F543A 14E        C=DATO B      Read MLFFLG, type
740 F543D 80D1       P=C      1      P=type
741 F5441 890        ?P=      =OUTPTt  "OUTPUT" type?
742 F5444 70         GOYES hPRTCO     Yes...do it!
743 F5446 880        ?PH      =PLOTt  "PLOT" type?
744 F5449 84         GOYES hPRTXM     No...exit, XM=1
745      *
746      * Need to re-setup the loop now!
747      *
748 F544B 8E00 hPRTCO GOSUBL =TSAVD1      Save D1 temporarily (restored by
749      00      *      PRTIS+)
750 F5451 1F00      D1=(5) (=STMTR1)+2    ...point to 7 nibble handler...
751      000      *+
752 F5458 07        C=RSTK      Save 2 RSTK levels,ST in FUNCR1

```

```

753 F545A 7150      GOSUB Cslc5
754 F545E 07        C=RSTK
755 F5460 8E00      GOSUBL =CSLC3
                   00
756 F5466 09        C=ST
757 F5468 8E00      GOSUBL =TSRV2C      (Save in FUNCR1)
                   00
758                *+
759 F546E 8E00      GOSUBL =PRTIS+      ...set it all up!...
                   00
760                *+
761 F5474 8E00      GOSUBL =TRES2C      Restore RSTK levels before check
                   00
762 F547A 0A        ST=C                Restore status bits
763 F547C 8E00      GOSUBL =CSRC3
                   00
764 F5482 06        RSTK=C              Restore second level
765 F5484 8E00      GOSUBL =CSRC5
                   00
766 F548A 06        RSTK=C              Restore first level
767                *+
768 F548C 831       ?XM=0                Handled?
769 F548F 60        GOYES hPRTC1         Yes...continue
770 F5491 6B20 hPRTXM GOTO hCPYXM       No...exit,XM=1,carry clear
771                *+
772                *+
773 F5495           hPRTC1
774                *
775                * Loop is set up now, A[A] is address of PRASCI
776                *
777 F5495 25        P= 5
778 F5497 3400      LC(5) (=STMTR1)+9   Position and length for OUTPUT
                   000
779 F549E 20        P= 0
780 F54A0 1B00      DO=(5) (=STMTR0)+1 Handler address
                   000
781 F54A7 D6        C=A A                Copy handler address from A[A]
782 F54A9 15C9      DATO=C 10           (Write it out!)
783 F54AD 03        RTNCC                Done!
784                *****
785                *****
786                **
787                ** Name:          hCOPYx - Copy POLL handler (HPIL)
788                **
789                ** Category:     STEXEC
790                **
791                ** Purpose:
792                **           Handler for COPY execute POLL
793                **
794                ** Entry:
795                **           A[W] is first 8 chars of filename
796                **           RO[3:0] is last 2 chars
797                **           D[A] is source device information
798                **           P=0
799                **           ST(=sEXTDV) set if either of both file specs are HPIL

```

```

800      **      ST(=sUNDEF) set if both file names are zero (undef'd)
801      **      ST(=sCARD) set if destination device is CARD or PCRD
802      **      R2 has destination device info!!!!
803      **      SAVSTK: (offsets from SAVSTK pointer)
804      **      -62 => -1: (POLL save area)
805      **      -87 => -63: (Source info)
806      **      -112 => -88: (Destination info)
807      **
808      **      Info format: low mem      ---      high mem
809      **      First 8 chars...last 2 chars...device
810      **
811      ** Exit:
812      **      P=0
813      **      Carry set: Error...error # in C[3:0]
814      **      Carry clear:
815      **      XM=0: handled
816      **      XM=1: not handled
817      **      SAVSTK unchanged from entry
818      **
819      ** Calls:      ASLC4;6;12,ASRC3;4;5;10,BLANKC,CHAIN-,CHKBIT,
820      **      CLMODE,CRTF,CSLC2;5;10,CSRC5;10,DO=FRO,D1=S20,
821      **      DdtRd,ENDTAP,FINDF,FINDFL,FNDMB+,FRAME-,GETBYT,
822      **      GETD,GETDev,GETDST,GETMBX,GETTYP,GETX,hCPY5S,
823      **      hCPYE.,hCPYEL,hCPYXM,hRNMSd,LEXBF+,MOVEFL,NEWFI+,
824      **      PRGFMF,PUTE,RDINFD,RDINFO,READSU,SEEKA,TRES2C,
825      **      TSAV2C,TSTAT,UTLEND
826      **
827      ** Uses.....
828      ** Inclusive: A-D,R0-R4,DO,D1,P,ST[8,4:0],FUNCRO;1,FUNCDO,SCRCH
829      **
830      ** Stk lvls:  6 (NEWFIL;PUGFIB)
831      **
832      ** History:
833      **
834      **      Date      Programmer      Modification
835      **      -----      -
836      **      12/21/83      NZ      Added check for zero-length file
837      **      in hCPY50...was sending an SDA
838      **      even if no more data was expected
839      **      from the device
840      **      10/30/83      NZ      Added fix for bug...if in device
841      **      mode and receive a zero-length file
842      **      which already exists in RAM, the
843      **      machine would lock up. DO was
844      **      being destroyed in the check for
845      **      the file existing (FINDF).
846      **      09/07/83      NZ      Added check for destination=HPIL
847      **      for COPY from mainframe to external
848      **      05/12/83      NZ      Removed convert to upper case for
849      **      destination
850      **      01/12/83      NZ      Updated documentation
851      **
852      ** *****
853      ** *****
854 F54AF 812 Cslc5  CSLC
  
```

```

855 F54B2 8C00 Cslc4  GOLONG =CSLC4
      00
856      *-
857      *-
858 F54B8      =hCOPYx
859 F54B8 870      ?ST=1 =sEXTDV      Is any of this external device?
860 F54BB 80      GOYES hCPY10      Yes...continue
861 F54BD      hCPY6.
862      *
863      * Copy tape to tape (whole volume)
864      *
865      * TWO cases...both on same loop vs. on different loops!
866      *
867 F54BD 21      hCPYXM P=      1
868 F54BF 0D      P=P-1      Clear carry...
869 F54C1 00      RTNSXM      Return, carry clear
870      *-
871      *-
872 F54C3 872      hCPY10 ?ST=1 =sCARD      Is either one CARD?
873 F54C6 7F      GOYES hCPYXM      Yes...not for me!!!
874 F54C8 DB      C=D      A
875 F54CA B06     C=C+1 P      Check if source is mainframe
876 F54CD 442     GOC hCPY3.      Source is (not specified)
877 F54D0 DB      C=D      A      Not (not specified)...
878 F54D2 A06     C=C+C P      Check if source is HPIL
879 F54D5 5C1     GONC hCPY3.      Source is NOT HPIL...copy main
880      *
881      * Source is external...check if HP-IL
882      *
883 F54D8 90E     ?C#0 P
884 F54DB 2E      GOYES hCPYXM      Not for me!
885      *
886      * Source IS HP-IL...check further
887      *
888 F54DD 11A     C=R2      Read back destination info
889 F54E0 D5      B=C      A      Save device in B[A] for loop>loop
890 F54E2 B06     C=C+1 P      Check if dest is (not specified)
891 F54E5 480     GOC hCPY5.      Destination is (not specified)
892 F54E8 A05     B=B+B P      Check if destination is HPIL
893 F54EB 451     GOC hCPY12     Destination is external
894 F54EE 62B2    hCPY5. GOTO hCPY50     Destination is not HPIL
895      *-
896      *-
897 F54F2      hCPY3.
898      *
899      * Check if destination is HPIL
900      *
901 F54F2 11A     C=R2
902 F54F5 A06     C=C+C P      This MUST carry...sEXTDV was set
903 F54F8 90E     ?C#0 P      Is this HPIL?
904 F54FB 2C      GOYES hCPYXM      No...don't handle!
905 F54FD 6A21    GOTO hCPY30     Copy from main to loop
906      *-
907      *-
908 F5501      hCPY12
  
```

```

909      *
910      * Destination is external...check if HP-IL
911      *
912 F5501 90D      ?B#0  P
913 F5504 9B      GOYES  hCPYXM      Not HP-IL!
914      *
915      * Source, destination are both HPIL...check if name given
916      *
917 F5506 871      ?ST=1  =sUNDEF      Names undefined?
918 F5509 4B      GOYES  hCPY6.      Yes...copy tape to tape
919      *
920      * Named HPIL to HPIL transfer
921      *
922 F550B F7      DSR    A      Shift address into D[X]
923      *
924      * Copy a file from HPIL to HPIL (may be same device)
925      *
926      * first find the source file
927      *
928 F550D 8E00    GOSUBL =FINDFL      Find the source file
          00
929 F5513 560    GONC   hCPY22      OK...continue
930 F5516 6392    GOTO   hCPY5?      Error...set it, return!
931      *
932      *
933      *
934      * Now save starting sector, etc in R3
935      *
936 F551A 8E00    hCPY22  GOSUBL =CSRC5      Temp put # sectors in C[15:11]
          00
937 F5520 D6      C=A    A      Copy starting sector to C[A]
938 F5522 74B6    GOSUB  Cslc10      Put # of sectors in C[9:5]
939 F5526 DB      C=D    A      Copy device address to C[A]
940 F5528 10B     R3=C
          Save all in R3!
941      *
942      * Now R3[A] is device address, [9:5] is # sectors, [14:10] is
943      * first sector address
944      *
945      * Now check the file type for private, copy code, unknown, etc
946      *
947 F552B 7B77    GOSUB  GETTYP      Read in file type & check it
948 F552F 460     GOC    hCPY23      OK...found it!
949 F5532 6CB2    hCPYtP  GOTO   hCPYtp      Illegal (unrecognized) type
950      *
951      *
952 F5536         hCPY23
953      *
954      * B[S] is offset into type table, B[A],C[A] point to entry,
955      * A[A] is file type
956      *
957 F5536 135     D1=C      Set D1 @ table start
958 F5539 A4D     B=B-1  S      Convert to base zero entry
959 F553C AC2     C=0    S
960 F553F B46     C=C+1  S      C[S] is now max non-private type
961 F5542 B49     C=C-B  S      If carry, then private
  
```

```
962 F5545 560          GONC   hCPY24      OK...not private
963 F5548 6997        GOTO   hPURSC      Illegal type (private)
964                  *-
965                  *-
966                  *
967                  * Type is acceptable to copy!!
968                  *
969                  * (Chose the FIRST type...not secure or private)
970                  *
971 F554C 17F hCPY24  D1=D1+ 16      Point to UN type
972 F554F 15B3        A=DAT1 4      Read the type
973 F5553 7C37        GOSUB  D1=S20    Position to TYPE in SCRCH
974 F5557 1593        DAT1=A 4      Write it out for now
975                  *
976                  * Now set up with destination name, etc for NEWFIL
977                  *
978 F555B 8E88        GOSUBL hRNMsd     Read dest, convert to UC, etc
      80
979                  *
980                  * Now A[W], R0[3:0] is filename, D[A] is unchanged, R1 is dest
981                  * address
982                  *
983                  * Check if destination device is (not specified) or (HPIL)
984                  *
985 F5561 119          C=R1
986 F5564 816          CSRC           Rotate into C[S], [X]
987 F5567 B46          C=C+1 S
988 F556A 440          GOC     hCPY25    Not specified...go on!
989                  *
990                  * Address is specified...put it in D!
991                  * (To get here, destination address had to be specified)
992                  *
993 F556D D7           D=C     A
994 F556F 120 hCPY25  AROEX      Put first 8 chars in R0...
995 F5572 8E00        GOSUBL =ASRC4     ...move last two to A[15:12]...
      00
996 F5578 104          R4=A           ...and put in R4[15:12]!
997                  *
998                  * New name is now set up...set up type and size
999                  *
1000 F557B 7417        GOSUB  D1=S20    Point to file type
1001 F557F AF2         C=0     W      Preclear high nibbles!
1002 F5582 15F3        C=DAT1 4      Read the type (written above!)
1003 F5586 113        A=R3           Get back # sectors to A[9:5]
1004                  *
1005                  * SOURCE info:
1006                  *
1007                  * A[A] is device addr, A[9:5] is # sectors, A[14:10] is sector
1008                  * address of data
1009                  *
1010 F5589 7F07        GOSUB  DO=FRO    Set DO=FUNCRO
1011 F558D 1507        DATO=A W      Save R3 contents in FUNCRO
1012 F5591 8E00        GOSUBL =ASRC5     # sectors to A[A]
      00
1013 F5597 741F        GOSUB  Cslc5     File type to C[8:5]
```



```

1014 F559B D6      C=A   A      Copy # sectors
1015 F559D F2      CSL   A      # sectors*16
1016 F559F BF2     CSL   W      # sectors*256 (# bytes) in C[5:0]
1017 F55A2 109     R1=C                    R1 is now set up for NEWFIL!
1018 F55A5 1D00    D1=(2) (=SCRATCH)+56 Point to implementation bytes
1019 F55A9 15F7    C=DAT1 8
1020 F55AD 10A     R2=C                    R2 is set up for NEWFIL
1021 F55B0 DB      C=D   A      Copy address to C[A]
1022 F55B2 8E00    GOSUBL =TSAV2C         Save source address in STMTR1
      00

1023      *
1024      * Now set up to call NEWFIL to create the file
1025      *
1026 F55B8 840     ST=0   =sOVERW         Do NOT overwrite the file!
1027 F55BB 8E00    GOSUBL =NEWFI+        START, Create the file
      00
1028 F55C1 426     GOC    hCPYer         Error
1029      *
1030      * Now R3 is B[W] contents from NEWFIL, FUNCRI is unchanged
1031      *
1032 F55C4 8E00    GOSUBL =TRES2C        Restore source address to C[A]
      00
1033 F55CA 109     R1=C                    Store address in dest field
1034 F55CD 7BC6    GOSUB  DO=FRO         Set DO to FUNCRO
1035 F55D1 1567    C=DATO W              Recall source file info to C[W]
1036 F55D5 10A     R2=C                    Store address in source field
1037 F55D8 7886    GOSUB  Csrc10         Get source sector addr to C[A]
1038 F55DC D5      B=C   A              Sector address of source
1039 F55DE 113     A=R3
1040 F55E1 8E00    GOSUBL =ASRC3        Get file start into A[4:1]
      00
1041 F55E7 F4      ASR    A              (Clear high nibble of A[A])
1042 F55E9 11A     C=R2                    Recall # of sectors to C[9:5]
1043 F55EC D6      C=A   A              Get sector # of destination
1044 F55EE 10B     R3=C                    R3 is now set up for MOVEFL
1045      *
1046      * Now set up for MOVEFL
1047      *
1048 F55F1 8E00    GOSUBL =MOVEFL        Move the file between devices
      00
1049 F55F7 4C2     GOC    hCPYer         Error
1050      *
1051      * Now clean up the tape(s) (rewind, etc)
1052      *
1053 F55FA 11A     C=R2                    Get source addr from R2[A]
1054 F55FD D7      hCPY28 D=C   A        Save in D[A]
1055 F55FF 8E00    GOSUBL =CHKBIT        Check if Filbert tape
      00
1056 F5605 521     GONC   hCPY29         Not a Filbert...try next device
1057 F5608 8E00    GOSUBL =FNOMB+        Find that mailbox
      00
1058 F560E 451     GOC    hCPYer         Error if carry
1059 F5611 7316    GOSUB  Endtap         Filbert...clean up (rewind,etc)
1060 F5615 4E0     GOC    hCPYer         Error if carry
1061 F5618      hCPY29

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```
1062 F5618 119          C=R1          Get dest addr from R1[A]
1063 F561B 937          ?CMD X        Is this a new device?(addr,loop#)
1064 F561E FD           GOYES hCPY28   Yes...clean it up also
1065 F5620 6E51        GOTO RtnXMO   Done...exit
1066                   *-
1067                   *-
1068 F5624 6296 hCPYer GOTO Error Error...set C[3:0] to code
1069                   *-
1070                   *-
1071 F5628             hCPY30
1072                   *
1073                   * Code to set up mainframe to loop copy
1074                   *
1075                   * First find the source file in the mainframe
1076                   *
1077                   * Filename is already in A[W]...shift D[A] around for FINDF
1078                   *
1079                   * (If filename is undefined i.e. zero, FINDF will error out)
1080                   *
1081 F5628 817          DSRC          Put D[0] into D[S]...
1082 F562B 8F00        GOSBVL =FINDF Find the file
1083                   000
1083 F5632 3300        LC(4) =eFnFND File not found
1084                   00
1084 F5638 400          RTNC          Return with error in C[3:0]
1085                   *
1086                   * D1 points to the start of file now
1087                   *
1088                   * Get the info about the file and put it in R1-R2
1089                   * (size, type, data start address, implementation bytes)
1090                   *
1091 F563B 17F          D1=D1+ =oFTYPH Skip name
1092 F563E 173          D1=D1+ =oFLAGh Skip type
1093                   *
1094                   * Now pointing to the flag field...read protection, copy code
1095                   *
1096 F5641 14B          A=DAT1 B      Flags (bit 0=SE,bit 1=PR)
1097 F5644 17B          D1=D1+ (oFLENh)-(oFLAGh) Leave D1 @ file length
1098 F5647 302          LCHEX 2      Privacy bit
1099 F564A 0E02        C=C&A P      (Could be A for code space)
1100 F564E 90A          ?C=0 P
1101 F5651 60          GOYES hCPY31 Not private...continue
1102                   *
1103                   * Attempt to copy a private file...error!
1104                   *
1105 F5653 6E86        GOTO hPURSC   Protection error
1106                   *-
1107                   *-
1108 F5657             hCPY31
1109                   *
1110                   * File is legal to copy...check copy code
1111                   *
1112 F5657 F4          ASR A        A[0] is now copy code
1113                   *
1114                   * Following instruction clears C[A] - used below this!
```

```

1115          *
1116 F5659 D2          C=0   A
1117 F565B A86        C=A   P          Read copy code into C[0]
1118 F565E AF0        A=0   W          Clear A[W]
1119 F5661 143        A=DAT1 A          Pre-read file length into A[W]!
1120 F5664 25         P=    =IFLENh     Skip length of length field
1121 F5666 80FO       CPEX  0
1122 F566A EA         A=A-C  A
1123 F566C 80FO       CPEX  0          Restore copy code
1124 F5670 20         P=    0          Reset P=0
1125          *
1126          * Decode what the copy code is!
1127          *
1128 F5672 90A        ?C=0   P          Is this copy code 0?
1129 F5675 42         GOYES  hCPY33     Yes...do it
1130 F5677 A06        C=C+C  P          Unknown type? (CC=8)
1131 F567A 4A1        GOC    hCPY32     Yes...can't handle it
1132 F567D A06        C=C+C  P          ASCII text file? (CC=4)
1133 F5680 560        GONC  hCPY3a     No...keep checking
1134 F5683 6580       GOTO   hCPY34     Yes...do it
1135          *
1136          *
1137 F5687 A06        hCPY3a C=C+C  P          HP41C data file? (CC=2)
1138 F568A 560        GONC  hCPY3b     No...TITAN data file
1139 F568D 6580       GOTO   hCPY36     Yes...do it
1140          *
1141          *
1142          *
1143          * TITAN fixed length data file (CC=1)
1144          *
1145 F5691 6FA0       hCPY3b GOTO   hCPY38
1146          *
1147          *
1148 F5695           hCPY32
1149          *
1150          * Unknown file type...exit or poll?
1151          *
1152 F5695 672E       GOTO   hCPYXM     I give up!
1153          *
1154          *
1155 F5699           hCPY33
1156          *
1157          * Mainframe executable file (COPY CODE = 0)
1158          * D1 points to file length field
1159          * A[W] is file length in nibbles (data + subheader)
1160          *
1161 F5699 102        R2=A          Set implementation bytes<=length
1162          *
1163          * D1 is pointing at FLENh, A[W] is length in bytes, C[A] is 5.
1164          *
1165 F569C 101        hCPY3- R1=A          Put file len in nibs in R1[5:0]
1166          *
1167          * Now get actual file start address
1168          *
1169 F569F 305        LC(1) =IFLENh     Offset to data for mainframe

```

```

1170 F56A2 133 hCPY3+ AD1EX
1171 F56A5 131          D1=A          Copy D1==>A
1172 F56A8 CA          A=A+C A      Add offset to data start
1173 F56AA 8E00        GOSUBL =ASLC4 Rotate into A[8:4]
      00

1174          *
1175          * Now get the file type (from the source)
1176          *
1177 F56B0 1CF          D1=D1- (oFLENh)-(oFTYPH) Move to file type
1178 F56B3 15B3        A=DAT1 4      Read it
1179          *
1180          * check if BASIC file...if so, set flag "BASIC"
1181          *
1182          Basic EQU 0
1183 F56B7 840          ST=0 Basic
1184 F56BA 3341        LC(4) =fBASIC
      2E

1185 F56C0 23          P= 3
1186 F56C2 916        ?A#C WP
1187 F56C5 50          GOYES hCPY3f
1188 F56C7 850        ST=1 Basic Set Basic flag
1189 F56CA          hCPY3f
1190          *
1191          * Rotate file type into A[9:6], file start into A[14:10]
1192          *
1193 F56CA 8E00        GOSUBL =ASLC6
      00

1194 F56D0 119        C=R1          Read back the length...
1195 F56D3 E6          C=C+1 A      ...add 1 to round UP...
1196 F56D5 81E        CSRB        ...convert to bytes!
1197 F56D8 DA          A=C A      (NOT WP: nibble 5 is always zero)
1198 F56DA 101        R1=A        Now size, type, and start are set
1199 F56DD 860        ?ST=0 Basic Is this NOT a BASIC file?
1200 F56E0 52          GOYES hCPY3g Not BASIC...continue
1201          *
1202          * This is a BASIC file...chain it first!
1203          *
1204 F56E2 8E00        GOSUBL =ASRC10 File start ==> A[A]
      00

1205 F56E8 20          P= 0
1206 F56EA D2          C=0 A
1207 F56EC 31+3 3152 LC(2) (=oFLENh)+(oBSSod) + (FLENh)
1208 F56F0 EA          A=A-C A
1209          *
1210          * Now A[A] is the start of the file header
1211          *
1212 F56F2 11A          C=R2
1213 F56F5 10B          R3=C      Save R2 in R3 for now...
1214 F56F8 8F00        GOSBVL =CHAIN- Chain the file
      000

1215 F56FF 11B          C=R3
1216 F5702 10A          R2=C      Restore R2 from R3!
1217 F5705 6A50 hCPY3g GOTO hCPY39 Get the destination name, do it!
1218          *-
1219          *-

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```

1220 F5709      hCPY34
1221           *
1222           * Handler for ASCII (TYPE=1) text files (COPY CODE = 4)
1223           *
1224           * D1 points to FLENh, A[W] is file length in nibbles
1225           *
1226 F5709 AF2          C=0      W
1227 F570C 10A         R2=C          Clear implementation bytes
1228 F570F 6C8F        GOTO      hCPY3-  Continue at common code
1229           *
1230           *
1231 F5713      hCPY36
1232           *
1233           * Handler for HP41C data file (COPY CODE = 2)
1234           * D1 points to file length field, A[W] is file length in nibbles
1235           *
1236 F5713 101          R1=A          Save file length in R1[5:0](nibs)
1237 F5716 AF2          C=0      W          Check if it fits...
1238 F5719 D6           C=A      A          C[W] is file length
1239 F571B 972         ?A=C     W          Contained in [A] field?
1240 F571E 60          GOYES   hCPY37      OK...continue
1241 F5720 68B0        GOTO      hCPY5!     Too big...size error
1242           *
1243           *
1244 F5724 8E00 hCPY37  GOSUBL =CSRC5      Rotate high byte to C[15:14]
1245           00
1245 F572A AB6         C=A      X          Copy low byte (ignore low nibble)
1246 F572D F6          CSR      A
1247 F572F 8E00 hCPY37  GOSUBL =CSLC2      C[B] is high byte, C[3:2] is low
1248           00
1248 F5735 10A         R2=C          Set up implementation bytes!
1249 F5738 D2          C=0      A
1250 F573A 305         LC(1)   =o41sod      Offset for 41C data file
1251 F573D 646F        GOTO      hCPY3+
1252           *
1253           *
1254 F5741      hCPY38
1255           *
1256           * Handler for fixed length data files (COPY CODE = 1)
1257           * D1 points to file length field, A[W] is file length in nibbles
1258           *
1259 F5741 308         LC(1)   8          Subtract impl bytes from length
1260 F5744 EA          A=A-C   A
1261 F5746 101         R1=A          Save actual file length in nibs
1262 F5749 174         D1=D1+  =1FLENh      Skip to implementation fields
1263 F574C 15B7        A=DAT1  8          Read them...
1264 F5750 102         R2=A          Set up implementation field in R2
1265 F5753 111         A=R1          Get file length back for hCPY3+
1266 F5756 1C4         D1=D1-  =1FLENh      Move back to FLENh
1267 F5759 30D        LC(1)   (=1FLENh)+8      Point past implementation field
1268 F575C 654F        GOTO      hCPY3+      Finish up
1269           *
1270           *
1271 F5760      hCPY39
1272 F5760 72F4        GOSUB   Rdinfd      Read the info from SAVSTK

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```

1273      *
1274      * Now A is first 8 chars, R0 is last 2 chars, D is device info
1275      *
1276 F5764 817      DSRC      Shift device info...addr->D[A]
1277 F5767 120      AROEX      Put first 8 chars in R0
1278 F576A 8E00    GOSUBL =ASLC12    Rotate last 2 chars to A[15:12]
      00
1279 F5770 104      R4=R      Now last 2 chars in R4[15:12]
1280      *
1281      * Do the actual transfer now
1282      *
1283      * (Get the mailbox back - NEWFI+ does START, NEWFIL)
1284      *
1285 F5773 850      ST=1   =sOVERW    Allow overwriting existing file
1286 F5776 8E00    GOSUBL =NEWFI+    Create a new file on the tape
      00
1287 F577C 436      GOC     hCPY5a    Error...set it up!
1288 F577F 821    RtnXMO XM=0    No error...return CC, XM=0
1289 F5782 03      RTNCC
1290      *
1291      *
1292 F5784 8E00    =CKBITL GOSUBL =CHKBIT    Check if bit for Filbert is set
      00
1293 F578A 501      GONC    CKHPIx    No carry...set XM (not Filbert)
1294 F578D ACB    =CKHPIL C=D      S
1295 F5790 A46    =CKHPI+ C=C+C    S      Check if external
1296 F5793 570      GONC    CKHPIx    Not external...don't handle
1297 F5796 94A      ?C=0    S      HPIL?
1298 F5799 00      RTNYES
1299 F579B 00    CKHPIx RTNSXM    Yes...return, set carry
      Carry clear, XM=1
1300      *
1301      *
1302 F579D 6F1D    hCPYxm GOTO    hCPYXM
1303      *
1304      *
1305 F57A1      hCPY50
1306      *
1307      * Copy from loop to main
1308      *
1309      * A[W] is first 8 chars, R0[3:0] is last 2 chars
1310      * D[A] is device of source
1311      *
1312 F57A1 817      DSRC      Shift device back to normal
1313 F57A4 8E00    GOSUBL =FINDFL    Save first 8, START,FINDFx
      00
1314 F57AA 06    hCPY5? RSTK=C      Save (possible) error message
1315      *
1316      * Found the file (A[3:0] is start, C[3:0] is length, D1->type)
1317      * (If this is LOOP, then may have a bad name, but rest is OK)
1318      *
1319 F57AC 7FFC      GOSUB   Cslc5      Save length in [9:5]
1320 F57B0 D6      C=R     A      Start in [A]
1321 F57B2 79FC      GOSUB   Cslc5      Start to [9:5], length to [14:10]
1322 F57B6 10C      R4=C
1323 F57B9 11A      C=R2      C[A] is destination type
  
```

```

1324 F57BC D7          D=C   A
1325 F57BE 817        DSRC           Rotate device into correct place!
1326 F57C1 07         C=RSTK          Restore (possible) error message
1327                  *
1328                  * Now R4[14:10] is length, R4[9:5] is start,
1329                  * D1 points to file type
1330                  *
1331 F57C3 502         GONC   hCPY51      Found it!
1332 F57C6 880        ?P#    0           NOT "Device mode error, tape"?
1333 F57C9 71         GOYES  hCPY5a     No...error exit!
1334 F57CB D0         A=0    A           Set A[A]=0 (# left to read)
1335 F57CD 102        R2=A           Set R2[A]=0
1336 F57D0 300        LC(1) =eNFILE    "File not found"
1337 F57D3 20         P=      =eTAPE     Set P value for "File not found"
1338 F57D5 6143      GOTO   hCPYeL     Go clean up (or exit)
1339                  *
1340                  *
1341 F57D9 20         hCPY5! P=      0
1342 F57DB 300        LC(1) =eTSIZE
1343 F57DE 20         hCPY5t P=      =eTAPE     Size error!
1344 F57E0 634E      hCPY5a GOTO   hCPYer
1345                  *
1346                  *
1347 F57E4           hCPY51
1348 F57E4 72C4      GOSUB  GETTYP     Read file type & get type entry
1349 F57E8 401       GOC    hCPY52     OK...type in A[A]
1350                  *
1351                  * Unrecognized type...error
1352                  *
1353                  * Clean up the loop (check for LOOP or non-MS source)
1354                  *
1355 F57EB 7673      hCPYt- GOSUB  hCPYeL     Error...check for copy from loop
1356 F57EF 20        hCPYtp P=      0           Guarantee P=0 here
1357 F57F1 3300      LC(4) =eFTYPE    Illegal (Unrecognized) type
          00
1358 F57F7 02       RTNSC
1359                  *
1360                  *
1361 F57F9 D8        hCPY52 B=A    A           Copy file type to B[A]
1362 F57FB 101       R1=A           Save file type in R1 for CRTF
1363                  *
1364                  * Now B[S] is position of file type within entry
1365                  * C[A] points to start of entry
1366                  *
1367 F57FE 135       D1=C           Set D1 to start of entry
1368 F5801 1574     C=DAT1 S      Read the create code for the file
1369                  *
1370 F5805 A4D       B=B-1 S      Convert entry # to base zero
1371 F5808 114       A=R4
1372 F580B AC0       A=0    S
1373 F580E B44       A=A+1 S
1374 F5811 BCC       A=-A-1 S     A[S]="1110" (binary)
1375 F5814 0E40     A=A&B S      A[S] is new security code (not
1376                  *                               secure!)
1377 F5818 104       R4=A           Save security code in R4[S]

```

```

1378      *
1379      * C[S] is create code for this file.
1380      * B[A] is file type for this file.
1381      *
1382 F581B 1F00      D1=(5) (=SCRATCH)+56  Point to implementation bytes
          000
1383 F5822 94A      ?C=0  S          Check if mainframe type
1384 F5825 17       GOYES  hCPY56      Yes...set it up
1385 F5827 A46     C=C+C  S          Check if external...
1386 F582A 560     GONC   hCPY5j      ...no...keep checking
1387 F582D 6AA0    GOTO   hCPY5-      ...yes...will be set up in CRTF
1388      *-
1389      *-
1390 F5831 A46     hCPY5j  C=C+C  S          Check if create type is LIF1
1391 F5834 4C0     GOC    hCPY53      Yes...set it up
1392 F5837 A46     C=C+C  S          Check if type is 41C data file
1393 F583A 454     GOC    hCPY55      Yes...set it up
1394      *          Type is TITAN data file...
1395 F583D 6820    GOTO   hCPY54      ...set it up
1396      *-
1397      *-
1398      *
1399      * LIF1 file type
1400      *
1401 F5841 23      hCPY53  P=      3
1402 F5843 1D00    D1=(2) (=SCRATCH)+32  Length field
1403 F5847 AF2     C=0    W
1404 F584A 7000    GOSUB  =GETBYT      Read 4 bytes @ length
1405 F584E BF2     CSL    W
1406 F5851 BF2     CSL    W          Convert to BYTES!
1407 F5854 10A    R2=C          Store in R2
1408      *
1409      * Check if "reasonable" size
1410      *
1411 F5857 D2       C=0    A          Clear low end!
1412 F5859 97A     ?C=0  W          Bigger than 1M bytes?
1413 F585C C7      GOYES  hCPY5-      No...do it!
1414 F585E 7303    hCPY5%  GOSUB  hCPY5e1     Check for more bytes to read
1415 F5862 667F    GOTO   hCPY5!     Yes...size error
1416      *-
1417      *-
1418 F5866         hCPY54
1419      *
1420      * TITAN data file type
1421      *
1422 F5866 AF0     A=0    W          Clear high nibble first
1423 F5869 173     D1=D1+ 4        Point to record length
1424 F586C 15B3    A=DAT1 4        Read record length...
1425 F5870 103     R3=A          ...and save in R3
1426 F5873 1C3     D1=D1- 4        Point back to # of records
1427 F5876 15B3    A=DAT1 4        Read # of records
1428 F587A 102     hCPY5b  R2=A          Put into R2
1429 F587D 5A5     GONC   hCPY5-      Go always...finish it up
1430      *-
1431      *-

```



```

1432 F5880 AF0 hCPY55 A=0 W
1433 F5883 103 R3=A R3[4] must be zero for CRTF
1434 F5886 14B A=DAT1 B Read high byte of size
1435 F5889 F0 ASL A
1436 F588B F0 ASL A
1437 F588D 171 D1=D1+ 2
1438 F5890 14B A=DAT1 B Read low byte of size
1439 F5893 56E GONC hCPY5b Go always
1440 *-
1441 *-
1442 *
1443 * This is a mainframe create code!
1444 *
1445 F5896 hCPY56 D1<=start of implementation bytes
1446 *
1447 * First read in offset to data from @ C[A]+3 (set up by FTYPF#)
1448 *
1449 F5896 137 CD1EX
1450 F5899 172 D1=D1+ 3
1451 F589C DA A=C A Start of implementation bytes
1452 F589E AF2 C=0 W
1453 F58A1 14F C=DAT1 B Offset to data in C[W]
1454 F58A4 131 D1=A
1455 F58A7 15B5 A=DAT1 6 Read in the file length
1456 F58AB 25 P= 5
1457 F58AD B1A A=A-C WP Subtract off offset to data
1458 F58B0 20 P= 0
1459 F58B2 3150 LC(2) =IFLENh Length of file length field
1460 F58B6 25 P= 5
1461 F58B8 A1A A=A+C WP (Add this back to length)
1462 *
1463 * Now A[5:0] contains the length of data portion of the file
1464 *
1465 F58BB 102 R2=A Save in R2 for future use...
1466 F58BE 90C ?A#0 P
1467 F58C1 D9 GOYES hCPY5% Error...size
1468 *
1469 * Check if this size is reasonable...
1470 *
1471 F58C3 11C C=R4
1472 F58C6 7D93 GOSUB Csrc10 Get length into C[A]
1473 F58CA BF2 CSL W
1474 F58CD BF2 CSL W Convert to bytes...
1475 F58D0 A76 C=C+C W ...now to nibbles...
1476 F58D3 996 ?A>C WP ...check if bigger (corrupt!!!)
1477 F58D6 88 GOYES hCPY5% Error...file size
1478 *
1479 * Passed reasonability test
1480 *
1481 * R2 contains # of nibbles for copy code 0, # of logical
1482 * records for other codes; R3 contains the record size in
1483 * bytes (If create code is 8, none of these are defined yet)
1484 *
1485 F58D8 hCPY5-
1486 F58D8 7853 GOSUB GETDST Read source info back
  
```

```

1487      *
1488      * D[A] is destination info, A[W],RO[3:0] is dest. filename,
1489      * B[A] is the file type number, B[S] is the security nibble,
1490      * R2 contains # of nibbles/bytes/records as per file type,
1491      * R3 is record size in bytes
1492      * D1 is destroyed (Points at device info now)
1493      *
1494 F58DC 8E00      GOSUBL =BLANKC
           00
1495 F58E2 37B6      LCASC  \syek\      Check if keys
           5697
           37
1496 F58EC 976      ?RMC  W
1497 F58EF 21      GOYES  hCPY5x      Not keys...OK
1498 F58F1 34C0      LC(5)  =fKEY      Is the type "KEYS"?
           2E0
1499 F58F8 8A1      ?B=C  A
1500 F58FB 60      GOYES  hCPY5x      Yes...OK
1501      *
1502      * Error...file name is keys, type is NOT keys
1503      *
1504 F58FD 6DEE      GOTO   hCPYt-      Error...Illegal File Type
1505      *
1506      *
1507 F5901      hCPY5x
1508      *
1509      * Save R2, R3[A] (R3[15:5]=0), R4[15:5] in FUNCrx RAM
1510      * Save R1[A] (type) in FUNCDO
1511      *
1512 F5901 7793      GOSUB  DO=FRO      Set DO=(5) =FUNCRO
1513 F5905 11A      C=R2
1514 F5908 1547      DATO=C W      Save R2 in FUNCRO
1515 F590C 16F      DO=DO+ 16
1516 F590F 123      AR3EX
1517 F5912 11C      C=R4
1518 F5915 D6      C=A  A      Save R4[15:5], R3[A] in FUNCr1
1519 F5917 113      A=R3      Restore A[W] (Name)
1520 F591A 1547      DATO=C W      (FUNCr1)
1521 F591E 16F      DO=DO+ 16      (FUNCDO)
1522 F5921 119      C=R1
1523 F5924 144      DATO=C A      Save R1[A] in FUNCDO
1524      *
1525      * Now ready to call FINDF:A[W] is filename, D[S],[B] is device
1526      *
1527 F5927 8F00      GOSBVL =FINDF      Find the file in main RAM
           000
1528      *
1529      * Now restore R2,R3[A],R4[15:5],R1[A] WITHOUT changing carry
1530      *
1531 F592E 146      C=DATO A      (FUNCDO)
1532 F5931 109      R1=C      Restore R1[A] (type)
1533 F5934 1900      DO=(2) =FUNCr1      (DO=DO- 16 clears carry)
1534 F5938 1567      C=DATO W      Read R4[15:5],R3[A] (FUNCr1)
1535 F593C 10C      R4=C      Restore R4[15:5]
1536 F593F AF0      A=0  W

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1537 F5942 DA      A=C   A      A[W] is now R3 value
1538 F5944 103    R3=A
1539 F5947 1900   DO=(2) =FUNCRO      (DO=DO- 16 clears carry)
1540 F594B 1567   C=DATO W
1541 F594F 10A    R2=C      Restore R2[W]
1542
1543      *
1544      * Now check if the file already exists in main RAM
1545      *
1545 F5952 4A0     GOC    hCPY5y      Not found...OK
1546      *
1547      * File exists now...error
1548      *
1549 F5955 7C02   GOSUB  hCPYe1      Read any remaining data
1550 F5959 6E34   GOTO   hRNMfx      File exists error
1551      *
1552      *
1553 F595D        hCPY5y
1554      *
1555      * Read back the destination info from SAVSTK
1556      *
1557 F595D 73D2   GOSUB  GETDST
1558      *
1559      * Create the destination file now
1560      *
1561      * First save 1 RSTK level in FUNCRO (DO now at SCRATCH),
1562      * status bits in FUNCRO+5
1563      *
1564 F5961 07      C=RSTK
1565 F5963 7533   GOSUB  DO=FRO
1566 F5967 144   DATO=C A      Save stack level in FUNCRO
1567 F596A 164   DO=DO+ 5
1568 F596D 09    C=ST      Save status bits...
1569 F596F 15C2  DATO=C 3      ...write out status bits
1570 F5973 8F00  GOSBVL =CRTF   Create the file in RAM
1571      000
1571 F597A 7E13   GOSUB  DO=FRO
1572 F597E 142   A=DATO A      Restore stack level from FUNCRO
1573 F5981 DE    ACEX  A      Save error code in A[A]
1574 F5983 06    RSTK=C
1575 F5985 1900  DO=(2) (=FUNCRO)+5  (DO=DO+5 will destroy carry)
1576 F5989 15E2  C=DATO 3      Read in old status bits...
1577 F598D 0A    ST=C      ...restore status bits
1578 F598F 571   GONC   hCPY5d   No error if no carry
1579      *
1580      * Save the error code in (FUNCRO)+5 for now
1581      *
1582 F5992 1583   DATO=A 4      Write out 4 nibs of error code
1583      *
1584      * Now clean up the loop (if needed)
1585      *
1586 F5996 7BC1   GOSUB  hCPYe1
1587      *
1588      * Recall the error # from (FUNCRO)+5
1589      *
1590 F599A 1B00   DO=(5) (=FUNCRO)+5

```

```

000
1591 F59A1 15E3      C=DATO 4
1592 F59A5 02      RTNSC          Error! (Set up in C[3:0])
1593                * _
1594                * _
1595                *
1596                * Now D[S] is device code, D[X] is device address, R1 is start
1597                * of file header in memory, D1 points to start of data in file
1598                *
1599 F59A7 111 hCPY5d A=R1
1600 F59AA D2      C=0      A
1601 F59AC 3141    LC(2)   =oFLAGh      Offset to flags...
1602 F59B0 CA      A=A+C    A
1603 F59B2 133    AD1EX          Save start of data in R[A]
1604                *
1605                * Now D1 points to the flag nibble
1606                *
1607 F59B5 11C      C=R4
1608 F59B8 1554    DAT1=C S      Write out the protection nibble
1609 F59BC 1F00    D1=(5) (=STMTR1)+14 Go to create code
000
1610 F59C3 1574    C=DAT1 S      Read into C[S]
1611 F59C7 131    D1=A          Restore start of data
1612                *
1613                * Now get data length back from R2[A] (nibbles)
1614                *
1615 F59CA 112      A=R2
1616                *
1617                * A[A] is now data length in nibbles, C[S] is create code
1618                *
1619 F59CD 80DF     P=C      15
1620 F59D1 D2      C=0      A          Clear high nibbles
1621 F59D3 881     ?P#     1          TITAN data file?
1622 F59D6 90      GOYES   hCPY5,      No...continue
1623 F59D8 20      P=      0
1624 F59DA 308     LC(1)   (=oDAsod)-5 Amount of offset
1625 F59DD EA      A=A-C    A
1626 F59DF 20 hCPY5, P=      0
1627 F59E1 305     LC(1)   =lFLENh      Length of length field
1628 F59E4 EA      A=A-C    A
1629 F59E6 822     SB=0          Clear flag for extra nibble
1630 F59E9 25      P=      5
1631 F59EB A80     A=0      P          Clear nibble...
1632 F59EE 81C     ASRB          ...for bit shift
1633 F59F1 20      P=      0
1634                *
1635                * A[A] is now data length in bytes, SB is 1 if extra nibble
1636                *
1637 F59F3 821     XM=0          Convert XM to SB value
1638 F59F6 832     ?SB=0
1639 F59F9 60      GOYES   hCPY58
1640 F59FB 7EBA    GOSUB   hCPYXM      Set XM bit
1641 F59FF 102 hCPY58 R2=A          Save back in R2 for now
1642 F5A02 843     ST=0     =sDEST
1643 F5A05 7052    GOSUB   Rdinfo      Get source info back (addr)

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1644 F5A09 817          DSRC          Rotate address into D[X]
1645 F5A0C 751A        GOSUB Getmbx   Get mailbox address back
1646 F5A10 870         ?ST=1 =sLoop? Is this LOOP or non-MS device?
1647 F5A13 B1          GOYES hCPY5f   Yes...skip SEEKA, DDT
1648 F5A15 114         A=R4
1649 F5A18 8E00        GOSUBL =ASRC5  Get starting address of file
          00
1650 F5A1E 7C02        GOSUB Seeka    Seek that record
1651 F5A22 473         GOC hCPYER     Error
1652
1653 *
1654 * Now at the correct record...read the record, check status
1655 F5A25 8E00        GOSUBL =DdtRd  Read tape
          00
1656 F5A2B 4E2         GOC hCPYER
1657
1658 *
1659 * First set D1 to correct location:
1660 *
1661 * Type: 8 - Start of header + oIMPLh + osod (from POLL)
1662 *         4 - Start of header + oIMPLh (LIF1 file)
1663 *         2 - Start of header + oIMPLh (41C data file)
1664 *         1 - Start of header + oIMPLh + 8 (TITAN data file)
1665 *         0 - Start of header + oIMPLh (BASIC, KEYS, etc)
1666 F5A2E 111 hCPY5f A=R1          Start of file header in memory
1667 F5A31 D2          C=0 A
1668 F5A33 3152        LC(2) =oIMPLh
1669 F5A37 CA          A=A+C A Skip first part of header
1670 F5A39 D2          C=0 A
1671 F5A3B 1F00        D1=(5) (=STMTR1)+14 Create code...
          000
1672 F5A42 1574        C=DAT1 S ...into C[S]
1673 F5A46 94A        ?C=0 S Mainframe?
1674 F5A49 32         GOYES hCPY59   Yes...
1675 F5A4B A46        C=C+C S Implementation (OEM)?
1676 F5A4E 5E0        GONC hCPY5&   No...
1677 F5A51 1C8        D1=D1- 9 Point to offset field
1678 F5A54 14F        C=DAT1 B Read it
1679 F5A57 541        GONC hCPY59   Go always
1680
1681 *
1682 F5A5A 4C1 hCPYER GOC hCPYE5 Go always...purge the file, error
1683
1684 *
1685 F5A5D A46 hCPY5& C=C+C S ASCII file?
1686 F5A60 4B0        GOC hCPY59   Yes...
1687 F5A63 A46        C=C+C S 41C data file?
1688 F5A66 450        GOC hCPY59   Yes...
1689
1690 *
1691 * TITAN data file
1692 F5A69 308          LC(1) (=oDAsod)-5 Offset to start of data - link
1693
1694 F5A6C CA hCPY59 A=A+C A A[A] points to start of data area
1695 F5A6E 131        D1=A Point D1 to start of data area

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1696          *
1697          * Set terminate modes to none before copy
1698          *
1699 F5A71 8E00          GOSUBL =CLMODE          Clear terminate modes
                00
1700 F5A77 4A6 hCPYE5 GOC hCPYEL          Error clearing modes
1701          *
1702          * Now ready to copy the data area of the file
1703          *
1704 F5A7A 112          A=R2          Read back file length from R2
1705 F5A7D 8A8          ?A=0 A          Is the length zero?
1706 F5A80 11          GOYES hCPY5z          Yes...don't call READSU (sends SDA)
1707 F5A82 7F81          GOSUB hCPY5s          Set up send data/set frame count
1708          *
1709 F5A86 D6          C=A A          ...limit is A[A] bytes
1710 F5A88 8E00          GOSUBL =READSU          Read that many bytes to @ D1
                00
1711 F5A8E 435          GOC hCPYEL          Error during read
1712 F5A91 831 hCPY5z ?XM=0          Need 1 more nibble?
1713 F5A94 22          GOYES hCPY5+          No...continue
1714 F5A96 7B71          GOSUB hCPY5s          Set up send data/set frame count
1715          *
1716 F5A9A D2          C=0 A
1717 F5A9C E6          C=C+1 A          Read 1 byte to get last nibble
1718 F5A9E DA          A=C A          Needed for hCPYeL (if error)
1719 F5AA0 8E00          GOSUBL =PUTE
                00
1720 F5AA6 4B3          GOC hCPYEL          Error
1721 F5AA9 8E00          GOSUBL =GETD          Read the data byte (nibble)
                00
1722 F5AAF 423          GOC hCPYEL          Error
1723 F5AB2 15D0          DAT1=C 1          Write the one nibble out to RAM
1724 F5AB6 860 hCPY5+ ?ST=0 =sLoop?          Is this a mass storage transfer?
1725 F5AB9 22          GOYES hCPY5i          Yes...go on
1726          *
1727          * For hCPYeL to return, P must be zero!
1728          *
1729 F5ABB 20          P= 0
1730 F5ABD D0          A=0 A          A[A]=0 (have read all bytes)
1731 F5ABF 7450          GOSUB hCPYeL          No...read the rest of the data
1732 F5AC3 8E00          GOSUBL =GETDev          Am I controller?
                00
1733 F5AC9 4D0          GOC hCPY5H          No...skip cleanup
1734 F5ACC 96B          ?D=0 B          Is this "LOOP"?
1735 F5ACF 80          GOYES hCPY5H          Yes...skip cleanup
1736 F5AD1 8E00          GOSUBL =UTLEND          Yes...clean up the loop
                00
1737 F5AD7 6801 hCPY5H GOTO hCPY5I          Go check error, etc
1738          *
1739          *
1740 F5ADB 7941 hCPY5i GOSUB Endtap          Clean up tape business, Loop
1741 F5ADF 57F          GONC hCPY5H          no error...continue
1742 F5AE2          hCPYEL
1743          *
1744          * Entry to purge mainframe file, then hCPYeL

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1745      *
1746      * First save A[A], P, C[0] in R3
1747      *
1748 F5AE2 816      CSRC      C[S] is C[0]
1749 F5AE5 80FE    CPEX   14      C[14] is P
1750 F5AE9 D6      C=A    A
1751 F5AEB 10B     R3=C
1752 F5AEE 7241    GOSUB  GETDST      Read destination info
1753      *
1754      * Now D[S] is correct for this file, A[W] is filename
1755      *
1756 F5AF2 119      C=R1      Get file header start
1757 F5AF5 135      D1=C
1758 F5AF8 17F     D1=D1+ 16    Position to file type
1759 F5AFB D2       C=0    A
1760 F5AFD 15D3    DAT1=C 4     Make sure type is not LEX
1761 F5B01 1CF     D1=D1- 16    Set D1 back at start of file
1762 F5B04 8F00    GOSBVL =PRGFMF Purge the file (partial) file
      000
1763 F5B0B 11B     C=R3
1764 F5B0E DA      A=C    A
1765 F5B10 80DE    P=C    14
1766 F5B14 812     CSLC
1767 F5B17      hCPYeL
1768      *
1769      * Entry for P, C[0] = error message, R2[A] is # to have been
1770      * read, A[A] is number NOT read yet of R2 count, R4[14:10] is
1771      * number of sectors to be read (total)
1772      *
1773 F5B17 80C1     C=P    1
1774 F5B1B 8E00    GOSUBL =TSRV2C      Save error stuff in FUNCR1
      00
1775      *
1776      * Set up R4[14:10] to reflect the number of sectors LEFT,
1777      * A[A] the number of bytes within the current sector, XM=1 if
1778      * R2[A] is one byte short of real count
1779      *
1780 F5B21 D8      B=A    A      Save A[A] in B[A]
1781 F5B23 112     A=R2      Get count to A[A]
1782 F5B26 E0      A=A-B  A      Now A[A] is # actually read
1783 F5B28 831     ?XM=0
1784 F5B2B 40      GOYES  hCPYe0    No extra byte
1785 F5B2D E4      A=A+1  A      Extra byte!
1786 F5B2F D8      hCPYe0 B=A    A      Save count read in B[A]
1787 F5B31 F4      ASR    A
1788 F5B33 F4      ASR    A      Now A[A] is # sectors
1789 F5B35 11C     C=R4
1790 F5B38 7B21    GOSUB  Csrc10
1791 F5B3C E2      C=C-A  A
1792 F5B3E 431     GOC    hCPYex
1793 F5B41 D0      A=0    A
1794 F5B43 B60     A=A-B  B      Now A[A] is # bytes to read
1795 F5B46 8AC     ?A#0   A      Is it non-zero?
1796 F5B49 50      GOYES  hCPYe+    Yes...OK as is
1797 F5B4B B24     A=A+1  XS      No...full sector

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1798	F5B4E	7320	hCPYe+	GOSUB	hCPYe.	Read then
1799	F5B52	8E00	hCPYex	GOSUBL	=TRES2C	Restore the error stuff
		00				
1800	F5B58	80D1		P=C	1	
1801	F5B5C	890		?P=	0	If P=0, return (not error)
1802	F5B5F	00		RTNYES		
1803	F5B61	62CA	hCPYeR	GOTO	hCPYer	
1804				*-		
1805				*-		
1806	F5B65	7CB8	hCPYe1	GOSUB	Getmbx	Set D0 back to the mailbox
1807	F5B69	D0	hCPYe-	A=0	A	
1808	F5B6B	B24		A=A+1	XS	Set A[A]=#100 (256)
1809	F5B6E	11C		C=R4		
1810	F5B71	72F0		GOSUB	Csrc10	Get # of sectors into C[A]
1811				*		
1812				* Check	if not loop or non-MS device...if so, return	
1813				*		
1814	F5B75	860	hCPYe.	?ST=0	=sLoop?	
1815	F5B78	44		GOYES	hCPYe4	Set P=0, return
1816	F5B7A	CE		C=C-1	A	Decrement by 1
1817	F5B7C	7A50		GOSUB	Cslc10	Put it back
1818	F5B80	10C		R4=C		
1819	F5B83	483		GOC	hCPYe4	If carry, done with reads
1820	F5B86	7B98		GOSUB	Getmbx	Get the mailbox back
1821	F5B8A	7780	hCPYe1	GOSUB	hCPY5s	Set up send data/set frame count
1822				*		
1823	F5B8E	D6		C=A	A	Get count into C[A] (frame count)
1824	F5B90	8E00		GOSUBL	=PUTE	Send it to start conversation
		00				
1825	F5B96	452		GOC	hCPYe4	Error if carry
1826	F5B99	8A8	hCPYe2	?A=0	A	
1827	F5B9C	DC		GOYES	hCPYe-	
1828	F5B9E	8E00		GOSUBL	=GETX	Read the data
		00				
1829	F5BA4	582		GONC	hCPYe3	Got a data byte...process it
1830	F5BA7	880		?P#	0	Is this a EOT?
1831	F5BA9	21		GOYES	hCPYe4	Definitely not...error!
1832	F5BAC	8E00		GOSUBL	=FRAME-	Check for EOT
		00				
1833	F5BB2	890		?P=	=pTERM	Is it terminator match? (possible)
1834	F5BB5	5D		GOYES	hCPYe1	Yes...restart it
1835	F5BB7	890		?P=	=pEOT	Is it specifically EOT?
1836	F5BB9	0D		GOYES	hCPYe1	Yes...restart it
1837	F5BBC	20	hCPYe4	P=	0	Common exit code
1838	F5BBE	8E00		GOSUBL	=GETDev	Check if device or controller
		00				
1839	F5BC4	500		RTNNC		If controller:return, carry clear
1840	F5BC7	8C00		GOLONG	=TER/LF	Terminate on LF/end frame
		00				
1841				*-		
1842				*-		
1843	F5BCD	CC	hCPYe3	A=A-1	A	
1844	F5BCF	4CE		GOC	hCPYe4	Error (too many)
1845	F5BD2	0D		P=P-1		Decrement # of bytes
1846	F5BD4	58F		GONC	hCPYe3	More yet


```

1847 F5BD7 41C      GOC      hCPYe2      Done with this one...go on
1848              *-
1849              *-
1850 F5BDA 8C00    =Cslc10 GOLONG =CSLC10
                00
1851              *-
1852              *-
1853              *
1854              * Check if this is a lex file...if so, add it to LEX tables
1855              *
1856 F5BE0 111    hCPY51  A=R1      Get back start of file
1857 F5BE3 102      R2=A      Save in R2, in case call LEXBF+
1858 F5BE6 20      P=        0
1859 F5BE8 D2      C=0      A      Clear the high nibbles first
1860 F5BEA 3101    LC(2)    =oFTYP  Offset of TYPE in header
1861 F5BEE CA      A=A+C    A
1862 F5BF0 131    D1=A
1863 F5BF3 D0      A=0      A      Clear high nibble
1864 F5BF5 15B3    A=DAT1   4
1865 F5BF9 3380    LC(4)    =fLEX    LEX file type
                2E
1866 F5BFF 8A6      ?A#C    A      Is this LEX?
1867 F5C02 F0      GOYES   hCPY5e   No...exit
1868 F5C04 8F00    GOSBVL  =LEXBF+ Yes...update the LEX buffers
                000
1869 F5C0B 11A      C=R2
1870 F5C0E 109      R1=C      Restore start of file from R2
1871 F5C11 6D6B    hCPY5e  GOTO     RtnXM0  Clear XM for sure to finish
1872              *-
1873              *-
1874 F5C15 25      =hCPY5s P=        5
1875 F5C17 300      LC(1)    =MSDA@5  Assume controller mode...
1876 F5C1A 8E00    GOSUBL  =GETDev  Sets carry if device
                00
1877 F5C20 500      RTNCC
1878 F5C23 300      LC(1)    =MSFC@5  (controller...done)
1879 F5C26 03      RTNCC    Device mode...set frame count
1880              *-      Force carry clear
1881              *-
1882 F5C28 8C00    =Endtap GOLONG =ENDTAP
                00
1883              *-
1884              *-
1885 F5C2E 8C00    =Seeka  GOLONG =SEEKA
                00
1886              *-
1887              *-
1888 F5C34 7E10    GETDST  GOSUB   Rdinfd  Get destination information first
1889 F5C38 1B00    DO=(5)  =SCRICH
                000
1890 F5C3F 97C      ?A#0    W      Filename defined?
1891 F5C42 60      GOYES   GETDS1  Yes...check device type
1892 F5C44 1527    A=DAT0  W      No...read source name
1893 F5C48 817    GETDS1  DSRC     Rotate device into D[S]
1894 F5C4B B47      D=[+1  S      Check if device is specified...
  
```

```
1895 F5C4E 400          RTNC          ...no...return with mainframe
1896 F5C51 R4F          D=D-1 S      Specified...restore it
1897 F5C54 03          RTNCC
1898                  * _
1899                  * _
1900 F5C56 853 RdInfd  ST=1  =sDEST
1901 F5C59 8C00 Rdinfo  GOLONG =RDINFO
      00
1902                  * _
1903                  * _
1904 F5C5F D2  Gt2zer  C=0   R      Clear high nibs of C before call
1905 F5C61 8C00 Gt2byt  GOLONG =GT2BYT
      00
1906                  * _
1907                  * _
1908 F5C67 8C00 Csrc10  GOLONG =CSRC10
      00
1909                  * _
1910                  * _
1911 F5C6D 8C00 =Findf+  GOLONG =FINDF+
      00
1912                  * _
1913                  * _
1914 F5C73 20  =DdlPwr P=    =PWrite
1915 F5C75 7410 GOSUB  Ddl
1916 F5C79 400          RTNC
1917 F5C7C 8E00 GOSUBL =TSTAT
      00
1918 F5C82 400          RTNC
1919 F5C85 8C00 Mtyl   GOLONG =MTYL
      00
1920                  * _
1921                  * _
1922 F5C8B 20  DdlWrt  P=    =Write
1923 F5C8D 8C00 Ddl    GOLONG =DDL
      00
1924                  * _
1925                  * _
1926 F5C93 1F00 =D1=S20 D1=(5) (=SCRATCH)+20
      000
1927 F5C9A 01          RTN
1928                  * _
1929                  * _
1930 F5C9C 1B00 =DO=FRO DO=(5) =FUNCRO
      000
1931 F5CA3 01          RTN
1932 *****
1933 *****
1934 **
1935 ** Name:          hPURGE - PURGE statement POLL handler (HPIL)
1936 **
1937 ** Category:     POLL
1938 **
1939 ** Purpose:
1940 **          Handle the PURGE statement POLL if HPIL device
```

```

1941      **
1942      ** Entry:
1943      **      Name in A[W], R0[3:0]
1944      **      Device in D[S], D[X]
1945      **      P=0,HEXMODE
1946      **      Destination info on SAVSTK (under POLLSV)
1947      **
1948      ** Exit:
1949      **      P=0
1950      **      Carry set: Error (C[3:0] is error number)
1951      **      Carry clear:
1952      **      XM=0: handled...FIB file start zeroed, file purged
1953      **      ST[8]=0 (Current file not purged)
1954      **      XM=1: not handled (not HPIL/not Filbert)
1955      **      SAVSTK unchanged from entry
1956      **
1957      ** Calls:      CKBITL, FINDF+, DATST+, SAVDIR, CHKSEC, FPROT, D1=S20,
1958      **             hPUTDR, ENDTAP, I/OFND
1959      **
1960      ** Uses.....
1961      ** Inclusive: A-D, R0-R3, D0, D1, P, ST[8,5:0], SCRCH
1962      **
1963      ** Stk lvls:   6 (FINDF+)
1964      **
1965      ** History:
1966      **
1967      **      Date      Programmer      Modification
1968      **      -----      -
1969      **      01/12/83      NZ              Updated documentation
1970      **
1971      **
1972      **
1973 F5CA5 D9  SAVDIR  C=B   A              Save directory pointer in R3
1974 F5CA7 10B          R3=C
1975 F5CAA 71BF GETTYP  GOSUB  Gt2zer      Read the file type
1976      *
1977      * Now C[A] is the file type...check security!
1978      *
1979 F5CAE DA          A=C   A
1980 F5CB0 8000 =FTYPF# GOVLNG =FTYPF#
1981      *
1982      *
1983 F5CB7          hPURER
1984 F5CB7 8C00 =Error  GOLONG =ERROR      Set up error, return w/carry set
1985      *
1986      *
1987 F5CBD          =hPURGE
1988 F5CBD 73CA          GOSUB  CKBITL
1989 F5CC1 500          RTNNC              If no carry, not (HPIL&Filbert)
1990      *
1991      * This IS an HPIL purge!
1992      *
1993      * Save filename in R0, R1, START,CHKMAS,FINDFx
    
```

```

1994      *
1995 F5CC4 75AF      GOSUB Findf+
1996      *
1997      * If file not found, carry will be set...Error, not warning!
1998      *
1999 F5CC8 4EE      GOC      hPURER
2000      *
2001      * Save file information in R2 (to clean up FIB)
2002      * R2[6:4] is device address, R2[3:0] is data start address
2003      *
2004 F5CCB 8E2D      GOSUBL DATST+
      4F
2005 F5CD1 10A      R2=C          Save it in R2
2006      *
2007      * Save the directory information in R1 now
2008      *
2009 F5CD4 7DCF      GOSUB SAVDIR      Save dir pointer in R3, get type
2010 F5CD8 573      GONC      hPUR20      If no carry, didn't find type
2011      *
2012      * Found it...check if secure (if so, error...can't purge it)
2013      *
2014 F5CDB 7C00      GOSUB      CHKSEC      Check if secure
2015 F5CDF 503      GONC      hPUR20      Not secure...ok to purge
2016      *
2017      * This is a secure file...can't purge it
2018      *
2019 F5CE2 8E00 hPURSC GOSUBL =fPROT      Protected file error (P, C[0])
      00
2020 F5CE8 4EC      GOC      hPURER      Go always (set up error, RTNSC)
2021      *
2022      *
2023 F5CEB A4D      =CHKSEC B=B-1 S      Convert to base zero
2024 F5CEE AC9      C=B      S
2025 F5CF1 80DF      P=C      15
2026 F5CF5 891      ?P=      1
2027 F5CF8 00      RTNYES      Secure
2028 F5CFA 893      ?P=      3
2029 F5CFD 00      RTNYES      Secure, private
2030 F5CFF 03      RTNCC
2031      *
2032      *
2033 F5D01 11B hPUTDR C=R3
2034 F5D04 816      CSRC
2035 F5D07 AD2      C=0      M      Clear all unneeded nibbles
2036 F5D0A 8C00      GOLONG =PUTDR#      Write the entry from SCRTCH
      00
2037      *
2038      *
2039 F5D10      hPUR20
2040      *
2041      * OK to purge it
2042      *
2043 F5D10 7F7F      GOSUB      D1=S20      Set D1= (=SCRTCH)+20
2044 F5D14 D2      C=0      R
2045 F5D16 15D3      DAT1=C 4      Set file type = 0

```

```
2046      *
2047      * Now record # in C[A], directory entry # in C[S]
2048      *
2049 F5D1A 73EF      GOSUB hPUTDR      Write the entry from SCRCH
2050 F5D1E 489      GOC   hPURER      Error during write
2051      *
2052      * Now clean up the tape, etc
2053      *
2054 F5D21 730F      GOSUB Endtap      Clean up tape (rewind, etc)
2055 F5D25 419      GOC   hPURER      Error during clean-up
2056 F5D28 848      ST=0  8           Current file was not purged
2057 F5D2B 3230      LC(3) =bFIB
      8
2058 F5D30 8E00      GOSUBL =i/OFND
      00
2059 F5D36 11A      C=R2
2060      *
2061      * Entry to purge an FIB entry (D1 @ FIB buffer, C is pointer)
2062      *
2063 F5D39 26      =PURFIB P=      6
2064 F5D3B 14B      FNDENT A=DAT1 B
2065 F5D3E 968      ?A=0  B
2066 F5D41 72      GOYES NOTFND
2067 F5D43 17C      D1=D1+ =oFBEGb
2068 F5D46 177      D1=D1+ (oDBEGb)-(oFBEGb)
2069 F5D49 15B6     A=DAT1 7
2070 F5D4D 912      ?A=C  WP
2071 F5D50 E0      GOYES FIXIT
2072 F5D52 17E      D1=D1+ (oRECLb)-(oDBEGb)
2073 F5D55 17F      D1=D1+ (oRLENb)-(oRECLb)
2074 F5D58 17A      D1=D1+ (lFIB)-(oRLENb)
2075 F5D5B 5FD      GONC  FNDENT
2076      *
2077 F5D5E 1C7      FIXIT D1=D1- (oDBEGb)-(oFBEGb)
2078 F5D61 AF2      C=0  W
2079 F5D64 15D5     DAT1=C 6
2080      *
2081 F5D68 20      NOTFND P=      0
2082 F5D6A 641A     GOTO  RtnXMO
2083      *****
2084      *****
2085      **
2086      ** Name:      hRENAM - HPIL handler for the RENAME POLL
2087      **
2088      ** Category:  POLL
2089      **
2090      ** Purpose:
2091      **      HPIL handler for RENAME execute POLL
2092      **
2093      **
2094      ** Entry:
2095      **      A[W] is first 8 chars of filename
2096      **      RO[3:0] is last 2 chars
2097      **      D[3:0],D[S] is source device information
2098      **      P=0
```

```

2099      **      Source, destination info on SAVSTK (under POLLSV)
2100      **
2101      ** Exit:
2102      **      P=0
2103      **      Carry set: Error...error # in C[3:0]
2104      **      Carry clear:
2105      **          XM=0: handled
2106      **          XM=1: not handled
2107      **
2108      ** Calls:      CKBITL,hRNMSb,FINDF+,FINDFx,SAVDIR,D1=SCR,hPUTDR,
2109      **              ENDTAP
2110      **
2111      ** hRNMSb calls RDINFO
2112      **
2113      ** Uses.....
2114      ** Inclusive: A-D,R0,R1,R3,D0,D1,P,ST[8,5:0],SCRCH
2115      **
2116      ** Stk lvls:  6 (FINDF+)
2117      **
2118      ** History:
2119      **
2120      **      Date      Programmer      Modification
2121      **      -----      -
2122      **      06/02/83      NZ      Rewrote parts to pack code and
2123      **                      share routines with PURGE, SECURE
2124      **      01/13/83      NZ      Fixed bug in hRNMSb (setup for
2125      **                      FINDFx was incorrect)
2126      **                      Changed very first part of hRENAM
2127      **      01/12/83      NZ      Updated documentation
2128      **
2129      ** *****
2130      ** *****
2131 F5D6E 721A =hRENAM GOSUB CKBITL
2132 F5D72 500      RTNMC      Not HPIL HP82161...returnCC, XM=1
2133      *
2134      * Source or destination is HPIL (D[A] is address)
2135      *
2136      * A[W] is first 8 chars of source name, R0[3:0] is last 2 char
2137      * D[X] is HPIL address, D[S] is "8"
2138      *
2139 F5D75 7470      GOSUB hRNMSd
2140 F5D79 70FE      GOSUB Findf+      Find the destination file
2141      *
2142      * If found, error (File exists already)
2143      *
2144 F5D7D 5C1      GONC hRNMFx      Error...file exists already
2145      *
2146      * Check if error is "file not found" or something else
2147      *
2148 F5D80 880      ?PW      =eTAPE      Is it tape error?
2149 F5D83 E1      GOYES hRNMER      No..."real" error
2150 F5D85 80D0      P=C      0
2151 F5D89 890      ?P=      =eNFILE      Is it "No file" (Not found)?
2152 F5D8C D1      GOYES hRNMC0
2153 F5D8E 501      GONC hRNMeT      Go always - tape error
  
```

```

2154      *-
2155      *-
2156 F5D91 0          CON(1) =FIXSPC      9 nibbles available here
2157 F5D92          BSS      9-1
2158      *-
2159      *-
2160 F5D9A 20 hRNMfx P=      0
2161 F5D9C 300      LC(1) =eEFILE      File already exists
2162 F5D9F 20 hRNMeT P=      =eTAPE
2163 F5DA1 651F hRNMER GOTO  Error      Set up error code, RTNSC
2164      *-
2165      *-
2166 F5DA5 67F9 hRNMxM GOTO  hCPYxM      Carry clear, XM=1
2167      *-
2168      *-
2169      *
2170      * Destination file not found...continue
2171      *
2172 F5DA9 843 hRNM30 ST=0  =sDEST
2173 F5DAC 7040      GOSUB  hRNMsb
2174 F5DB0 120      AROEX
2175 F5DB3 101      R1=A
2176 F5DB6 8E00      GOSUBL =FINDFx      Find the source file
      00
2177 F5DBC 44E          GOC   hRNMER      Error
2178      *
2179      * Now the B[3:0] is the directory pointer for the file
2180      *
2181 F5DBF 72EE          GOSUB  SAVDIR      Save directory info, get file type
2182      *                               (Ignore carry from FIYPFW)
2183      *
2184      * Now get the destination name back
2185      *
2186 F5DC3 7620          GOSUB  hRNMsd      Get back the destination info
2187      *
2188      * Now A[W] is the first 8 chars, R0 is the last 2 chars
2189      *
2190 F5DC7 8E00      GOSUBL =D1=SCR      Point D1 @ SCRtCH
      00
2191 F5DCD 1517          DAT1=A W      Write out first 8 chars of name
2192 F5DD1 17F          D1=D1+ 16      Position to last 2 chars location
2193 F5DD4 110          A=R0
2194 F5DD7 1593          DAT1=A 4      Write out last 2 chars of name
2195 F5DD8 722F          GOSUB  hPUTDR      Write directory entry from SCRtCH
2196 F5DDF 41C          GOC   hRNMER      Error
2197 F5DE2 724E          GOSUB  Endtap      End the tape conversation
2198 F5DE6 4AB          GOC   hRNMER      Error
2199 F5DE9 6599          GOTO  RtnXMO      Return, indicate "handled"
2200      *-
2201      *-
2202 F5DED 853 hRNMsd ST=1  =sDEST      Set destination first
2203 F5DF0 DB hRNMsb C=D   A
2204 F5DF2 109          R1=C
2205 F5DF5 706E          GOSUB  Rdinfo
2206 F5DF9 AFB          C=D   W      Save dest device & address in R1
  
```

```

2207 F5DFC 129          CR1EX          Restore old address, save new
2208 F5DFF D7          D=C   A          Restore address to D[A]
2209 F5E01 03          RTNCC          Carry clear
2210 *****
2211 *****
2212 **
2213 ** Name:           hFPROT - File protection handler (HPIL files)
2214 **
2215 ** Category:      POLL
2216 **
2217 ** Purpose:
2218 **     Execute the SECURE/PRIVATE command for an HPIL device
2219 **
2220 ** Entry:
2221 **     D[S] is the device type: if HPIL, then A[W] is first
2222 **     8 chars of filename, RO[3:0] is last 2 chars, D[X] is
2223 **     HPIL address of the device
2224 **     Destination info on SAVSTK (under POLLSSV)
2225 **     (See detail also!)
2226 **
2227 ** Exit:
2228 **     Carry set: Error (C[3:0] is error number)
2229 **     Carry clear:
2230 **     XM=1: Not handled (not HPIL/not HP82161)
2231 **     XM=0: Handled (action taken)
2232 **
2233 ** Calls:          CKBITL, FINDF+, SAVDIR, CHKSEC, D1=S20, PT2BYT,
2234 **                 HPUTDR, ENDTAP
2235 **
2236 ** Uses.....
2237 **     Inclusive:  A-D, RO, R1, R3, DO, D1, P, ST[8,5:0], SCRTCH
2238 **
2239 ** Stk lvls:      6 (FINDF+)
2240 **
2241 ** Detail:
2242 **     ST(sPRIVT) set if PRIVATE, clear if SECURE
2243 **     ST(sUNSEC) set if UNSECURE, clear if SECURE
2244 **
2245 ** History:
2246 **
2247 **     Date         Programmer          Modification
2248 **     -----
2249 **     06/02/83     NZ              Reworked to share much code with
2250 **                                     PURGE and RENAME
2251 **     02/08/83     NZ              Changed to prevent PRIVATE on a
2252 **                                     secure file (design change)
2253 **     01/12/83     NZ              Converted to single poll entry
2254 **     12/20/82     NZ              Added routine and documentation
2255 **
2256 *****
2257 *****
2258 F5E03 7D79 =hFPROT GOSUB CKBITL      Check if this is HPIL & HP82161
2259 F5E07 500          RTNCC          No...set XM (not handled)
2260 *
2261 * This is an HPIL device

```



```

2262      *
2263 F5E0A 7F5E      GOSUB Findf+      Save A in RO, RO>R1, START,FINDFx
2264 F5E0E 4E7      GOC   hSECEr      Error
2265      *
2266      * Have found the file (D1 is at file type)
2267      *
2268 F5E11 709E      GOSUB SAVDIR      Save dir info in R3, check type
2269 F5E15 460      GOC   hSEC15      Found type entry...continue
2270 F5E18 66D9 hSECft GOTO  hCPYtp      Not found...error
2271      *
2272      *
2273      *
2274      * Found it...C[A], B[A] point to the entry, B[S] is position
2275      * of the type within the entry
2276      *
2277 F5E1C 7BCE hSEC15 GOSUB  CHKSEC      Check if secure(leaves P=entry #)
2278 F5E20 0B      CSTEM
2279 F5E22 80F0      CPEX  0
2280 F5E26 0B      CSTEM      Now ST[3:0] is the current pos
2281      sSEC  EQU  0      Bit for SECURE
2282      sPR   EQU  1      Bit for PRIVATE
2283 F5E28 860      ?ST=0 =sPRIVT     Is this PRIVATE statement?
2284 F5E2B E0      GOYES hSEC20      No...must be secure
2285      *
2286      * PRIVATE statement
2287      *
2288 F5E2D 851      ST=1  sPR      Make it private!
2289 F5E30 860      ?ST=0 sSEC      Is it OK (NOT secure)?
2290 F5E33 41      GOYES hSEC30     Yes...write it back out
2291 F5E35 6CAE      GOTO  hPURSC     No...file secure
2292      *
2293      *
2294 F5E39      hSEC20
2295      *
2296      * [UN]SECURE statement (need to determine which it is)
2297      *
2298 F5E39 860      ?ST=0 =sUNSEC     UNSECURE?
2299 F5E3C 80      GOYES hSEC25      No...must be SECURE statement
2300      *
2301      * This is the UNSECURE statement
2302      *
2303 F5E3E 840      ST=0  sSEC      Clear the security bit
2304 F5E41 550      GONC  hSEC30     Go always
2305      *
2306      *
2307 F5E44      hSEC25
2308      *
2309      * This is the SECURE statement
2310      *
2311 F5E44 850      ST=1  sSEC
2312 F5E47      hSEC30
2313      *
2314      * Now ST[3:0] is the desired entry #
2315      *
2316 F5E47 0B      CSTEM

```

```

2317 F5E49 80F0          CPEX   0          Restore ST[3:0] from P
2318 F5E4D 0B           CSTEX
2319 F5E4F 80CF          C=P   15         Set C[S] to desired security
2320                      *
2321                      * Now C[S] is the desired type #, C[A] is the entry address
2322                      *
2323 F5E53 135           D1=C
2324 F5E56 17E           D1=D1+ 15        Point to # types
2325 F5E59 1534          R=DAT1 S         Read it in...
2326 F5E5D 9CA           ?R<=C S         ...is the type I want available?
2327 F5E60 8B           GOYES hSECft     No...file type error
2328 F5E62 1C4           D1=D1- 5         Position to (type-2)
2329 F5E65 173 hSEC40  D1=D1+ 4         Go to next type
2330 F5E68 A4E           C=C-1 S         Done yet?
2331 F5E6B 59F          GONC   hSEC40    No...loop back
2332                      *
2333                      * Now D1 is at the desired file type
2334                      *
2335 F5E6E 15F5          C=DAT1 6         Read type into C[5:2]
2336 F5E72 7D1E          GOSUB  D1=S20    Point to the type
2337 F5E76 8E00          GOSUBL =PT2BYT  Write the new file type
      00
2338                      *
2339                      * Now get the pointer back from R3 and write the entry
2340                      *
2341 F5E7C 718E          GOSUB  hPUTDR    Write the entry from SCRTCH
2342 F5E80 4C0           GOC    hSECer    Error
2343 F5E83 71AD          GOSUB  Endtap    Clean up the loop
2344 F5E87 821           XM=0           Make sure XM=0 (handled)
2345 F5E8A 500           RTNNC          Return if no carry...done
2346                      *
2347                      * If fall through RTNNC, then error has occurred during ENDTAP
2348                      *
2349 F5E8D 692E hSECer  GOTO   Error    Return, carry set
2350 F5E91           END

```

A-MULT	Ext		-	353						
ACES=0	Abs	1004290	#F5302	-	454	444	567			
ASLC12	Ext			-	1278					
ASLC3	Ext			-	334					
ASLC4	Ext			-	1173					
ASLC6	Ext			-	1193					
ASRC10	Ext			-	1204					
ASRC3	Ext			-	1040					
ASRC4	Ext			-	995					
ASRC5	Ext			-	1012	1649				
BLANKC	Ext			-	1494					
Basic	Abs	0	#00000	-	1182	1183	1188	1199		
CHAIN-	Ext			-	1214					
CHKASN	Ext			-	660					
CHKBIT	Ext			-	1055	1292				
CHKMAS	Ext			-	259					
=CHKSEC	Abs	1006827	#F5CEB	-	2023	2014	2277			
=CKBITL	Abs	1005444	#F5784	-	1292	115	1988	2131	2258	
=CKHPI+	Abs	1005456	#F5790	-	1295	633				
=CKHPIL	Abs	1005453	#F578D	-	1294	253				
CKHPIx	Abs	1005467	#F579B	-	1299	1293	1296			
CLMODE	Ext			-	1699					
CRTF	Ext			-	1570					
CRTF00	Abs	1003983	#F51CF	-	261	258				
CRTF01	Abs	1003987	#F51D3	-	264	260				
CRTF05	Abs	1004004	#F51E4	-	272	267				
CRTF10	Abs	1004053	#F5215	-	300	286				
CRTF20	Abs	1004074	#F522A	-	312	303				
CRTF30	Abs	1004114	#F5252	-	342	313				
CRTF35	Abs	1004134	#F5266	-	348	346				
CRTF4.	Abs	1004049	#F5211	-	297	301				
CRTF40	Abs	1004154	#F527A	-	359	297	309	336		
CSLC10	Ext			-	1850					
CSLC2	Ext			-	1247					
CSLC3	Ext			-	755					
CSLC4	Ext			-	855					
CSLC6	Ext			-	362					
CSLC7	Ext			-	182					
CSLC9	Ext			-	439					
CSRC10	Ext			-	1908					
CSRC3	Ext			-	763					
CSRC4	Ext			-	343	371				
CSRC5	Ext			-	765	936	1244			
CSRC9	Ext			-	638					
=Cslc10	Abs	1006554	#F5BDA	-	1850	938	1817			
Cslc4	Abs	1004722	#F54B2	-	855	184	351			
Cslc5	Abs	1004719	#F54AF	-	854	127	753	1013	1319	1321
Csrc10	Abs	1006695	#F5C67	-	1908	1037	1472	1790	1810	
D0=FIB	Ext			-	688					
=D0=FR0	Abs	1006748	#F5C9C	-	1930	1010	1034	1512	1565	1571
=D1=S20	Abs	1006739	#F5C93	-	1926	973	1000	2043	2336	
D1=SCR	Ext			-	2187					
DATST+	Abs	1003939	#F51A3	-	183	2004				
DATSTR	Abs	1003921	#F5191	-	179	134				
DDL	Ext			-	1923					

Ddl	Abs	1006733	#F5C8D	-	1923	1915					
=DdlPwr	Abs	1006707	#F5C73	-	1914						
DdlWrt	Abs	1006731	#F5C8B	-	1922						
DdtRd	Ext			-	1655						
ENDTAP	Ext			-	1882						
ERROR	Ext			-	1984						
ERRORX	Ext			-	448						
ERror	Abs	1004000	#F51E0	-	269	138	256				
=Endtap	Abs	1006632	#F5C28	-	1882	136	1059	1740	2054	2194	2343
=Error	Abs	1006775	#F5CB7	-	1984	1068	2160	2349			
Errorx	Abs	1004284	#F52FC	-	448	426	432	443	502	552	559
				-	654						566
FINDF	Ext			-	1082	1527					
FINDF+	Ext			-	1911						
FINDFL	Ext			-	928	1313					
FINDFx	Ext			-	119	2173					
FIXIT	Abs	1006942	#F5D5E	-	2077	2071					
FNDENT	Abs	1006907	#F5D3B	-	2064	2075					
FNDMB+	Ext			-	1057						
FRAME-	Ext			-	1832						
FTYPF#	Ext			-	1980						
FUNCRO	Ext			-	1539	1575	1590	1930			
FUNCR1	Ext			-	1533						
=Findf+	Abs	1006701	#F5C6D	-	1911	1995	2140	2263			
GETBYT	Ext			-	1404						
GETD	Ext			-	1721						
GETDS1	Abs	1006664	#F5C48	-	1893	1891					
GETDST	Abs	1006644	#F5C34	-	1888	1486	1557	1752			
GETDev	Ext			-	1732	1838	1876				
GETMBX	Ext			-	682						
GETTYP	Abs	1006762	#F5C9A	-	1975	947	1348				
GETX	Ext			-	1828						
GT2BYT	Ext			-	1905						
=Getmbx	Abs	1004581	#F5425	-	682	563	583	1645	1806	1820	
Gt2byt	Abs	1006689	#F5C61	-	1905	181					
Gt2zer	Abs	1006687	#F5C5F	-	1904	1975					
LEXBF+	Ext			-	1868						
MOVEFL	Ext			-	1048						
MTYL	Ext			-	1919						
Mtyl	Abs	1006725	#F5C85	-	1919						
NEWFI+	Ext			-	1027	1286					
NEWFIL	Ext			-	377						
NOTFND	Abs	1006952	#F5D68	-	2081	2066					
OUTPTt	Ext			-	741						
PILVER	Ext			-	63						
PLOTt	Ext			-	743						
PRGFMF	Ext			-	1762						
PRTIS+	Ext			-	759						
PT2BYT	Ext			-	2337						
=PURFIB	Abs	1006905	#F5D39	-	2063						
PUTDR#	Ext			-	2036						
PUTE	Ext			-	1719	1824					
PWrite	Ext			-	1914						
RDINFO	Ext			-	1901						
RDNB10	Abs	1004371	#F5353	-	561	556					

READR#	Ext			-	431	565				
READSU	Ext			-	1710					
RSTOR+	Abs	1004252	#F52DC	-	432	505				
RSTORE	Abs	1004255	#F52DF	-	438	584				
Rdinfo	Abs	1006678	#F5C56	-	1900	1272	1888			
Rdinfo	Abs	1006681	#F5C59	-	1901	1643	2202			
RtnXMO	Abs	1005439	#F577F	-	1288	458	1065	1871	2082	2196
SAVDIR	Abs	1006757	#F5CA5	-	1973	2009	2178	2268		
SCRCH	Ext			-	1018	1382	1402	1889	1926	
SEEKA	Ext			-	1885					
SNAPRS	Ext			-	445					
START	Ext			-	685					
STBUF+	Abs	1004436	#F5394	-	630	422	498	548		
STMTR0	Ext			-	780					
STMTR1	Ext			-	273	750	778	1609	1671	
STUP10	Abs	1004513	#F53E1	-	657	651				
STUP20	Abs	1004531	#F53F3	-	663	681				
STUPBF	Abs	1004471	#F53B7	-	642	562				
=Seeka	Abs	1006638	#F5C2E	-	1885	1650				
Start	Abs	1004587	#F542B	-	685	117	255	425	501	551
TER/LF	Ext			-	1840					
TRES2C	Ext			-	761	1032	1799			
TSV2C	Ext			-	757	1022	1774			
TSVD1	Ext			-	748					
TSTAT	Ext			-	1917					
UTLEND	Ext			-	1736					
Utlend	Ext			-	442					
WRITE#	Ext			-	504	558				
WRTADR	Abs	1004561	#F5411	-	676	427	503	553		
Write	Ext			-	1922					
bFIB	Abs	2051	#00803	-	13	2057				
d0=FIB	Abs	1004593	#F5431	-	688	454	630	642	676	
eFILE	Ext			-	2158					
eTYPE	Ext			-	1357					
eFnFND	Ext			-	1083					
eNFILE	Ext			-	1336	2151				
ePIL	Ext			-	653					
eRANGE	Ext			-	268					
eSYSer	Ext			-	652					
eTAPE	Ext			-	1337	1343	2148	2159		
eTSIZE	Ext			-	1342					
fBASIC	Abs	57876	#0E214	-	13	1184				
fKEY	Abs	57868	#0E20C	-	13	1498				
fLEX	Abs	57864	#0E208	-	13	1865				
fPROT	Ext			-	2019					
=fTYPF#	Abs	1006768	#F5CBO	-	1980					
=hCOPYx	Abs	1004728	#F54B8	-	858					
hCPY10	Abs	1004739	#F54C3	-	872	860				
hCPY12	Abs	1004801	#F5501	-	908	893				
hCPY22	Abs	1004826	#F551A	-	936	929				
hCPY23	Abs	1004854	#F5536	-	952	948				
hCPY24	Abs	1004876	#F554C	-	971	962				
hCPY25	Abs	1004911	#F556F	-	994	988				
hCPY28	Abs	1005053	#F55FD	-	1054	1064				
hCPY29	Abs	1005080	#F5618	-	1061	1056				

o41sod	Abs	5 #00005	-	13	1250					
oACCSb	Abs	11 #0000B	-	13	455	568	643	648		
oBSsod	Abs	17 #00011	-	13	1207					
oCOPYb	Abs	10 #0000A	-	13	657	658				
oCPOSb	Abs	40 #00028	-	13	569	666				
oDRsod	Abs	13 #0000D	-	13	1624	1692				
oDBEGb	Abs	21 #00015	-	13	568	569	658	666	678	2068 2072
					2077					
oDEVcb	Abs	12 #0000C	-	13	631					
oFBEGb	Abs	13 #0000D	-	13	677	678	2067	2068	2077	
oFBF#b	Abs	2 #00002	-	13	648	657				
oFLAGh	Abs	20 #00014	-	13	1092	1097	1601			
oFLENh	Abs	32 #00020	-	13	1097	1177	1207			
oFTYPh	Abs	16 #00010	-	13	1091	1177	1860			
oIMPLh	Abs	37 #00025	-	13	1668					
oRECLb	Abs	36 #00024	-	13	2072	2073				
oRENBb	Abs	52 #00034	-	13	2073	2074				
pEOT	Ext		-		1835					
pTERM	Ext		-		1833					
sCARD	Abs	2 #00002	-	13	872					
sDEST	Abs	3 #00003	-	13	1642	1900	2169	2199		
sEXTDV	Abs	0 #00000	-	13	859					
sLoop?	Ext		-		1646	1724	1814			
=sNAPRS	Abs	1004277 #F52F5	-		445					
sOVERW	Ext		-		376	1026	1285			
sPR	Abs	1 #00001	-		2282	2288				
sPRIVT	Ext		-		2283					
sSEC	Abs	0 #00000	-		2281	2289	2303	2311		
sUNDEF	Abs	1 #00001	-	13	917					
sUNSEC	Ext		-		2298					

Input Parameters

Source file name is NZ&HND::MS

Listing file name is NZ/HND:TI:ML::-1

Object file name is NZ%HND:TI:MS::-1

Initial flag settings are
111111
0123456789012345

Errors

None

Saturn Assembler News

```
1          TITLE HPIL CAT <840106.1936>
2 F5E91     ABS   #F5E91          TIXHP6 address (fixed)
3          *
4          *      N  N  ZZZZZ  &      CCC      A      TTTT
5          *      N  N      Z  & &    C  C      A  A      T
6          *      NN N      Z  & &    C      A  A      T
7          *      N  N  N      Z      &      C      A  A      T
8          *      N  NN  Z      & & &  C      AAAAA  T
9          *      N  N  Z      & &    C  C      A  A      T
10         *      N  N  ZZZZZ  && &    CCC      A  A      T
11         *
12         *****
13         *****
14         **
15         ** Name:          hCAT - HPIL poll handler for the CAT statement
16         **
17         ** Category:     POLL
18         **
19         ** Purpose:
20         **      Execute the CAT function for an HPIL device
21         **
22         ** Entry:
23         **      File name in A[W], RO[3:0] (A[W]=0 if none specified)
24         **      Device specifier in D[3:0], D[S]
25         **      P=0
26         **
27         ** Exit:
28         **      P=0
29         **      Carry set: error (C[3:0] is error number)
30         **      Carry clear:
31         **      XM=0: handled (cat is finished)
32         **      XM=1: not handled (not HPIL or not Filbert)
33         **
34         ** Calls:         CKBITL, FINDF+, SAVED1, SETCAT, BLDCAT, DSPCAT, BF2DSP,
35         **                RESTD1, START, GETDR!, hCATsu, CK=ATn, UTLEND, POPBUF,
36         **                RPTKY, SCRLLR, FINDA, D1=AVE, ENDTAP, hCTA+, hCTA-,
37         **                CSRC10, NXTENT, hCTA=, CSRC5, LSTENT, CSLC10, CSLC5
38         **
39         ** Uses.....
40         **      Inclusive: A, B, C, D, RO, R1, R2, R3, R4, DO, D1, P, STMTDO, ST[4:0],
41         **                SCRCH[63:0], 3 RSTK save fields, FUNCDO, FUNCRI,
42         **                F-R0-1
43         **
44         ** Stk lvls:     6 (FINDF+)(hCTA+)(hCTA-)(hCTA=)
45         **
46         ** Detail:
47         **      R3 contains the pointers to the current drive:
48         **      [A] is the # of entries remaining in directory
49         **      (after the current one!), including any
50         **      purged entries
51         **      [9:5] is the current entry number (this is the
52         **      number of entries to here in the directory,
53         **      including the current entry and any purged
54         **      entries)
55         **      [13:10] is the physical directory pointer (3 nib
```

```

56      **          record pointer, 1 nib offset pointer)
57      **          [S] is the "valid" flag - indicates whether
58      **          the physical directory pointer is where the
59      **          drive really is pointing now (0 means valid)
60      **
61      ** Algorithm:
62      **
63      **          hCAT: IF (not HPIL) or (not Filbert) THEN
64      **                  RETURN carry clear, XM=1 -- Not handled
65      **                  --
66      **                  -- This is HPIL...continue
67      **                  --
68      **                  IF (filename not specified) THEN CATALL
69      **                  --
70      **                  -- This is a specific entry
71      **                  --
72      **                  Find the file (FINDF+)
73      **                  IF error then set up error, RTNSC
74      **                  --
75      **                  -- File found (directory entry in SCRTCH)
76      **                  --
77      **                  Save device address in STMTD1
78      **                  Reserve RAM on MTHSTK for building entry
79      **                  --
80      **                  BLDCAT -- Build the CAT string on the stack
81      **                  --
82      **                  DSPCAT -- Send the string to the display
83      **                  ---
84      **                  GOTO hCTA35 -- Collapse the MTHSTK, RTNCC
85      **          -----
86      **          -----
87      **          CATALL: Save device address in STMTD1
88      **                  Display header line (NAME...TYPE...LEN...)
89      **                  --
90      **                  Restore device address
91      **                  Get directory info and first entry from drive
92      **                  --
93      **                  Reserve RAM on MTHSTK for building entry
94      **                  --
95      **          hCTA20: Check for ATTN key pressed (if so, exit)
96      **                  Unaddress the device as listener
97      **                  --
98      **                  Build the catalog entry                (BLDCAT)
99      **                  Display the catalog entry              (DSPCAT)
100     **                  Goto hCTA22
101     **                  -----
102     **          hCTAct --
103     **                  -- Continue with next key
104     **                  --
105     **                  Unaddress talkers/listeners            (UTLEND)
106     **                  --
107     **          hCTA22 Pop key from buffer (Either entry or already used)
108     **                  --
109     **                  Repeat key if still down                (RPTKEY)
110     **                  --

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```

111      **          If key not still down, get next key      (SCRLLR)
112      **          --
113      **          hCTA35 Restore device address from STMTD1  (RESTD1)
114      **          --
115      **          Set up the loop and device again          (START )
116      **          If error, goto hCTAer (clean up)
117      **          --
118      **          Set R2=R3 (R2 is temporary position)
119      **          Check keycode                                (FINDA )
120      **          Down  :goto hCTAdn
121      **          Up    :goto hCTAup
122      **          Bottom:goto hCTAbt
123      **          Top   :goto hCTAtp
124      **          Else continue
125      **          --
126      **          If keycode is not zero (CAT all) then
127      **             inhibit display scrolling
128      **          --
129      **          hCTA38 Release RAM from MTHSTK
130      **          --
131      **          hCTA39 Remind the drive, unaddress all      (ENDTAP)
132      **          Return with carry clear, XM=0
133      **          -----
134      **          hCTAdn -- Down arrow
135      **          --
136      **          Get next non-purged directory entry        (hCTA+ )
137      **          --
138      **          hCTAxx If not End_of_Directory, goto hCTAbl --Build disp
139      **          else goto hCTAct --Ignore the down arrow
140      **          -----
141      **          hCTAup -- Up arrow
142      **          --
143      **          Get previous non-purged directory entry (hCTA-)
144      **          Goto hCTAxx
145      **          -----
146      **          hCTAbt -- gDown arrow (bottom)
147      **          --
148      **          Get next non-purged directory entry        (hCTA+ )
149      **          If not End_of_Directory, goto hCTAbt --Get next
150      **          --
151      **          -- Reached End_of_Directory...
152      **          -- ...Check if new record...if so, say not exact
153      **          --
154      **          Get the current entry                        (hCTA= )
155      **          Goto hCTA20 --Build it, display it
156      **          -----
157      **          hCTAtp -- gUp arrow (top)
158      **          --
159      **          If already at top, then goto hCTA&& --Redisplay it
160      **          Position to first non-purged directory entry
161      **          Goto hCTA&& --Redisplay it
162      **
163      ** History:
164      **
165      **      Date      Programmer      Modification
  
```

```

166      ** -----
167      ** 01/03/84      NZ      Changed RAM usage (added two RSTKBF
168      **                                     levels in hCTA+c to fix bug)
169      ** 10/25/83      NZ      Updated documentation
170      ** 05/16/83      NZ      Changed CKHPIL to CKBITL, removed
171      **                                     check for mass storage (done in
172      **                                     CKBITL)
173      ** 04/14/83      NZ      Added call to CHKMAS
174      ** 01/14/83      NZ      Packed code (CKHPIL,FINDF+), fixed
175      **                                     bug (CAT :<device>, no files on
176      **                                     medium)
177      ** 12/02/82      NZ      Wrote statement & documentation
178      **
179      ****
180      ****
181 F5E91 7000 =hCAT  GOSUB =CKBITL      Is this an HPIL CAT on Filbert?
182 F5E95 500   RTNNC                                     No...return, XM set, carry clear
183      *
184      * This IS HPIL...is it for whole device or just one file?
185      *
186 F5E98 978   ?A=0  W      Filename specified?
187 F5E9B 62    GOYES hCATAL No...CAT ALL
188      *
189      * This is CAT for a specific file
190      *
191 F5E9D 7000   GOSUB =Findf+      Set up and find the file
192 F5EA1 4D7    GOC   hCATer      Not found/error
193      *
194      * Now the directory entry is in SCRCH
195      *
196 F5EA4 DB     C=D   A
197 F5EA6 135    D1=C
198 F5EA9 8E00   GOSUBL =SAVED1     Save device address in STMTD1
199      00
200 F5EAF 7E73   GOSUB SETCAT      Reserve the stack space for entry
201 F5EB3 7ED4   GOSUB BLDCAT      Build the CAT entry
202 F5EB7 7B47   GOSUB DSPCAT      Display the cat entry
203 F5EBB D0     A=0   A      Clear A[B] ("keycode")
204 F5EBD 69E0   GOTO  hCTA35      Exit after cleanup
205      *
206 F5EC1        hCATAL
207      *
208      * This is a CAT ALL! (Device address in D[3:0])
209      *
210 F5EC1 7E50   GOSUB hCTA10      (GOSUB to get address on RSTK)
211      *
212      *
213      * Header string here
214      *
215 F5EC5 B1C3   NIBHEX B1C3      Cursor off - want non-readable
216 F5EC9 0202   NIBASC \  NAME \      chars
      02E4
      14D4
      5402
  
```

```

217 F5ED9 0202      NIBASC \  S TYP\
      0235
      0245
      9505
218 F5EE9 5402      NIBASC \E  LEN \
      0202
      C454
      E402
219 F5EF9 0202      NIBASC \  DATE \
      0244
      1445
      5402
220 F5F09 0202      NIBASC \  TIME \
      0245
      94D4
      5402
221 F5F19 D0A0      NIBHEX D0A0FF
      FF
222          *-
223          *-
224 F5F1F 6000 hCATer GOTO  =Error      Return, set carry,err # in C[3:0]
225          *-
226          *-
227 F5F23 DB  hCTA10 C=D    A
228 F5F25 135          D1=C
229 F5F28 8E00          GOSUBL =SAVED1      Save address in STMTD1
      00
230 F5F2E 07          C=RSTK
231 F5F30 135          D1=C      Position D1 @ string
232 F5F33 8F00          GOSBVL =BF2DSP      Send the header,build the display
      000
233 F5F3A 8E00          GOSUBL =RESTD1      (Don't care about D1 any more)
      00
234 F5F40 137          CD1EX
235 F5F43 D7          D=C    A      Restore address
236 F5F45 8E00          GOSUBL =START      Set up the loop, check modes
      00
237 F5F4B 43D hCATer GOC    hCATer      Error...set it up
238 F5F4E 8E00          GOSUBL =GETDR1     Get directory start, first entry
      00
239 F5F54 7162          GOSUB  hCATsu      Set up for directory
240 F5F58 42F          GOC    hCATer      Error
241 F5F5B 8AE          ?C#0  A      Any entries?
242 F5F5E 60          GOYES  hCTA20      Yes...do them
243 F5F60 6680          GOTO  hCTAex      No...exit
244          *-
245          *-
246          *
247          * Now R3[A] is # ENTRIES remaining, R3[9:5] is current entry,
248          * R3[13:10] is current entry address
249          *
250 F5F64 8E00 hCTA20 GOSUBL =CK=ATn      Check if ATNFLG is set...
      00
251 F5F6A 531          GONC   hCTA21      ...yes it is...exit
252 F5F6D 8E00          GOSUBL =UTLEND     Unaddress the device...

```

```

      00
253 F5F73 7E14      GOSUB  BLDCAT      ...Build the catalog entry...
254 F5F77 7B86      GOSUB  DSPCAT      ...display the entry
255 F5F7B 4E0       GOC    hCTA22      Go always
256                *-
257                *-
258 F5F7E 5A7      hCTA21  GONC    hCTA38      Go always (jump out of range)
259                *-
260                *-
261 F5F81 8E00      hCTAct  GOSUBL =UTLEND      Unaddress talkers/listeners
      00
262 F5F87 443       GOC    hCTAeR      Error
263                *
264                * Pop the key, if any, out of the buffer
265                *
266 F5F8A 8F00      hCTA22  GOSBVL =POPBUF
      000
267 F5F91 8F00      hCTA25  GOSBVL =RPTKY      Repeat the last key if still down
      000
268 F5F98 490       GOC    hCTA30      (Key repeated if carry)
269 F5F9B 8F00      GOSBVL =SCRLLR      Scroll left/right
      000
270 F5FA2 968      hCTA30  ?A=0  B      Valid key?
271 F5FA5 CE        GOYES  hCTA25      No...continue
272 F5FA7 8E00      hCTA35  GOSUBL =RESTD1      Yes...process key
      00
273 F5FAD 137       CD1EX
274 F5FB0 D7        D=C    A      Restore device addr from STMTR1
275 F5FB2 D8        B=A    A      Save keycode in B[B]
276 F5FB4 8E00      GOSUBL =START      Set up the loop again
      00
277 F5FBA D4        A=B    A      Restore keycode from B[B]
278 F5FBC 495      hCTAeR  GOC    hCTAeR      Error
279 F5FBF 11B      C=R3
280 F5FC2 10A      R2=C      Use R2 as temporary position reg
281                *
282                * A[B] is the keycode of the key...check if valid CAT key
283                *
284 F5FC5 8F00      GOSBVL =FINDA
      000
285 F5FCC 00        CON(2) =k#DOWN      Down
286 F5FCE F50      REL(3) hCTAdn
287 F5FD1 00        CON(2) =k#UP        Up
288 F5FD3 A60      REL(3) hCTAup
289 F5FD6 00        CON(2) =k#BOT       Bottom
290 F5FD8 D60      REL(3) hCTAbt
291 F5FDB 00        CON(2) =k#TOP       Top
292 F5FDD B90      REL(3) hCTAtp
293 F5FE0 00        CON(2) 0           End of table
294                *
295                * This is not a valid CAT key...exit
296                *
297 F5FE2 968      ?A=0  B      Is this a single entry CAT?
298 F5FE5 41        GOYES  hCTA38      Yes...don't touch NEEDSC
299 F5FE7          hCTAex
  
```

300	F5FE7	DO	A=0	A	Clear NEEDSC (CAT :<device>)
301	F5FE9	1F00 000	D1=(5)	=NEEDSC	
302	F5FF0	1590	DAT1=A	1	Clear NEEDSC to inhibit scrolling
303	F5FF4	8AA	?C=0	A	Exit for no files on medium?
304	F5FF7	41	GOYES	hCTA39	Yes.Don't release RAM-never reserved
305	F5FF9	hCTA38			
306	F5FF9	8E00 00	GOSUBL	=D1=AVE	Set D1 to AVMEME
307	F5FFF	143	A=DAT1	A	Read (AVMEME)
308	F6002	79A0	GOSUB	LC40*2	Load C[A] with 40*2 (40 bytes)
309	F6006	CA	A=A+C	A	
310	F6008	141	DAT1=A	A	Write out updated AVMEME
311	F600B	hCTA39			
312	F600B	7000	GOSUB	=Endtap	Clean up the loop
313	F600F	20	P=	0	Ignore error from ENDTAP
314	F6011	821	XM=0		
315	F6014	03	RTNCC		Return, carry clear, XM=0
316		*-			
317		*-			
318	F6016	80C1	hCTAer	C=P 1	Save P in C[1]
319	F601A	06	RSTK=C		
320	F601C	8F00 000	GOSBVL	=POPBUF	Pop the key out of the buffer
321	F6023	07	C=RSTK		
322	F6025	80D1	P=C	1	Restore P from C[1]
323	F6029	65FE	GOTO	hCTAer	Error exit
324		*-			
325		*-			
326	F602D	hCTAdn			
327		*			
328		* Down arrow			
329		*			
330	F602D	7722	GOSUB	hCTA+	Get next entry
331	F6031	44E	hCTAxx	GOC hCTAer	Error
332	F6034	8AE	?C#0	A	
333	F6037	D3	GOYES	hCTAb1	Not at end of directory...build it
334	F6039	674F	GOTO	hCTAct	End of directory...ignore key
335		*-			
336		*-			
337	F603D	hCTAup			
338		*			
339		* Up arrow			
340		*			
341	F603D	7772	GOSUB	hCTA-	Get previous directory entry
342	F6041	6FEF	GOTO	hCTAxx	Finish it up (error if carry)
343		*-			
344		*-			
345	F6045	hCTAbt			
346		*			
347		* (g) Down arrow [bottom]			
348		*			
349	F6045	7F02	GOSUB	hCTA+	Get next entry
350	F6049	4CC	GOC	hCTAer	Error...exit
351	F604C	8AE	?C#0	A	End of directory yet?


```

352 F604F 6F          GOYES  hCTA<
353                *
354                * Check if crossed a record boundary - if so, need to re-peek
355                *
356 F6051 11B         C=R3
357 F6054 94E        ?CWO  S      Already marked as "not current"?
358 F6057 61         GOYES  hCTA&&    Yes...skip unnecessary test
359 F6059 7D56       GOSUB  Csrc10
360 F605D 7566       GOSUB  Nxtent    Check if this crossed a boundary
361 F6061 5B0        GONC   hCTA&&    No...OK as is
362 F6064 11B        C=R3      Yes...need to set C[S]="F"
363 F6067 A4E        hCTA&+ C=C-1  S      (Set "not current")
364 F606A 10B        R3=C
365                *
366                * Get and build the entry now
367                *
368 F606D 73B2       hCTA&& GOSUB  hCTA=    Get this entry
369 F6071 44A        GOC    hCTAer    Error
370 F6074 6FEE       hCTA<1 GOTO   hCTA20    Build it if no error
371                *
372                *
373 F6078            hCTAtp
374                *
375                * (g) Up arrow [top]
376                *
377 F6078 11A        C=R2      Read back pointers
378 F607B 7B26       GOSUB  Csrc5    Get entry # in C[A]
379 F607F DA         A=C      A      Save count in A[A]
380 F6081 CC         A=A-1    A      Adjust to zero-based count
381 F6083 CC         A=A-1    A      Check if this is first entry
382 F6085 47E        GOC     hCTA&&    Yes...already AT the top
383 F6088 7E16       GOSUB  Csrc5    Get pointer into C[3:0]
384 F608C 7C36       hCTA<1 GOSUB  Lstent    Back up an entry
385 F6090 7000       GOSUB  =Cslc10
386 F6094 E6         C=C+1    A      Increment "remaining" pointer
387 F6096 7026       GOSUB  Csrc10
388 F609A CC         A=A-1    A      Check if at start yet...
389 F609C 5FE        GONC   hCTA<1    ...not at start...loop back
390 F609F 7116       GOSUB  Cslc5     Set back to normal form...
391 F60A3 7906       GOSUB  C=1LC5   Set position to first record
392 F60A7 AC2        C=0      S
393 F60AA 5CB        GONC   hCTA&+    Go always...set NOT correct-->R3
394                *
395                *
396 F60AD D7          LC80**  D=C      A
397 F60AF 20          LC40*2  P=        0      Load C[A] with 80 (40*2)
398 F60B1 D2          C=0      A
399 F60B3 3105       LC(2)   40*2
400 F60B7 03         RTNCC    Carry clear on exit
401                *****
402                *****
403                **
404                ** Name:      hCAT$ - HPIL CAT$ function POLL handler
405                **
406                ** Category:  POLL

```

```

407      **
408      ** Purpose:
409      **      Execute the CAT$ function for HPIL mass storage devices
410      **
411      ** Entry:
412      **      F-RO-0 is the (saved) PC
413      **      AVMEME is the pointer to the start of string header
414      **      (The device string)
415      **      The numeric expression is on the stack after the device
416      **      string
417      **
418      ** Exit:
419      **      F-RO-0 is unchanged
420      **      Carry clear:
421      **      XM=0:
422      **      AVMEME points to the CAT$ string on the stack
423      **      XM=1:
424      **      Not HPIL/not Acc ID=16 device
425      **      Carry set:
426      **      Error (C[3:0] is error number)
427      **
428      ** Calls:      D1@AVE, POP1S, DEVPR$, CHKMAS, POP1N, D1=AVE, FLTDH,
429      **              GETDR!, hCAT$u, hCTA+, BLDCAT, D1@AVS, ENDTAP, <REV$>
430      **
431      ** Uses.....
432      ** Inclusive: A-D, RO, R1, R2, R3, SCRTCH[63:0], ST[4:0], P, F-RO-1,
433      **              FUNCDO, FUNCRI
434      **
435      ** Stk lvls:  5 (GETDR!)
436      **
437      ** History:
438      **
439      **      Date      Programmer      Modification
440      **      -----      -
441      **      01/04/84      NZ      Packed code in the vicinity of
442      **
443      **
444      **      04/14/83      NZ      GOSUBL =fLTDH call, hCAT$5, and
445      **
446      **
447      **      12/13/82      NZ      GOSUB =Endtap, changed RAM usage
448      **
449      **
450      **
451      **
452      **
453      **
454      **
455      **
456      **
457      **
458      **
459      **
460      **

```

Date	Programmer	Modification
01/04/84	NZ	Packed code in the vicinity of GOSUBL =fLTDH call, hCAT\$5, and GOSUB =Endtap, changed RAM usage
04/14/83	NZ	Added check for D=0 after DEVPR\$
12/13/82	NZ	Added routine and documentation

```

*****
*****
449 F60B9 21 hCAT$x P= 1 Return, set XM: not HPIL.
450 F60BB 0D P=P-1 Clear carry, P=0
451 F60BD 00 RTNSXM Set XM
452 *_
453 *_
454 F60BF =hCAT$
455 *
456 * Is this an HPIL CAT$?
457 *
458 F60BF 7DF5 GOSUB D1@ave Set D1 @ start of string
459 F60C3 8F00 GOSBVL =POP1S Now A[A] is string len, D1@string
000
460 *

```

```

461      * DEVPR$ leaves DO at the mailbox if good device spec
462      *
463 F60CA 8E00      GOSUBL =DEVPR$      Get the device info
      00
464 F60D0 501      GONC   hCAT$2      This is a GOOD device spec (D[A])
465      *
466      * Need to check if this is valid device spec...
467      *
468 F60D3 890      ?P=   =eDSPEC      Is this a device spec error?
469 F60D6 3E      GOYES  hCAT$x      Yes...return, clear carry, XM=0
470 F60D8 890      ?P=   =eRANGE      Is it out of range (device spec)?
471 F60DB ED      GOYES  hCAT$x      Yes...return, clear carry, XM=0
472 F60DD 6000 hCAT$e GOTO   =Error      No...error
473      *
474      *
475 F60E1      hCAT$2
476      *
477      * If D[A] is zero, then device not found
478      *
479 F60E1 8AB      ?D=0   A
480 F60E4 5D      GOYES  hCAT$x      Not found...return, not handled
481      *
482      * Now D[A] is the device address, DO @ mailbox
483      *
484 F60E6 8E00      GOSUBL =CHKMAS      Check if this is mass storage
      00
485 F60EC 4CC      GOC    hCAT$x      Not mass storage...don't handle
486      *
487      * Now know this is a mass storage device...find the start of
488      * directory, set up for search
489      *
490      * D1 is now at the numeric value pointer -16
491      *
492 F60EF 17F      D1=D1+ 16      Point to the numeric value
493 F60F2 8E00      GOSUBL =POP1N      Get the value
      00
494      *
495      * Now D1 is where the string should go -16
496      *
497 F60F8 17F      D1=D1+ 16
498 F60FB 8E00      GOSUBL =aVE=D1      Write D1 value to AVMEME
      00
499      *
500      * A[W] is the numeric value
501      *
502 F6101 8E00      GOSUBL =FLTDH      Convert to HEX
      00
503      *
504      * If XM=1, then out of range, else negative (both are null
505      * string)
506      *
507 F6107 533      GONC   hCAT$5      Either negative or out of range
508      *
509      * Now A[A] is the value
510      *

```

```

511 F610A CC      A=A-1  A      Convert to base zero
512 F610C 436    GOC    hCAT$5    (Zero=null string)
513 F610F 101    R1=A      Save value in R1[A]
514              *
515              * The following call cannot be in hCATsu because of RSTK lvl$
516              *
517 F6112 8E00    GOSUBL =GETDR!    Get the first entry
      00
518 F6118 7D90    GOSUB  hCATsu     Set up the drive (Position to 1st)
519 F611C 40C    GOC    hCAT$e     Error
520 F611F 8AA    ?C=0  A      No entries?
521 F6122 E4     GOYES  hCAT$5     No...exit, null string
522 F6124 111    hCAT$3 A=R1      Recall count from R1
523 F6127 CC     A=A-1  A      Check if done
524 F6129 452    GOC    hCAT$4     Yes...build the string
525 F612C 101    R1=A      Save count into R1 again
526 F612F 7521   GOSUB  hCTA+     Get next entry
527 F6133 49A    GOC    hCAT$e     Error...exit
528 F6136 8AE    ?C#0  A      End of directory?
529 F6139 BE     GOYES  hCAT$3     No...continue
530              *
531              * End of directory
532              *
533 F613B 543    hCAT$5 GONC    hCAT$5     Send null string
534              *
535              *
536 F613E 20     hCAT$m P=      =eNORAM     Mem error
537 F6140 4C9    GOC    hCAT$e     Go always...error
538              *
539              *
540 F6143 0      CON(1) =FIXSPC    12 nibbles available here
541 F6144        BSS    12-1
542              *
543              *
544              *
545              * Got a good entry...save device address, build entry
546              *
547 F614F        hCAT$4
548 F614F 1F00    D1=(5) =F-R0-1    Address to save device address
      000
549 F6156 DB     C=D    A
550 F6158 145    DAT1=C A
551              *
552 F615B 7632   GOSUB  BLDCAT     Build the entry in memory
553              *
554              * Set DO back to mailbox
555              *
556 F615F 1F00    D1=(5) =F-R0-1    Address of device address
      000
557 F6166 147    C=DAT1 A      (LC80** does a D=C A)
558 F6169 704F   GOSUB  LC80**     String is 40 bytes (80 nibbles)
559 F616D 560    GONC   hCAT$6     Go always
560              *
561              *
562 F6170 D2     hCAT$5 C=0    A      Length=0 (Null string)

```

```

563 F6172 20          P=      0          Must set P=0 for A=A-1 P below
564                  *
565                  * Now C[A] is the length of the string, AVMEME is start
566                  *
567 F6174 AF0        hCAT$6  A=0      W
568 F6177 DA          A=C      A          Now A[A] is length in nibs
569 F6179 7345       GOSUB   D1@ave    Set D1 @ (AVMEME)
570                  *
571                  * Now A[A] is length in nibbles, D1 @ start
572                  *
573 F617D BF0          ASL      W
574 F6180 BF0          ASL      W
575 F6183 ROC          A=A-1    P          Set A[0]="F"
576 F6186 1CF         D1=D1- 16    Point to string header field
577                  *
578                  * D1 @ intended header destination
579                  *
580 F6189 137         CD1EX          Pointer in C[A]
581 F618C 06          RSTK=C
582 F618E 8E00       GOSUBL  =D1@AVS    Read (AVMEMS) into D1
                    00
583                  *
584                  * RSTK @ intended header, D1 @ (AVMEMS)
585                  *
586 F6194 07          C=RSTK          (AVMEME) into C[A]
587                  *
588                  * D1 @ (AVMEMS), C @ intended header
589                  *
590 F6196 133         AD1EX
591                  *
592                  * A[R] @ (AVMEMS), C[A] @ intended header
593                  *
594 F6199 8B6          ?A>C    A          Room?
595 F619C 2A          GOYES  hCAT$m    No...mem error
596 F619E 133         AD1EX          Yes...OK to write it
597                  *
598                  * A[W] is intended header, C[A] @ intended header
599                  *
600 F61A1 135         D1=C          Set D1 to start of header
601                  *
602                  * There is room to put this here
603                  *
604 F61A4 1517       DAT1=A  W          Write the string header
605                  *
606                  * Now set AVMEME (pointed to by D1) to the new header
607                  *
608 F61A8 8E00       GOSUBL  =aVE=D1    Write out new AVMEME
                    00
609                  *
610                  * (Leave D1 @ AVMEME for REV$)
611                  *
612                  * Clean up the mass storage device now
613                  *
614 F61AE 795E       GOSUB   hCTA39    Unaddress Talker&listener,P=0,XM=0
615 F61B2 8D00      =rEV$  GOVLNG =REV$    Reverse the string

```

```

000
616 *****
617 *****
618 **
619 ** Name:      hCATsu - Subroutine for hCAT routines
620 **
621 ** Category:  LOCAL
622 **
623 ** Purpose:
624 **      Set up for executing hCTA-, hCTA+ and BLDCAT routines
625 **
626 ** Entry:
627 **      Carry clear:
628 **          D[A] is drive address
629 **          AVMEME points to the top of the stack
630 **          DO points to the HPIL mailbox
631 **      Carry set:
632 **          Error (will just RTNC)
633 **
634 ** Exit:
635 **      Carry clear:
636 **          C[A]=0:
637 **              No directory entries on medium
638 **          C[A]#0:
639 **              R3 contains the directory pointers (see hCAT)
640 **              AVMEME reflects the new top of stack (after reserving
641 **                  RAM for CAT)
642 **
643 ** Calls:      CSRC5, CSRC10, CSLC5, CSLC10, TSAV2C, R<RST2, GDIRS+,
644 **              hCTA+C, RST2<R, TRES2C, GETMBX, SETCAT, D1=AVS, D1=AVE
645 **
646 ** Uses.....
647 ** Inclusive:  A[W], B[W], C[W], R2, R3, D1, P, (3 RSTK save locations)
648 **
649 ** Stk lvls:   3 (hCTA+c) {3 levels saved by R<RST2}
650 **
651 ** History:
652 **
653 **      Date      Programmer      Modification
654 **      -----      -
655 **      01/04/84      NZ              Reworked code around hCTA+C call
656 **                      to reduce the number of stack
657 **                      levels used (added R<RST2, RST2<R)
658 **      12/14/82      NZ              Added routine and documentation
659 **
660 *****
661 *****
662 F61B9 400 hCATsu RTNC      Error! (Return at once)
663 *
664 * Now B[3:0] is pointer to first directory entry, D[8:5] is
665 * number of directory records, SCRTCH is first entry,
666 * D1 is at (=SCRTCH)+16
667 *
668 * Save # of directory ENTRIES remaining in R3[A], current
669 * ENTRY number in R3[9:5]

```

```

670
671 F61BC AFB          C=D      W
672 F61BF 77E4        GOSUB   Csrc5      Now C[3:0] is # of records
673 F61C3 F2          CSL      A          (# records times 8 is # ENTRIES)
674 F61C5 81E        CSRB
675 F61C8 CE          C=C-1   A          Now C[A] is # of ENTRIES
676 F61CA 7CE4        GOSUB   Csrc10     (We have the first one already)
677 F61CE D9          C=B      A
678 F61D0 7000        GOSUB   =Cslc10    C[13:10] is current dir location
679 F61D4 10A        R2=C
680 F61D7 10B        R3=C          # of entries, current entry-->R2
681
682
683
684
685 F61DA 8F00        GOSBVL  =R<RST2    Save 3 RSTK levels in RAM
        000
686 F61E1 8E00        GOSUBL  =GETMBX    Get the mailbox address back to D0
        00
687 F61E7 7371        GOSUB   GDIRS+    Read file type, set P=3
688 F61EB 72A0        GOSUB   hCTA+C    Check if PURGED, etc.
689 F61EF 80CE        C=P      14        Save P value in C[14]
690 F61F3 AC2         C=0      S
691 F61F6 550         GONC    hCATs1    If carry is clear, leave C[S]=0
692 F61F9 B46         C=C+1    S
693 F61FC 8E00 hCATs1 GOSUBL  =TSRV2C    Save C[W] in FUNCR1 for now
        00
694 F6202 8F00        GOSBVL  =RST2<R    Restore the RSTK levels
        000
695 F6209 8E00        GOSUBL  =GETMBX    Restore the mailbox addr to D0
        00
696 F620F 8E00        GOSUBL  =TRES2C    Restore C[W]
        00
697 F6215 80DE        P=C      14        Restore P
698 F6219 94E         ?C#0    S          Was carry set?
699 F621C 00          RTNYES
700 F621E 8AA         ?C=0    A          Yes...error
701 F6221 F2          GOYES   hCATsx    No...exit
702 F6223 11B         C=R3
703 F6226 7084        GOSUB   Csrc5
704 F622A 7284        GOSUB   C=1LC5    Set C[A]=1, CSLC5
705 F622E 10B        R3=C          This is the FIRST entry
706
707 F6231             *
        SETCAT
708 F6231 7A7E        GOSUB   LC40*2    40 bytes = 80 nibbles
709 F6235 D5          B=C      A
710 F6237 8E00        GOSUBL  =D1=AVS    Check if room for 40 bytes
        00
711 F623D 143         A=DAT1  A
712 F6240 174         D1=D1+  5          RVMEME is 5 nibbles after RVMEMS
713 F6243 147         C=DAT1  A
714 F6246 E9          C=C-B    A          Now C[A] is proposed new RVMEME
715 F6248 8B6         ?A>C    A
716 F624B 70          GOYES   SETenn    No memory
717

```

```
718      * There IS room for this
719      *
720 F624D 145      DAT1=C A      Write out the (temp) AVMEME
721 F6250 03      hCATsx RTNCC      Return, carry clear
722      * _
723      * _
724 F6252 8C00    SETenn GOLONG =NORAMe      No memory
              00
725      *****
726      *****
727      **
728      ** Name:          hCTA+ - Go forward 1 non-purged entry
729      **
730      ** Category:     LOCAL
731      **
732      ** Purpose:
733      **      Move one non-purged directory entry forward from
734      **      current position
735      **
736      ** Entry:
737      **      D0 points to the mailbox, D[X] is device address
738      **      R2 is current position pointers, R3 is old pointers
739      **
740      ** Exit:
741      **      Carry clear:
742      **      C[A]=0: No more directory entries
743      **      C[A]#0: R3 updated to current pointers
744      **      Carry set:
745      **      Error (P=error code)
746      **
747      ** Calls:        CSRC10,NXTENT,SEEKRD,CSRC5,GDIRSB
748      **
749      ** Uses.....
750      ** Exclusive:    C[W],R2,R3
751      ** Inclusive:   A[A],C[W],R2,R3,D1,P
752      **
753      ** Stk lvls:    5 (GDIRSB)
754      **
755      ** History:
756      **
757      **      Date      Programmer      Modification
758      **      -----      -
759      **      01/04/84      NZ      Packed to install bug fix for CAT
760      **                                     on a medium with the first file
761      **                                     purged
762      **      12/10/82      NZ      Added documentation
763      **
764      *****
765      *****
766 F6258 11A      hCTA+ C=R2
767      *
768      * Down arrow key (C[W] is R2 contents)
769      *
770 F625B 8AA      ?C=0 A
771 F625E E4      GOYES hCTA+x      Exit...already at end of directory
```



```

772 *
773 * Have NOT reached EOD yet
774 *
775 F6260 94A ?C=0 S Is the medium at that record?
776 F6263 41 GOYES hCTA+2 Yes...don't need to SEEK
777 *
778 * Need to position to that record
779 *
780 F6265 7154 GOSUB Csrc10 C[3:1] is record #, [0] is BP
781 F6269 7954 GOSUB Nxtent Set to NEXT record
782 F626D 7CFO GOSUB SEEKRD Seek to the record & read it
783 F6271 400 RTNC Error
784 F6274 11A hCTA+1 C=R2
785 *
786 * Now the medium is positioned at the record specified
787 *
788 F6277 8AA hCTA+2 ?C=0 A End of directory?
789 F627A 22 GOYES hCTA++ Yes...exit, mark end of directory
790 F627C CE C=C-1 A No...decrement the count
791 F627E 7824 GOSUB Csrc5
792 F6282 7224 GOSUB C+1RC5 Increment current location
793 F6286 7C34 GOSUB Nxtent Go to next entry
794 *
795 * GDIRSB sets R2 to C after CSLC10, C[S]=0
796 *
797 F628A 78B0 GOSUB GDIRSB Get directory entry, set up
798 F628E 400 RTNC Error
799 *
800 * Now the entry is in SCRICH, C[3:0] is type (byte-reversed)
801 *
802 F6291 91A hCTA+C ?C=0 WP Purged entry?
803 F6294 0E GOYES hCTA+1 Yes...get next one
804 F6296 B16 C=C+1 WP
805 F6299 541 GONC hCTA+! Done: P=3, carry clear
806 *
807 * End of directory...set count=0, position flag=false
808 * (Set position=last good position from R3)
809 *
810 F629C 11B hCTA++ C=R3 End of directory
811 F629F D2 C=0 A
812 F62A1 AC2 hCTA&t C=0 S
813 F62A4 A4E C=C-1 S Set R3[S]#0 (not at current record)
814 F62A7 10B R3=C Set # of entries remaining=0
815 F62AA D2 C=0 A (Needed for hCTA&t entry)
816 F62AC 03 hCTA+x RTNCC (Carry clear, C[A]=0)
817 *
818 *
819 F62AE 11A hCTA+! C=R2
820 F62B1 10B R3=C Update the pointers
821 F62B4 E6 C=C+1 A Insure that C[A]#0 for exit cond
822 F62B6 03 RTNCC
823 *****
824 *****
825 **
826 ** Name: hCTA- - Move back one directory entry

```

```
827      ** Name:      hCTA= - Get the current directory entry
828      **
829      ** Category:  LOCAL
830      **
831      ** Purpose:
832      **      hCTA--:Move back one non-purged directory entry
833      **      hCTA=:Read in the current directory entry
834      **
835      ** Entry:
836      **      D0 points to the mailbox, D[X] is device address
837      **      R2 is current directory pointers, R3 is old pointers
838      **
839      ** Exit:
840      **      Carry clear:
841      **      C[A]=0: Beginning of directory reached
842      **      C[A]#0: SCRICH[63:0] is the new entry
843      **      R3 is updated to current directory entry
844      **      Carry set:
845      **      Error (P=error code)
846      **
847      ** Calls:      CSRC5,CSLC5,NXTENT,LSTENT,SEEKRD,GDIRSB
848      **
849      ** Uses.....
850      ** Exclusive: A[A],C[W],R2,R3,D1,P
851      ** Inclusive: A[A],C[W],R2,R3,D1,P
852      **
853      ** Stk lvls:   5 (GDIRSB)
854      **
855      ** History:
856      **
857      **      Date      Programmer      Modification
858      **      -----      -
859      **      01/04/84      NZ      Packed to install bug fix (see CAT)
860      **      01/03/84      NZ      Moved the RTNC after SEEKRD to be
861      **      before the C=B A (Was destroying
862      **      the error number in C[0])
863      **      01/24/83      NZ      Changed R2[A] to include purged
864      **      entries
865      **      12/10/82      NZ      Added documentation
866      **
867      ****
868      ****
869 F62B8 11A hCTA- C=R2
870 F62BB 79E3      GOSUB C+1RC5      Increment # of entries left
871 F62BF CE      C=C-1 A      Decrement to previous entry
872 F62C1 SAR      ?C=0 A      At top already?
873 F62C4 A4      GOYES hCTA-3      Yes...set R3 to first entry
874 F62C6 70E3      GOSUB Csrc5
875 F62CA 10A      R2=C      Save counts in R2 for now
876 F62CD 25      P= 15-10      Point to C[S], CSRC5'ed twice
877 F62CF DA      A=C A      Save entry in A[A]
878 F62D1 90E      ?C#0 P      Is this the current position?
879 F62D4 21      GOYES hCTA-1      No...need to SEEK that record
880 F62D6 7CE3      GOSUB Nxtent      Check if this was the last entry
881 F62DA 4B0      GOC hCTA-1      Was last...need to SEEK
```

```

882 F62DD D6      C=A   A      Check if was FIRST entry
883 F62DF 79E3    GOSUB Lstent  Go back 1 entry (record)
884 F62E3 5F0     GONC  hCTA-2  Still in same record
885
886 F62E6 D6     hCTA-1 C=A   A      Get the entry location back again
887 F62E8 70E3    GOSUB Lstent  Go back 1 entry (for position)
888
889              * Now C[3:1] is the correct record #
890              *
891              * Go to that record
892              *
893 F62EC 7D70     GOSUB SEEKRD  Seek to that record, read it
894 F62F0 400     RTNC          Error
895 F62F3         hCTA-2
896              *
897              * Now medium is positioned to the correct record
898              *
899 F62F3 11A      C=R2
900 F62F6 72D3    GOSUB Lstent  Set C[3:0] to the last entry
901 F62FA 7840    GOSUB GDIRSB  Get directory entry, set P=3
902 F62FE 400     RTNC          Error
903              *
904              * D1 @ (=SCRATCH)+20, P=3, C[3:0] is type (byte-reversed)
905              *
906 F6301 91A      ?C=0  WP      Purged?
907 F6304 4B      GOYES hCTA-   Yes...try next entry
908              *
909              * Good entry (Cannot get EOD with up-arrow)
910              *
911 F6306 11A      C=R2
912 F6309 10B     R3=C          Set R3 to the current pointer
913 F630C 03      RTNCC
914              *
915              *
916 F630E 11B     hCTA-3 C=R3
917 F6311 7593    GOSUB Csrc5
918 F6315 CE      C=C-1  A
919 F6317 8AA     ?C=0   A
920 F631A 29      GOYES hCTA+x  Started at beginning..leave as is
921 F631C 7093    GOSUB C=1LC5  Indicate at FIRST entry in CAT
922 F6320 608F    GOTO  hCTA&t  Set R3[S]#0, continue
923              *
924              *
925 F6324 11B     hCTA=  C=R3
926 F6327 7F83    GOSUB Csrc10  Get current entry into C[3:0]
927 F632B 25      P=      15-10  Point to R3[S], shifted 10
928 F632D 90A     ?C=0   P      Is it correct?
929 F6330 61      GOYES GDIRSB  Yes...just read that entry
930 F6332 D5      B=C     A      (Save entry info in B[3:0])
931 F6334 7530    GOSUB SEEKRD  No...SEEK to the record, read it
932              *
933              * Before restoring entry information to C[3:0], check for error
934              *
935 F6338 400     RTNC          Error if carry set
936 F633B D9      C=B     A      (Restore entry info to C[3:0])

```

```
937 F633D 12B          CR3EX          Save C[3:0] in R3, fetch R3-->C
938 F6340 AC2          C=0 S          Current record is positioned
939 F6343 12B          CR3EX          Restore C[3:0], R3
940 *
941 * Fall through to GDIRSB
942 *
943 *****
944 *****
945 **
946 ** Name:           GDIRSB - Subroutine to get a directory entry
947 **
948 ** Category:      LOCAL
949 **
950 ** Purpose:
951 **   Save location, get directory entry, check file type
952 **
953 ** Entry:
954 **   C[3:0] is the directory pointer
955 **   DO points to the mailbox
956 **   D[X] is the device address
957 **
958 ** Exit:
959 **   Carry clear:
960 **     P=3, C[3:0]=file type (C[B] is high byte of type)
961 **   Carry set:
962 **     Error (P=error code)
963 **
964 ** Calls:         CSLC10,GETDR+
965 **
966 ** Uses.....
967 ** Exclusive: A[A],C[W],R2,D1,P
968 ** Inclusive: A[A],C[W],R2,D1,P
969 **
970 ** Stk lvls:     4 (GETDR+)
971 **
972 ** History:
973 **
974 **   Date         Programmer      Modification
975 **   -----
976 **   01/04/84     NZ             Added GDIRS+ entry point
977 **   12/09/82     NZ             Added routine & documentation
978 **
979 *****
980 *****
981 *
982 * Code above falls into this routine
983 *
984 F6346 DA =GDIRSB A=C A          Copy entry to A[A]
985 F6348 7000      GOSUB =Cslc10      Restore R2 to correct orientation
986 F634C AC2      C=0 S          (At correct record)
987 F634F 10A      R2=C          Set R2 again
988 *
989 * Now A[3:0] is the CORRECT pointer for this file
990 *
991 F6352 814      ASRC
```

```
992 F6355 8E00      GOSUBL =GETDR+      Set byte pointer, read entry
                      00
993 F635B 400      RTNC                Error
994 F635E 1F00 GDIRS+ D1=(5) (=SCRCH)+20 Position to TYPE bytes
                      000
995 F6365 15F3      C=DAT1 4
996 F6369 23      P= 3
997 F636B 03      RTNCC                Leave C[3:0]=type, P=3
998 *****
999 *****
1000 **
1001 ** Name:        SEEKRD - Seek to a record, then read it
1002 **
1003 ** Category:    PILI/O
1004 **
1005 ** Purpose:
1006 **     Seek a record on the mass memory device and read it
1007 **
1008 ** Entry:
1009 **     C[3:1] is the record # desired
1010 **     DO points to the mailbox
1011 **     D[X] is the device address
1012 **
1013 ** Exit:
1014 **     Carry clear:
1015 **     P=0, record has been read into buffer 0 of device
1016 **     Carry set: Error (P=error #)
1017 **     Error (P,C[0] are the error code)
1018 **
1019 ** Calls:        TSTAT,SEEKA,DDT,TSTATA
1020 **
1021 ** Uses.....
1022 ** Exclusive: A[A],C[W],P
1023 ** Inclusive: A[A],C[W],P
1024 **
1025 ** Stk lvls:    3 (TSTAT)(SEEKA)(TSTATA)
1026 **
1027 ** History:
1028 **
1029 **     Date      Programmer      Modification
1030 **     -----      -
1031 **     12/09/82      NZ              Added routine & documentation
1032 **
1033 *****
1034 *****
1035 F636D      =SEEKRD
1036 *
1037 * Go to the record, but check status first
1038 *
1039 F636D DO      A=0    A
1040 F636F F6      CSR    A
1041 F6371 ABA      A=C    X      A[A] is now record #
1042 F6374 8E00      GOSUBL =TSTAT      Check device status first
                      00
1043 F637A 400      RTNC                Error
```

```
1044 F637D 7000      GOSUB =Seeka      Go to that record
1045 F6381 400      RTNC
1046 F6384 20       P= =Read
1047 F6386 8E00     GOSUBL =DDT       Read the data from the device
                   00
1048 F638C 400      RTNC
1049 F638F 8C00     GOLONG =TSTATATA  (Device is already talker)
                   00
```

```
1050 *****
1051 *****
1052 **
1053 ** Name:          BLDCAT - Build CAT text, given directory entry
1054 **
1055 ** Category:     LOCAL
1056 **
1057 ** Purpose:
1058 **   Build the CAT[$] string on the [MATH] stack, using the
1059 **   directory entry in SCRTCH[63:0]
1060 **
1061 ** Entry:
1062 **   SCRTCH contains the directory entry for the file
1063 **
1064 ** Exit:
1065 **   Carry clear, CAT text on stack, AVMEME at CAT text
1066 **
1067 ** Calls:        D1@AVE, TSAVDO, BLANKC, SWAPO1, GT2BYT, FTYPF#, HTODX,
1068 **               WRTASC, GETBYT, GT2BYO, A-MULT, TRESDO
1069 **
1070 ** Uses.....
1071 ** Exclusive: A[W],B[W],C[W],D[S],RO,D1,P
1072 ** Inclusive: A[W],B[W],C[W],D[S],RO,D1,P,FUNCDO
1073 **
1074 ** Stk lvls:    3 (FTYPF#)
1075 **
1076 ** History:
1077 **
1078 **   Date      Programmer      Modification
1079 **   -----      -
1080 **   12/06/82      NZ              Wrote routine and documentation
1081 **
1082 *****
1083 *****
1084 F6395 7723 =BLDCAT GOSUB D1@ave      Set D1 to start of string
1085 *
1086 * Now D1 is at start of CAT build area, SCRTCH contains the
1087 * directory entry for the desired CAT
1088 *
1089 * Save DO in FUNCDO (restore on exit)
1090 *
1091 F6399 8E00     GOSUBL =TSAVDO
                   00
1092 F639F 1B00     DO=(5) =SCRTCH
                   000
1093 F63A6 1567     C=DATO W          Read in first 8 chars of name
1094 F63AA 16F      DO=DO+ 16        Skip first 8 input chars
```

```

1095 F63AD 1557      DAT1=C W           Write out the first 8 chars
1096 F63B1 17F      D1=D1+ 16
1097 F63B4 146      C=DATO A           Read last 2 chars
1098 F63B7 163      DO=DO+ 4           Skip last 2 input chars
1099 F63BA 15D3     DAT1=C 4           Write last 2 chars
1100 F63BE 173      D1=D1+ 4
1101                *
1102                * Now the name is written...blank, security, blank next
1103                *
1104 F63C1 8E00      GOSUBL =BLANKC     Get blanks in C[W]
      00
1105                *
1106                * Blank out the rest of the text now
1107                *
1108 F63C7 133      AD1EX
1109 F63CA 131      D1=A               Save D1 in A[A]
1110 F63CD 2B       P= 16-5
1111 F63CF 15DB BLDC10 DAT1=C 6*2         Clear the remaining 30 bytes
1112 F63D3 17B      D1=D1+ 6*2         in chunks of 6 bytes
1113 F63D6 0C       P=P+1
1114 F63D8 56F      GONC BLDC10
1115 F63DB 131      D1=A               Restore D1
1116 F63DE 175      D1=D1+ 6           Skip to file type field
1117                *
1118                * D1 points to the file type byte in header
1119                *
1120                * DO is still at the file type in SCRTCH
1121                *
1122 F63E1 AF2      C=0 W             Must clear high nibs for HTOOX
1123 F63E4 7312     GOSUB SWAPO1       Swap DO, D1
1124 F63E8 8E00     GOSUBL =GT2BYT     Read in 2 bytes (type) at D1
      00
1125 F63EE 7902     GOSUB SWAPO1       Swap DO, D1
1126                *
1127                * DO is now at start of start address field, D1 is still at
1128                * text "type" field
1129                *
1130 F63F2 AFA      A=C W             File type into A[A]
1131 F63F5 7000     GOSUB =fTYPF#      Read the file type
1132                *
1133                * If carry set, found the type; C[A], B[A] @ entry, B[S] = #
1134                *
1135 F63F9 4A2      GOC BLDC30         Found a file type table with this
1136                *
1137                * This is an unknown type...leave security blank, print
1138                * type in ASCII digits (Type is in A[W])
1139                *
1140 F63FC AC3      D=0 S             Use D[S] as the SIGN of file type
1141 F63FF D6       C=A A             Check if A[3:0] is #8000 or more
1142 F6401 F2       CSL A
1143 F6403 C6       C=C+C A           If carry, then this is negative
1144 F6405 5A0     GONC BLDC20         Non-negative...continue
1145                *
1146                * This is negative...change sign field to 1
1147                *

```

```

1148 F6408 B47      D=D+1  S
1149 F640B 23      P=      3
1150 F640D B98      A=-A   WP      Negative of file type
1151 F6410 8E00 BLDC20 GOSUBL =HTODX  Convert to decimal
      00
1152 F6416 24      P=      4      B[W]<=32768 to get here
1153 F6418 7732      GOSUB  WRTASC  Write digits, suppress leading 0's
1154 F641C D1      B=0    A      Set B[A]=0...type not known
1155 F641E 171      D1=D1+ 2      Skip a blank between type, length
1156 F6421 5B3      GONC   BLDC40  Go always...continue with length
1157      *-
1158      *-
1159 F6424      BLDC30
1160      *
1161      * B[A] is pointer to file type, B[S] is the protection
1162      * D1 at file type text area
1163      *
1164 F6424 A4D      B=B-1  S      Always at LEAST 1 from FTYPF#
1165      *
1166      * Now B[S] is the protection, base zero
1167      *
1168 F6427 1C3      D1=D1- 4      Point to the protection byte
1169 F642A AC9      C=B     S      Read protection type
1170 F642D A46      C=C+C  S      Double it for bytes
1171 F6430 BCA      C=-C   S      Negate it for offset from C[S]
1172 F6433 80DF      P=C    15      Set P=offset from C[S]
1173 F6437 3702      LCASC  \EPS \  C[B] gets proper value
      3505
      54
1174 F6441 14D      DAT1=C  B      Write out the security code
1175 F6444 173      D1=D1+ 4      Back to file type text area
1176      *
1177      * Now ready to output the file type
1178      *
1179 F6447 D9      C=B     A
1180 F6449 137      CD1EX
      D1-->type entry
1181 F644C 174      D1=D1+ 5      Skip to ASCII for file type
1182 F644F 15B9     A=DAT1 10      Read the type...
1183 F6453 137      CD1EX
      ...restore true D1...
1184 F6456 1599     DAT1=A 10      ...and write the type
1185 F645A 17B      D1=D1+ 12     (Skip to length field)
1186 F645D      BLDC40
1187      *
1188      * Now continue at the length field
1189      *
1190 F645D 8AD      ?B#0   A      Is the type known?
1191 F6460 F1      GOYES  BLDC50  Yes...continue
1192      *
1193      * Type is unknown...use size in records
1194      *
1195 F6462 167      D0=D0+ 8      Skip the start of file field
1196      *
1197      * D0 is at the length of file in records
1198      *
1199 F6465 7291 BLDC45 GOSUB  SWAP01  Swap D0, D1 (D1 @ start of field)

```



```

1200 F6469 24          P=      4
1201 F646B AF2        C=0    W
1202 F646E 8E00      GOSUBL =GETBYT      Read 5 bytes into C[9:0]
          00
1203 F6474 AE2        C=0    B          Throw away low byte
1204
1205          * C[W] is now the file size in bytes (records * 256)
1206          *
1207 F6477 7081      GOSUB  SWAP01      Restore D1 from D0
1208 F647B 6590      GOTO   BLDC60      File size (bytes) in C[W]
1209          *
1210          *
1211 F647F D9         BLDC50  C=B      A
1212 F6481 E6         C=C+1  A          Skip create code
1213 F6483 134       DO=C          D0 points to start of entry
1214 F6486 AF2        C=0    W
1215 F6489 1564      C=DATO S          Read copy code from type table
1216 F648D 161       DO=D0+ 2      Point to offset to data
1217 F6490 14E       C=DATO B          Read offset to data value
1218 F6493 AF5        B=C     W          Copy to B[W]
1219 F6496 1B00      DO=(5) (=SCRCH)+56 Point to implementation bytes
          000
1220 F649D 94E       ?CNO   S          Copy code zero?
1221 F64A0 42         GOYES  BLDC52      No...check further
1222          *
1223          * Copy code zero...length is (IMPL)-(oDATA)+(1FLEN)
1224          *
1225 F64A2 15A5      A=DATO 6          Read in the length field
1226 F64A6 20         P=      0
1227 F64A8 3100      LC(2) =1FLENh    Length of FLEN field
1228 F64AC 25         P=      5
1229 F64AE A12       C=C+A  WP
1230 F64B1 B19       C=C-B  WP          Subtract offset to data
1231 F64B4 550       GONC   BLDC51
1232 F64B7 AF2        C=0    W          If less than zero, set =0
1233 F64BA          BLDC51
1234          *
1235          * Now C[W] is the length in nibbles
1236          *
1237 F64BA B76        C=C+1  W          Add one to round UP if odd
1238 F64BD 81E        CSRB
1239 F64C0 6050      GOTO   BLDC60      Done (size in C[W])
1240          *
1241          *
1242 F64C4          BLDC52
1243          *
1244          * Check further on the copy code
1245          *
1246 F64C4 A46        C=C+C  S          Copy code 8?
1247 F64C7 550       GONC   BLDC54      Not copy code 8...continue
1248          *
1249          * Copy code 8...use length in records to display size
1250          *
1251 F64CA 480        GOC    BLDC5?     Go always
1252          *

```

```

1253          *_-
1254 F64CD A46 BLDC54 C=C+C S          Copy code 4 (LIF1)?
1255 F64D0 5C0          GONC BLDC56      No...keep checking
1256          *
1257          * This is LIF1...use length in records
1258          *
1259 F64D3 1B00 BLDC5? DO=(5) (=SCRATCH)+32 Length in records
          000
1260 F64DA 4A8          GOC BLDC45      Go always (use record length)
1261          *_-
1262          *_-
1263 F64DD A46 BLDC56 C=C+C S          Copy code 2 (41C data file)?
1264 F64E0 591          GONC BLDC58      No...must be TITAN data file
1265          *
1266          * 41C (SDATA) data file
1267          *
1268 F64E3 7411          GOSUB SWAP01
1269 F64E7 8E00          GOSUBL =GT2BYO      Read 2 bytes (size in registers)
          00
1270 F64ED 7A01          GOSUB SWAP01
1271 F64F1 BF2          CSL W
1272 F64F4 81E          CSRB
1273 F64F7 591          GONC BLDC60      Multiply by 8 bytes/register
          Go always (Size in C[W])
1274          *_-
1275          *_-
1276 F64FA          BLDC58
1277          *
1278          * TITAN data file
1279          *
1280 F64FA 15E3          C=DATO 4          Read # of records
1281 F64FE 163          DO=DO+ 4          Position to record length
1282 F6501 AF0          A=0 W          Clear high nibs of A[W]
1283 F6504 15A3          A=DATO 4          Read record length
1284 F6508 8E00          GOSUBL =A-MULT      Leaves result in A[W]
          00
1285          *
1286          * A[W] is now the length
1287          *
1288 F650E AF6          C=A W          Copy to C[W]
1289 F6511 AFA BLDC60 A=C W          Copy size to A[W]
1290          *
1291          * Convert size to decimal...
1292          *
1293 F6514 8E00          GOSUBL =HTODX      Result in B[W]
          00
1294 F651A 2F          P= 15
1295 F651C 90D BLDC65 ?B#0 P
1296 F651F 90          GOYES BLDC70      Non-zero digit
1297 F6521 0D          P=P-1
1298 F6523 58F          GONC BLDC65      Go unless B[W]=0
1299 F6526 20          P= 0          Indicate 1 digit
1300 F6528          BLDC70
1301          *
1302          * Now B[WP] is the decimal value of size
1303          *

```

```

1304 F6528 80CF      C=P   15
1305 F652C AC5       B=C   S      Save (WP) in B[S]
1306 F652F AC3       D=0   S      Set D[S]=0 (for WRTASC)
1307 F6532 20        P=    0
1308 F6534 3500      LC(6) \MK\~0    C[B] is current node
      B4D4
1309 F653C 2F        P=    15
1310 F653E 305      LC(1) 5
1311 F6541 985      BLDC71 ?B<C P      Are there more than 5 digits?
1312 F6544 62        GOYES BLDC75      No...continue
1313 *
1314 * More than 5 digits...
1315 * ...if 5-8 digits, represent as xxxxxK
1316 * ...if >8 digits, represent as xxxxxM
1317 *
1318 F6546 BF6        CSR   W
1319 F6549 F6         CSR   A      Shift next #O/K/M into C[B]
1320 F654B BF5        BSR   W
1321 F654E BF5        BSR   W
1322 F6551 05         SETDEC
1323 F6553 A05        B=B+B P      Rounding digit
1324 F6556 BF5        BSR   W
1325 F6559 550        GONC  BLDC72
1326 F655C B75        B=B+1 W      Add one for rounding
1327 F655F 04         BLDC72 SETHEX
1328 *
1329 * For the case of >8 digits, this will execute this code a
1330 * third time. The ?B<C P test will fail, as B[12] will be
1331 * zero from BSR W's that have been done the first 2 times
1332 *
1333 F6561 2C          P=    15-3      Point to current length location
1334 F6563 308        LC(1) 8      Are there more than 8 digits?
1335 F6566 6ADF       GOTO  BLDC71      Check for more than 8 digits
1336 *
1337 *
1338 F656A            BLDC75
1339 *
1340 * Now C[B] is the tail character, B[A] is the value, PHO
1341 *
1342 F656A DA          A=C   A      Copy C[B] to A[B]
1343 F656C 24          P=    4      5 digits unless C[B]#0, then 4
1344 F656E 96A        ?C=0 B      Is the suffix (Null)?
1345 F6571 40         GOYES BLDC77      Yes...5 digits
1346 F6573 0D         P=P-1      No...4 digits
1347 F6575 7AD0      BLDC77 GOSUB WRTASC      Write the ASCII to the text area
1348 F6579 968        ?A=0 B      Is suffix character zero?
1349 F657C 80         GOYES BLDC78      Yes...go on
1350 F657E 149        DAT1=A B      No...write the suffix character
1351 F6581 171        D1=D1+ 2      Skip suffix character
1352 F6584 171        BLDC78 D1=D1+ 2      Point to date/time field
1353 *
1354 * Now D1 @ start of date field of text
1355 *
1356 F6587 1B00        DO=(5) (=SCRATCH)+40 Point to time/date field
      000

```

```
1357      *
1358      * Next seven lines are to convert YYMMDD to MMDDYY
1359      *
1360 F658E 15E5      C=DATO 6          Read in YYMMDD
1361 F6592 163      DO=DO+ 4          Point to DD
1362 F6595 14C      DATO=C B          Write out YY
1363 F6598 183      DO=DO- 4
1364 F659B BF6      CSR W
1365 F659E F6       CSR R
1366 F65A0 15C3     DATO=C 4          Write out MM DD
1367      *
1368 F65A4 20       P= 0
1369 F65A6 AF2      C=0 W
1370 F65A9 3103     LCASC \0\          Set high nib of A[B] for digits
1371 F65AD DA       A=C A
1372 F65AF 39F2     LCASC \ : /\      Separator for MM/DD/YY HH:MM
      F202
      A302
1373 F65BB 160 BLDC80 DO=DO+ 1
1374 F65BE 15A0     A=DATO 1          Read first digit
1375 F65C2 149     DAT1=A B          Write first digit
1376 F65C5 171     D1=D1+ 2
1377 F65C8 180     DO=DO- 1          Point to second digit...
1378 F65CB 15A0     A=DATO 1          ...read it...
1379 F65CF 161     DO=DO+ 2          (skip to next digit)
1380 F65D2 149     DAT1=A B          ...and write second digit
1381 F65D5 171     D1=D1+ 2
1382 F65D8 14D     DAT1=C B          Write the separator
1383 F65DB 171     D1=D1+ 2
1384 F65DE BF6     CSR W
1385 F65E1 BF6     CSR W          Shift in next separator
1386 F65E4 96E     ?C#0 B          Done yet?
1387 F65E7 4D      GOYES BLDC80     No...continue
1388      *
1389      * Set D1 back to start of text...
1390      *
1391 F65E9 2B       P= 16-5          Loop 5 times
1392 F65EB 1CF BLDC90 D1=D1- 16          (16*5 nibbles in text)
1393 F65EE 0C       P=P+1
1394 F65F0 5AF      GONC BLDC90
1395 F65F3 8E00     GOSUBL =TRESDO   Restore DO from FUNCDO
      00
1396 F65F9 03      RTNCC          Return with carry clear
1397      *
1398      *
1399 F65FB 136 =SWAP01 CDOEX     Swap DO, D1
1400 F65FE 137      CD1EX
1401 F6601 136      CDOEX
1402 F6604 01      RTN          Don't change carry
1403      *****
1404      *****
1405      **
1406      ** Name:      DSPCAT - Display a CAT text string from @ D1
1407      **
1408      ** Category:  LOCAL
```

```

1409      **
1410      ** Purpose:
1411      **       Send 40 bytes (starting at D1) to the display
1412      **
1413      ** Entry:
1414      **       D1 @ start of data
1415      **
1416      ** Exit:
1417      **       P=0
1418      **
1419      ** Calls:      DO=FRO,SWAP01,CKINF-,SEND20,CURSFL,CRLFND
1420      **
1421      ** Uses.....
1422      ** Inclusive: A-D,RO,DO,D1,all FUNCxx except FUNCRO,STMTRO,P
1423      **
1424      ** Stk lvls:  5 (CURSFL)
1425      **
1426      ** History:
1427      **
1428      **      Date      Programmer      Modification
1429      **      -----      -
1430      **      12/06/82      NZ      Added code and documentation
1431      **
1432      **
1433      **
1434 F6606 20      =DSPCAT P=      0
1435 F6608 8E00      GOSUBL =DO=FRO      Set DO=FUNCRO
1436      00
1436 F660E 1527      A=DATO W
1437 F6612 100      RO=A      Save FUNCRO in RO
1438 F6615 72EF      GOSUB SWAP01      Save D1 in DO
1439 F6619 8F00      GOSBVL =CKINF-    Set up display, check info
1440      000
1440 F6620 77DF      GOSUB SWAP01      Restore D1
1441 F6624 110      A=RO      Restore FUNCRO from RO to A[W]...
1442 F6627 8E00      GOSUBL =DO=FRO    ...set DO @ FUNCRO...
1443      00
1443 F662D 1507      DATO=A W      ...and write to FUNCRO
1444 F6631 133      AD1EX      Get D1 into A[A]
1445 F6634 D2      C=0      A
1446 F6636 3182      LC(2) 40      Send 40 bytes
1447 F663A DE      ACEX      A      A[A]=length in bytes, C[A]=start
1448 F663C D7      D=C      A      D[A]=start of string
1449      *
1450      * D[A] is at start of string, A[A] is length
1451      *
1452 F663E 8F00      GOSBVL =SEND20    Send it, ignore width
1453      000
1453      *
1454      * Set no delay, cursor far left
1455      *
1456 F6645 8F00      GOSBVL =CURSFL    Cursor far left
1457      000
1457 F664C 8D00      GOVLNG =CRLFND    Cr, Lf, no delay (builds display)
1458      000

```

```

1458 *****
1459 *****
1460 **
1461 ** Name:      WRTASC - Write out a decimal number in ASCII
1462 **
1463 ** Category:  GETUTL
1464 **
1465 ** Purpose:
1466 **      Write a decimal number from B[WP] to RAM @ D1
1467 **
1468 ** Entry:
1469 **      D1 at intended destination field (initialized to \ \)
1470 **      P is the first digit location in B to be considered
1471 **      B[WP] is the value
1472 **      D[S] is sign of value (D[S]=0:positive; else negative)
1473 **
1474 ** Exit:
1475 **      D1 past the last digit
1476 **      P=1 (NOTE THIS!)
1477 **      Carry clear
1478 **
1479 ** Calls:      None
1480 **
1481 ** Uses.....
1482 **      Inclusive: C[S,WP],D1,P
1483 **
1484 ** Stk lvls:   0
1485 **
1486 ** Detail:
1487 **      Write out the digits, starting with the first non-zero
1488 **      digit (if B[W]=0, write a single zero out)
1489 **
1490 ** History:
1491 **
1492 **      Date      Programmer      Modification
1493 **      -----      -
1494 **      12/06/82      NZ              Added documentation
1495 **
1496 *****
1497 *****
1498 F6653 90D =WRTASC ?B#0  P      Is leading digit non-zero?
1499 F6656 FO   GOYES  WRTA10  Yes...found a non-zero digit
1500 F6658 171 D1=D1+ 2      No...skip to next text location
1501 F665B 0D   P=P-1      Decrement P (if zero, will carry)
1502 F665D 55F GONC   WRTASC  Go unless B[WP] was zero
1503 F6660 20   P= 0      B[WP] was zero...output 1 digit
1504 F6662 1C1 D1=D1- 2      (Back up the last add)
1505 *
1506 F6665 94B WRTA10 ?D=0  S      Check the sign field
1507 F6668 51   GOYES  WRTA20  Positive...NO sign output
1508 F666A 137 CD1EX      Negative...output a leading "-"
1509 F666D 1DD2 D1=(2) \- \  Put a "-" in C[B], leave P as is
1510 F6671 137 CD1EX
1511 F6674 1C1 D1=D1- 2
1512 F6677 14D DAT1=C B      Write the leading sign

```

```

1513 F667A 171          D1=D1+ 2          Point back to first digit
1514 F667D          WRTA20
1515                  *
1516                  * Now P is the first digit, D1 at text location for first digit
1517                  *
1518 F667D 80CF          C=P    15          Save the pointer in C[S]
1519                  *
1520 F6681 80DF WRTA30 P=C    15          Get pointer to P again
1521 F6685 A89          C=B    P          Copy B[P] to C[P]
1522 F6688 890 WRTA40 ?P=    0
1523 F668B A0          GOYES WRTA50          Digit is in C[0] now
1524 F668D B96          CSR    WP
1525 F6690 0D          P=P-1
1526 F6692 55F          GONC  WRTA40          Go always
1527                  *
1528                  *
1529 F6695 21 WRTA50 P=    1
1530 F6697 303          LCHEx 3          High nibble for ASCII #
1531 F669A 14D          DAT1=C B          Write the digit
1532 F669D 171          D1=D1+ 2
1533 F66A0 A4E          C=C-1 S          Check if more digits
1534 F66A3 5DD          GONC  WRTA30          Not done yet...continue
1535                  *
1536                  * Have finished writing B[W] out in ASCII
1537                  *
1538 F66A6 03          RTNCC
1539                  *
1540                  *
1541 F66A8 E6 C+1RC5 C=C+1 A          Add 1 to C[A], CSRC5
1542 F66AA 8C00 Csrc5 GOLONG =CSRC5
      00
1543                  *
1544                  *
1545 F66B0 D2 C=1LC5 C=0 A          Set C[A]=1, CSLC5
1546 F66B2 E6 C=C+1 A
1547 F66B4 8C00 Cslc5 GOLONG =CSLC5
      00
1548                  *
1549                  *
1550 F66BA 8C00 Csrc10 GOLONG =CSRC10
      00
1551                  *
1552                  *
1553 F66C0 8C00 D1@ave GOLONG =D1@AVE
      00
1554                  *
1555                  *
1556 F66C6 8C00 Nxtent GOLONG =NXTENT
      00
1557                  *
1558                  *
1559 F66CC 8C00 Lstent GOLONG =LSTENT
      00
1560 F66D2          END
  
```

R-MULT	Ext	-	1284						
BF2DSP	Ext	-	232						
BLANKC	Ext	-	1104						
BLDC10	Abs 1008591 #F63CF	-	1111	1114					
BLDC20	Abs 1008656 #F6410	-	1151	1144					
BLDC30	Abs 1008676 #F6424	-	1159	1135					
BLDC40	Abs 1008733 #F645D	-	1186	1156					
BLDC45	Abs 1008741 #F6465	-	1199	1260					
BLDC50	Abs 1008767 #F647F	-	1211	1191					
BLDC51	Abs 1008826 #F648A	-	1233	1231					
BLDC52	Abs 1008836 #F64C4	-	1242	1221					
BLDC54	Abs 1008845 #F64CD	-	1254	1247					
BLDC56	Abs 1008861 #F64DD	-	1263	1255					
BLDC58	Abs 1008890 #F64FA	-	1276	1264					
BLDC5?	Abs 1008851 #F64D3	-	1259	1251					
BLDC60	Abs 1008913 #F6511	-	1289	1208	1239	1273			
BLDC65	Abs 1008924 #F651C	-	1295	1298					
BLDC70	Abs 1008936 #F6528	-	1300	1296					
BLDC71	Abs 1008961 #F6541	-	1311	1335					
BLDC72	Abs 1008991 #F655F	-	1327	1325					
BLDC75	Abs 1009002 #F656A	-	1338	1312					
BLDC77	Abs 1009013 #F6575	-	1347	1345					
BLDC78	Abs 1009028 #F6584	-	1352	1349					
BLDC80	Abs 1009083 #F65BB	-	1373	1387					
BLDC90	Abs 1009131 #F65EB	-	1392	1394					
=BLDCAT	Abs 1008533 #F6395	-	1084	200	253	552			
C+1RC5	Abs 1009320 #F66A8	-	1541	792	870				
C=1LC5	Abs 1009328 #F66B0	-	1545	391	704	921			
CHKMAS	Ext	-	484						
CK=ATn	Ext	-	250						
CKBITL	Ext	-	181						
CKINF-	Ext	-	1439						
CRLFND	Ext	-	1457						
CSLC5	Ext	-	1547						
CSRC10	Ext	-	1550						
CSRC5	Ext	-	1542						
CURSFL	Ext	-	1456						
Cslc10	Ext	-	385	678	985				
Cslc5	Abs 1009332 #F66B4	-	1547	390					
Csrc10	Abs 1009338 #F66BA	-	1550	359	387	676	780	926	
Csrc5	Abs 1009322 #F66AA	-	1542	378	383	672	703	791	874 917
DO=FR0	Ext	-	1435	1442					
D1=AVE	Ext	-	306						
D1=AVS	Ext	-	710						
D1@AVE	Ext	-	1553						
D1@AVS	Ext	-	582						
D1@ave	Abs 1009344 #F66C0	-	1553	458	569	1084			
DDT	Ext	-	1047						
DEVPR\$	Ext	-	463						
=DSPCAT	Abs 1009158 #F6606	-	1434	201	254				
Endtap	Ext	-	312						
Error	Ext	-	224	472					
F-RO-1	Ext	-	548	556					
FINDA	Ext	-	284						
FIXSPC	Ext	-	540						

FLTDH	Ext	-	502				
FTYPF#	Ext	-	1131				
=hCAT	Abs	1007249	#F5E91	-	181		
=hCAT\$	Abs	1007807	#F60BF	-	454		
hCAT\$2	Abs	1007841	#F60E1	-	475	464	
hCAT\$3	Abs	1007908	#F6124	-	522	529	
hCAT\$4	Abs	1007951	#F614F	-	547	524	
hCAT\$5	Abs	1007984	#F6170	-	562	512	533
hCAT\$6	Abs	1007988	#F6174	-	567	559	
hCAT\$e	Abs	1007837	#F60DD	-	472	519	527 537
hCAT\$h	Abs	1007934	#F613E	-	536	595	
hCAT\$x	Abs	1007801	#F60B9	-	449	469	471 480 485
hCATAL	Abs	1007297	#F5EC1	-	206	187	
hCATeR	Abs	1007435	#F5F4B	-	237	240	
hCATer	Abs	1007391	#F5F1F	-	224	192	237 323
hCATs1	Abs	1008124	#F61FC	-	693	691	
hCATsu	Abs	1008057	#F61B9	-	662	239	518
hCATsx	Abs	1008208	#F6250	-	721	701	
hCAT\$5	Abs	1007931	#F613B	-	533	507	
hCTA&&	Abs	1007725	#F606D	-	368	358	361 382
hCTA&+	Abs	1007719	#F6067	-	363	393	
hCTA&t	Abs	1008289	#F62A1	-	812	922	
hCTA+	Abs	1008216	#F6258	-	766	330	349 526
hCTA+!	Abs	1008302	#F62AE	-	819	805	
hCTA++	Abs	1008284	#F629C	-	810	789	
hCTA+1	Abs	1008244	#F6274	-	784	803	
hCTA+2	Abs	1008247	#F6277	-	788	776	
hCTA+C	Abs	1008273	#F6291	-	802	688	
hCTA+x	Abs	1008300	#F62AC	-	816	771	920
hCTA-	Abs	1008312	#F62B8	-	869	341	907
hCTA-1	Abs	1008358	#F62E6	-	886	879	881
hCTA-2	Abs	1008371	#F62F3	-	895	884	
hCTA-3	Abs	1008398	#F630E	-	916	873	
hCTA10	Abs	1007395	#F5F23	-	227	210	
hCTA20	Abs	1007460	#F5F64	-	250	242	370
hCTA21	Abs	1007486	#F5F7E	-	258	251	
hCTA22	Abs	1007498	#F5F8A	-	266	255	
hCTA25	Abs	1007505	#F5F91	-	267	271	
hCTA30	Abs	1007522	#F5FA2	-	270	268	
hCTA35	Abs	1007527	#F5FA7	-	272	203	
hCTA38	Abs	1007609	#F5FF9	-	305	258	298
hCTA39	Abs	1007627	#F600B	-	311	304	614
hCTA=	Abs	1008420	#F6324	-	925	368	
hCTAb1	Abs	1007732	#F6074	-	370	333	
hCTAbt	Abs	1007685	#F6045	-	345	290	352
hCTAct	Abs	1007489	#F5F81	-	261	334	
hCTAdn	Abs	1007661	#F602D	-	326	286	
hCTAeR	Abs	1007548	#F5FBC	-	278	262	
hCTAer	Abs	1007638	#F6016	-	318	278	331 350 369
hCTAex	Abs	1007591	#F5FE7	-	299	243	
hCTAt1	Abs	1007756	#F608C	-	384	389	
hCTAtp	Abs	1007736	#F6078	-	373	292	
hCTAup	Abs	1007677	#F603D	-	337	288	
hCTAxx	Abs	1007665	#F6031	-	331	342	
k#BOT	Ext	-	289				

K#DOWN	Ext	-	285
K#TOP	Ext	-	291
K#UP	Ext	-	287
IFLENh	Ext	-	1227
=rEV\$	Abs 1008050 #F61B2	-	615

Input Parameters

Source file name is NZ&CAT::MS

Listing file name is NZ/CAT:TI:ML::-1

Object file name is NZXCAT:TI:MS::-1

Initial flag settings are
111111
0123456789012345

Errors

None

Saturn Assembler News

```
1      *
2      *      N  N  ZZZZZ  &      III  00000  RRRR
3      *      N  N      Z  & &      I  0  0  R  R
4      *      NN N      Z  & &      I  0  0  R  R
5      *      N N N      Z      &      I  0  0  RRRR
6      *      N NN  Z      & & &      I  0  0  R  R
7      *      N  N  Z      & &      I  0  0  R  R
8      *      N  N  ZZZZZ  && &      III  00000  R  R
9      *
10     *
11     TITLE I/O(NEW Mailbox)<831101.2117>
12 F66D2 ABS #F66D2 TIXHP6 address (fixed)
13     *
14     * Mailbox locations and bits
15     *
16     =oOUTST EQU 6
17     =oOUTHS EQU 7
18     MAV EQU 0
19     NRD EQU 1
20     *
21     =oINHS EQU 8
22     =oINST EQU 9
23     *
24     * Local handshake bits
25     *
26     sPUTX EQU 0
27     sGETX EQU 0
28     sCHKER EQU 1 This MUST not be same bit as MAV!
29     *
30     * End of equates
31     *
32     *****
33     *****
34     **
35     ** Name: READIT,READSU - Read into RAM from loop
36     **
37     ** Category: PILI/O
38     **
39     ** Purpose:
40     ** Read data, given a buffer to put it into, and a count
41     ** of how many bytes to enter
42     **
43     ** Entry:
44     ** D0 points to mailbox
45     ** D1 points to the input buffer
46     ** A[A] is the number of bytes to read
47     ** A[5] is the conversion type for Diamond
48     **
49     ** READSU: C[5:0] is start message and count
50     ** READIT: the conversation is started
51     **
52     ** Exit:
53     ** Carry clear: D1 points past the last character
54     ** A[A] is zero
55     ** Carry set: Error...A[A] is the number of bytes left
```

```

56      **          in the buffer
57      **          If P= =ePIL, C[6:0], [S] is status msg
58      **          from Diamond ([S] has been doubled)
59      **          Else C[W] is undefined
60      **
61      ** Calls:      PUTE,GETX,FRAME-
62      **
63      ** Uses.....
64      ** Exclusive: A[5:0],C[W],D1,P
65      ** Inclusive: A[5:0],C[W],D1,P,ST[3:0]
66      **
67      ** Stk lvls:   1 (FRAME-)(GETX)(PUTE)
68      **
69      ** Algorithm:
70      **   READSC:Save conversation descriptor in A[5:0]
71      **   READS+:Start the conversation                (PUTE)
72      **   READIT:If no more data to read (A[A]=0) then RTNCC
73      **             Get a message from Diamond          (GETX)
74      **             If not data, check the message:     (FRAME-)
75      **             If EOT or terminator match, GOTO READS+
76      **             else error
77      **             (data)
78      **             If P#0 then write out 3 data bytes
79      **             else write out 1 byte
80      **             Increment D1 past data just written
81      **             GOTO READIT
82      **
83      ** History:
84      **
85      **   Date      Programmer      Modification
86      **   -----      -
87      **   09/20/83    NZ            Updated documentation
88      **   04/07/83    NZ            Changed to handle EOT, terminator
89      **   11/23/82    NZ            Added documentation
90      **
91      ** *****
92      ** *****
93      ** *
94      ** * START THE CONVERSATION...
95      ** *
96 F66D2 25  =READSU P=      5          Save start conversation in A[5]
97 F66D4 A9A      A=C      WP
98 F66D7 7A74 READS+  GOSUB  PUTE
99 F66DB 400      RTNC
100      **
101      ** * ...READ THE DATA
102      ** *
103 F66DE 8A8  =READIT ?A=0  A
104 F66E1 26      GOYES  READI9      Done!
105 F66E3 7E50      GOSUB  GETX
106 F66E7 462      GOC     READER      Error if carry
107 F66EA 890      ?P=     0
108 F66ED 94      GOYES  READI3      Single byte transfer
109      ** * must be a triple-byte transfer
110 F66EF 132      ADOEX

```

```
111 F66F2 182      DO=DO- 3
112 F66F5 132      ADOEX
113 F66F8 4C0      GOC   READI2      Read too many! (Can "never" be)
114 F66FB 15D5     DAT1=C 6
115 F66FF 175      D1=D1+ 6
116 F6702 5BD      GONC   READIT     GO ALWAYS...loop back for more
117                *-
118                * If fall through, ERROR!
119                *-
120 F6705 20      READI2 P=   0      If here, A[A] is <0...too far!
121 F6707 300      LC(1) =eUNEXP
122 F670A 20      P=     =ePIL
123 F670C 02      RTNSC
124                *-
125                *-
126 F670E 890     READER ?P=   =eABORT   Is this an ABORT?
127 F6711 00      RTNYES
128 F6713 8E00    GOSUBL =FRAME-    Decode what it is
129                00
129 F6719 890     ?P=     =pSTATE   Is this "Current state"?
130 F671C 21      GOYES  BADRD1    Yes...error in C[4]
131 F671E AF6     C=A     W        Can destroy C[W] now!
132 F6721 890     ?P=     =pEOT     Was it an EOT?
133 F6724 3B      GOYES  READS+    Yes...restart it
134 F6726 890     ?P=     =pTERM    Was it a terminator char?
135 F6729 EA      GOYES  READS+    Yes...reset count, continue
136 F672B 59D     GONC   READI2    No...error!
137                *-
138                *-
139 F672E 80D4    BADRD1 P=C     4      Fetch the error nibble...
140 F6732 6221    GOTO   GETST2   Go always (CPEX 0,P= ePIL,RTNSC)
141                *-
142                *-
143 F6736 CC      =READI3 A=A-1  A      Single byte transfer
144                * can never carry...since A[A] was not zero!
145 F6738 14D     DAT1=C  B
146 F673B 171     D1=D1+ 2
147 F673E 5F9     GONC   READIT     GO ALWAYS...Loop back for more
148                *-
149                *-
150                * if fall through, than ERROR! (can "never" happen)
151 F6741 02      RTNSC
152                *-
153                *-
154 F6743 03      READI9 RTNCC
155                ****
156                ****
157                **
158                ** Name:          GETX - Fast DATA input routine
159                **
160                ** Category:     PILI/O
161                **
162                ** Purpose:
163                **           Fast data input routine...read DATA bytes as quickly
164                **           as possible
```

```

165      **
166      ** Entry:
167      **      DO points to the mailbox
168      **      Conversation is set up and started
169      **
170      ** Exit:
171      **      If carry clear:
172      **          P=0: C[B] is a data byte
173      **          P=2: C[5:0] is three byte quantity; C[B] is first!
174      **      If carry set:
175      **          P=0: C[6:0] is message, C[S] is status*2
176      **          PWO: Aborted (P= =eABORT)
177      **
178      ** Calls:      None
179      **
180      ** Uses.....
181      ** Inclusive: C[W],P,ST[3:0]
182      **
183      ** Stk lvls:  0
184      **
185      ** History:
186      **
187      **      Date      Programmer      Modification
188      **      -----      -
189      **      09/20/83      NZ          Updated documentation
190      **      04/07/83      NZ          Changed exit condition for not
191      **                                     data to P=0, carry set
192      **      03/02/83      NZ          Changed to check for sERROR bit
193      **      02/15/83      NZ          Changed error for ATTN to eABORT
194      **      11/23/82      NZ          Added documentation
195      **
196      ****
197      ****
198 F6745 167 =GETX  DO=DO+ oINHS
199 F6748 0B  GETX1  CSTEM
200 F674A 15E0 C=DATO 1          Read handshake
201 F674E 0B  CSTEM
202 F6750 860 ?ST#1 MAV
203 F6753 62  GOYES  GETXE          No message yet!
204      * message available!
205 F6755 160 GETX2  DO=DO+ (oINST)-(oINHS)
206 F6758 15E6 C=DATO 7
207 F675C 816 CSRC          Now C[S] is the status nibble
208 F675F 188 DO=DO- oINST
209 F6762 A46 C=C+C  S          Check if Three-byte transfer...
210 F6765 560 GONC  GETX3          Not triple byte
211 F6768 22  P=      2          Indicate triple byte!
212 F676A 03  RTNCC
213      *
214      *
215 F676C      GETX3
216      *
217      * Either single byte or not data!
218      *
219 F676C 80D2 P=C      2          Check opcode

```



```

220 F6770 888          ?PH      8          Data?
221 F6773 20          GOYES   GETX4         No...
222 F6775 20          GETX4   P=      0          YES!!!...flag it as 1 byte!
223 F6777 01          RTN
224                  *_
225                  *_
226                  *
227 F6779 850         GETXE   ST=1    sGETX         This is GETX
228 F677C 851         GETx.  ST=1    sCHKER        DO check error bit
229 F677F             GETXNE
230                  *
231                  * First check for error bit set
232                  *
233 F677F 861          ?ST=0   sCHKER        Should I check error?
234 F6782 81          GOYES   GETx.N       No...check attn
235 F6784 160         DO=DO+ (oINST)-(oINHS) Point to error nib
236 F6787 15E0        C=DATO 1       Read nibble into C[0]
237 F678B 180         DO=DO- (oINST)-(oINHS) Put it back where it was
238 F678E 0B         CSTEX
239 F6790 870         ?ST=1   =sERROR    Is the error bit set?
240 F6793 20          GOYES   GETx..       (Set carry if set)
241 F6795 0B         GETx..  CSTEX
242 F6797 432         GOC     GETxE     Error bit set...error!
243                  *
244                  * Now check if the Attn key has been pressed
245                  *
246 F679A 860         GETx.N  ?ST=0   =Attn
247 F679D 52          GOYES   GETX.        Not waiting for Attn...continue
248                  *
249                  * Check if "ATTN" key has been pressed TWICE
250                  *
251 F679F 136         CDOEX
252 F67A2 1B00        DO=(5) =ATNFLG      Save DO in C[A]
253                  000
253 F67A9 1564        C=DATO S
254 F67AD 134         DO=C
255 F67B0 94A        ?C=0    S
256 F67B3 F0         GOYES   GETX.        If not ATTN, keep trying
257 F67B5 B46        C=C+1   S           Check if hit more than once...
258 F67B8 490        GOC     GETX.        No...continue
259 F67BB 187        GETxE   DO=DO- oINHS     Yes...reset DO.
260 F67BE 20         P=      =eABORT      Aborted by ATTN key or error!
261 F67C0 02         RTNSC
262                  *_
263                  *_
264 F67C2 861        GETX.   ?ST=0   sCHKER        Is it GETNE?
265 F67C5 E0         GOYES   GETNO     This is GETNE
266 F67C7 860        ?ST=0   sGETX        Is it GETX or GET?
267 F67CA F1         GOYES   GET1      This is GET
268 F67CC 6B7F       GOTO    GETX1     This is GETX
269 *****
270 *****
271 **
272 ** Name:          GET - Get a message from Diamond
273 ** Name:          GETNE - Get a message without checking error bit

```

```

274      **
275      ** Category:   PILI/O
276      **
277      ** Purpose:
278      **
279      ** Entry:
280      **      DO points to the HPIL mailbox
281      **
282      ** Exit:
283      **      Carry clear:
284      **      Contents of mailbox in C[7:0]
285      **      Handshake nibble in ST[3:0]
286      **      Status nibble in C[S]
287      **      Carry set:
288      **      Error (P=error number)
289      **
290      ** Calls:      None
291      **
292      ** Uses.....
293      **      Inclusive: C[W],ST[3:0] (P only if error)
294      **
295      ** Stk lvls:  0
296      **
297      ** History:
298      **
299      **      Date      Programmer      Modification
300      **      -----      -
301      **      09/20/83      NZ          Updated documentation
302      **      03/07/83      NZ          Added GETNE
303      **      03/02/83      NZ          Modified to share code with GETX
304      **      11/23/82      NZ          Added documentation
305      **
306      ****
307      ****
308 F67D0 167 =GETNE DO=DO+ oINHS
309 F67D3 0B  GETNO  CSTEM
310 F67D5 15E0 C=DATO 1      Read handshake
311 F67D9 0B   CSTEM
312 F67DB 841  ST=0   sCHKER  Clear the sCHKER bit for GETXNE
313 F67DE 860  ?ST#1  MAV
314 F67E1 E9   GOYES  GETXNE  No message, don't check error
315 F67E3 521  GONC   GET2   Go always...message...get it!
316      * _
317      * _
318 F67E6 167 =GET   DO=DO+ oINHS
319      *
320 F67E9 0B  GET1   CSTEM
321 F67EB 15E0 C=DATO 1      READ HANDSHAKE NIBBLE
322 F67EF 0B   CSTEM
323 F67F1 860  ?ST#1  MAV      IS MESSAGE AVAILABLE?
324 F67F4 11   GOYES  GET9      NO...CONTINUE WAITING
325      *
326      * A message is available
327      *
328 F67F6 160 GET2   DO=DO+ (oINST)-(oINHS)

```

```
329 F67F9 15E6      C=DATO 7          READ THE MESSAGE
330 F67FD 816       CSRC             Put the status nibble in C[S]
331 F6800 188       DO=DO- oINST
332 F6803 03        RTNCC
333                *
334                *
335                *
336                * Waiting for frame available...check Attn flag
337                *
338 F6805 840 GET9   ST=0   sGETX      This is GET, not GETX
339 F6808 637F     GOTO   GETx.      Check if Attn set
340                *****
341                *****
342                **
343                ** Name:      GETHS2 - Get the second Diamond handshake nibble
344                **
345                ** Category:  PILI/O
346                **
347                ** Purpose:
348                **           Get the software status nibble from the HPIL mailbox
349                **
350                ** Entry:
351                **           DO points to the HPIL mailbox
352                **
353                ** Exit:
354                **           Software status nibble in ST[3:0], carry clear
355                **
356                ** Calls:      None
357                **
358                ** Uses.....
359                ** Inclusive: ST[3:0]
360                **
361                ** Stk lvls:   0
362                **
363                ** History:
364                **
365                **      Date      Programmer      Modification
366                **      -----      -
367                **      11/23/82      NZ           Added documentation
368                **
369                *****
370                *****
371 F680C 0B        =GETHS2 CSTEK      Save C[X] in ST[11:0]
372 F680E 168       DO=DO+ oINST
373 F6811 15E0     C=DATO 1          Read software status in C[0]
374 F6815 188       DO=DO- oINST
375                *
376                * PIL info in ST[3:0], C unchanged
377                *
378 F6818 0B        CSTEK
379 F681A 01        RTN
380                *****
381                *****
382                **
383                ** Name:      GETST - Get status from Diamond
```

```

384      ** Name:      GETERR - Get error message from Diamond
385      ** Name:      GETST- - Read status message from mailbox with-
386      **                                     out checking the error bit
387      **
388      ** Category:   PILI/O
389      **
390      ** Purpose:
391      **      Get status/error message from Diamond
392      **
393      ** Entry:
394      **      D0 points to the HPIL mailbox
395      **
396      ** Exit:
397      **      Carry clear: PIL status in C[X], error # in C[3]
398      **                      P=0
399      **      Carry set:  Error (# in P,C[0])
400      **
401      ** Calls:      PUTC+N,GETNE,FRAME+
402      **
403      ** Uses.....
404      ** Exclusive:  C[W],          P
405      ** Inclusive: C[W],ST[3:0],P
406      **
407      ** Stk lvls:   1 (PUTC+N)(GETNE)(FRAME+)
408      **
409      ** History:
410      **
411      **      Date      Programmer      Modification
412      **      -----      -
413      **      09/20/83      NZ          Updated documentation
414      **      03/19/83      NZ          Changed both routines so that
415      **                                     they wait for a status message to
416      **                                     be sent by Diamond, instead of
417      **                                     erroring out with P=ePIL,C=eUNEXP
418      **      03/07/83      NZ          Changed GETERR again...to use
419      **                                     new routines PUTC+N and GETNE
420      **      03/04/83      NZ          Modified GETERR to wait for MAV
421      **                                     before calling GET (otherwise
422      **                                     GET will check the sERROR bit
423      **                                     while waiting and abort out!)
424      **      02/03/83      NZ          Modified GETERR to return with
425      **                                     error if Diamond error # is #0
426      **      11/23/82      NZ          Added documentation
427      **
428      ** *****
429      ** *****
430 F681C 20 =GETST P= 0
431 F681E 3100 LC(2) =MSTATS Request status
432 F6822 6900 GOTO GETERO
433      * _
434      * _
435 F6826 20 =GETERR P= 0
436 F6828 3100 LC(2) =MERSTS
437 F682C 7D43 GETERO GOSUB PUTC+N Write it
438 F6830 400 RTNC
  
```

```

439 F6833 799F =GETST- GOSUB GETNE      Get the message-don't check error
440 F6837 400      RTNC
441 F683A 8E00      GOSUBL =FRAME+
      00
442 F6840 880      ?P#    =pSTATE      Is it a current state?
443 F6843 0F      GOYES  GETST-      No...get another one
444 F6845 80D4      P=C    4          Check if error # is zero
445 F6849 BB2      CSL    X          Move all status bits to C[3:1]
446 F684C 880      ?P#    0          Zero?
447 F684F 60      GOYES  GETER3      No...error!
448 F6851 F6      CSR    A          Move all status bits into C[X]
449 F6853 03      RTNCC
450      *_-
451      *_-
452 F6855      GETST2
453 F6855 80F0 GETER3 CPEX  0
454 F6859 20      P=    =ePIL      PIL Error
455 F685B 02      RTNSC
456      *****
457      *****
458      **
459      ** Name:      GETD - Get data message
460      ** Name:      GETEND - Get EOT message
461      **
462      ** Category:  PILI/O
463      **
464      ** Purpose:
465      **      Read a data/EOT message from Diamond
466      **
467      ** Entry:
468      **      Expecting data/EOT from the mailbox
469      **      DO points to the mailbox
470      **
471      ** Exit:
472      **      Carry clear:
473      **      Frame in C[X]
474      **      Frame type in C[S]
475      **      Carry set:
476      **      GETD: Not a data frame/aborted/error bit set
477      **      GETEND: Not an EOT frame/aborted/error bit set
478      **
479      ** Calls:      GET,FRAME+
480      **
481      ** Uses.....
482      ** Exclusive: C
483      ** Inclusive: C,ST[3:0] (P only if error)
484      **
485      ** Stk lvls:  1 (GET)(FRAME+)
486      **
487      ** History:
488      **
489      **      Date      Programmer      Modification
490      **      -----      -
491      **      09/20/83      NZ          Updated documentation
492      **      11/23/82      NZ          Added documentation

```

```
493          **
494          ****
495          ****
496 F685D 758F =GETD  GOSUB  GET           Get frame
497 F6861 400          RTNC           Error
498 F6864 8E00 =CHECKD GOSUBL =FRAME+   Check what kind of frame it is
          00
499 F686A 880          ?P#    =pDATA   DATA?
500 F686D 20          GOYES  GETD1     No...set carry
501 F686F 80FF  GETD1  CPEX    15      Yes...Carry clear!
502 F6873 500          RTNNC
503 F6876 6E8E        GOTO    READI2
504          *-
505          *-
506 F687A 786F =GETEND GOSUB  GET           Get frame
507 F687E 400          RTNC           Error
508 F6881 8E00 =CHKEND GOSUBL =FRAME+   Decode frame
          00
509 F6887 880          ?P#    =pEOT    END?
510 F688A 5E          GOYES  GETD1     No...set carry
511 F688C 52E        GONC    GETD1     Yes...clear carry
512          ****
513          ****
514          **
515          ** Name:      GETID - Read 8 bytes data into A after YTMLL
516          ** Name:      READRG - Read 8 bytes data into the A register
517          ** Name:      GETID+ - Read 8 bytes data into A after YTML
518          **
519          ** Category:   PILI/O
520          **
521          ** Purpose:
522          **   Read up to 8 bytes of data from a device and put it
523          **   into A[W] (GETID and GETID+ strip Cr and trailing
524          **   characters)
525          **
526          ** Entry:
527          **   D[X] is address of the device
528          **   DO @ mailbox
529          **
530          **   READRG: Conversation is already set up
531          **
532          ** Exit:
533          **   Carry clear:
534          **     Up to 8 bytes in A[W], number of bytes in D[S]
535          **     P=0
536          **   Carry set:
537          **     Error (other than device not ready)
538          **     P,C[0]= Error #
539          **
540          ** Calls:      YTML(GETID+),YTMML(GETID),PUTE,GETX,FRAME-
541          **
542          ** Uses.....
543          ** Exclusive: A[W],C[W],D[S],D[13],P
544          ** Inclusive: A[W],C[W],D[S],D[13],P
545          **
```

```

546      ** Stk lvls:  2 (YTMLL)(YTML) (READRG uses only 1 level)
547      **
548      ** History:
549      **
550      **      Date      Programmer      Modification
551      **      -----      -
552      **      09/20/83      NZ      Updated documentation
553      **      09/01/83      NZ      Added check for P= =eABORT at GOC
554      **                                     from GETX (fix of SPOLL&STANDBY
555      **                                     bug)
556      **      03/09/83      NZ      Added check for not changing #
557      **                                     bytes received if strip is false
558      **      03/03/83      NZ      Added check for READRG to not
559      **                                     strip trailing Cr
560      **      11/23/82      NZ      Added documentation
561      **
562      ****
563      ****
564 F688F 8E00 =GETID+ GOSUBL =YTML      D[X] is talker, I am listener
565      00
566 F6895 551      GONC  GETIDO      If no errors
567 F6898 02      RTNSC      Error!
568      *
569 F689A 2D      =READRG P= 13
570 F689C A83      D=0  P      Clear "strip returns" flag
571 F689F 6B10     GOTO  READRg
572      *
573      *
574 F68A3 20      =GETID  P= 0
575 F68A5 8E00     GOSUBL =YTMLL      D[X] is talker, I am listener
576      00
577 F68AB 3500 GETIDO LC(6) (=mSDI)+8      Max of 8 characters
578      0000
579 F68B3 2D      P= 13      Set flag to indicate strip Cr
580 F68B5 A83      D=0  P
581 F68B8 A0F      D=D-1 P      D[13]="F"...strip returns
582 F68BB 7692 READRg GOSUB  PUTE
583 F68BF 400      RTNC
584 F68C2 AFO      A=0  W      Preclear A[W]
585 F68C5 AC3      D=0  S      Clear D[S] (count)
586 F68C8 797E GETID1 GOSUB  GETX      Get a message
587 F68CC 487      GOC  GETID4      If carry, not data
588 F68CF AEA      GETID2 A=C  B
589 F68D2 814      ASRC
590 F68D5 814      ASRC      Rotate into A[15:14]
591 F68D8 BF6      CSR  W      Shift next char into C[B]
592 F68DB F6      CSR  A      (at most GETX returns 6 nibs)
593 F68DD B47      D=D+1 S      Increment count
594 F68E0 0D      P=P-1
595 F68E2 5CE      GONC  GETID2      If no carry, more bytes
596      *
597      * If carry, P=15!
598      *
599 F68E5 308      LC(1) 8

```

```

598 F68E8 9C7      ?D<C   S
599 F68EB DD      GOYES  GETID1   Get more bytes
600 F68ED 20      P=     0        Now remove any Cr,Lf!
601 F68EF 31D0   GETID3  LC(2)  13       Check for <Cr>
602 F68F3 2D      P=     13
603 F68F5 90F     ?D#0   P        Strip flag set?
604 F68F8 50      GOYES  GETIDs   Yes...strip <Cr>s
605 F68FA RE2     C=0    B        No...don't strip <Cr>s
606 F68FD 2F      GETIDs P=     15
607 F68FF 96A    GETID* ?C=0   B        Stripping trailing chars?
608 F6902 A0      GOYES  GETID-   No...continue
609 F6904 966     ?A#C   B        Yes...match?
610 F6907 50      GOYES  GETID-   No...continue
611 F6909 A90     A=0    WP      Yes...clear anything after <Cr>
612 F690C 814    GETID- ASRC
613 F690F 814     ASRC
614 F6912 0D      P=P-1
615 F6914 0D      P=P-1
616 F6916 58E     GONC   GETID*   If no carry, continue
617 *
618 * Now remove any trailing zero bytes (decrement count)
619 *
620 F6919 2D      P=     13       Check if strip flag set
621 F691B 90B     ?D=0   P
622 F691E 32      GOYES  GETID!   Not strip...exit
623 F6920 2F      P=     15
624 F6922 AC2     C=0    S        Preclear the count!
625 F6925 978     ?A=0   W        Is whole word zero?
626 F6928 61      GOYES  GETID%   Yes...set count=0!
627 F692A 90C    GETID^ ?A#0   P
628 F692D 70      GOYES  GETID#
629 F692F 0D      P=P-1
630 F6931 58F     GONC   GETID^   Go always
631 *
632 *
633 F6934 80FF   GETID# CPEX   15
634 F6938 81E     CSR#
635 F693B B46     C=C+1  S        Now C[S] is # of characters-1
636 F693E AC7    GETID% D=C    S        C[S] is # of characters
637 F6941 20      GETID! P=     0        Reset count in D[S]
638 F6943 03      RTNCC
639 *
640 *
641 F6945 890    GETID4 ?P=    =eABORT  Is this an abort or error?
642 F6948 00      RTNYES
643 F694A 80FF   CPEX   15       Yes...tell caller
644 F694E 8E00   GOSUBL =FRAME-  Check what it IS
645 F6954 890     ?P=    =pSTATE  Current state?
646 F6957 B0      GOYES  GETID5   Yes...justify, return-carry clear
647 F6959 890     ?P=    =pEOT   EOT?
648 F695C 60      GOYES  GETID5   Yes...justify, return-carry clear
649 *
650 * NOT state or EOT...error!
651 *

```



```
652 F695E 66AD      GOTO  READI2      Unexpected frame
653                *_-
654                *_-
655 F6962 ACB      GETID5  C=D      S
656 F6965 80DF      P=C      15      P=count until justified!
657 F6969 890      GETID6  ?P=      0
658 F696C 38        GOYES   GETID3      Return, carry clear
659 F696E 810      ASLC
660 F6971 810      ASLC      Shift one character
661 F6974 0D        P=P-1     Decrement character count
662 F6976 52F      GONC    GETID6     Go always
663                *****
664                *****
665                **
666                ** Name:      INITFL - Initialize a file on external device
667                **
668                ** Category:  FILUTL
669                **
670                ** Purpose:
671                **      Initialize an external file after creation
672                **
673                ** Entry:
674                **      R1[S] = Create code of the file
675                **      Tape is positioned at the start of the file data area
676                **      R2[A] is # of sectors in the file
677                **
678                ** Exit:
679                **      Carry clear:
680                **      The file will be filled with zeros or all FF's
681                **      Create code = 2 - filled with zeros
682                **      Otherwise - filled with all FF's
683                **      Carry set:
684                **      Error...P, C[0] are error code
685                **
686                ** Calls:      SENDIT
687                **
688                ** Uses:
689                **      Exclusive: A[W],C[W],D1,      FUNCRI[15:0],P
690                **      Inclusive: A[W],C[W],D1,ST[3:0],FUNCRI[15:0],P
691                **
692                ** Stk lvls:  2 (SENDIT)
693                **
694                ** History:
695                **
696                **      Date      Programmer      Modification
697                **      -----      -
698                **      09/21/83      NZ      Updated documentation
699                **      04/18/83      NZ      Modified entry conditions and
700                **                                rewrote routine to save code and
701                **                                fix several bugs
702                **      01/25/83      NZ      Updated documentation, changed
703                **                                code to cut 2B(hex) nibbles
704                **      10/01/82      SC      Wrote routine
705                **
706                *****
```

```

707 *****
708 F6979 =INITFL
709 F6979 1F00      D1=(5) =FUNCR1
      000
710 F6980 AF4      A=B      W      Get B[W] into A[W]
711 F6983 1517     DAT1=A W      Save B[W] in FUNCR1
712 *
713 F6987 112      A=R2      Recall size in sectors
714 F698A F0       ASL      A
715 *
716 * If the file size can exceed 1M bytes, the following shift
717 * will produce erroneous results!!!!
718 *
719 F698C F0       ASL      A      Multiply by 256 bytes/sector
720 *
721 F698E AF1      B=0      W      Clear B[W] (pattern)
722 F6991 119      C=R1      C(S)= CREATE CODE
723 F6994 80DF     P=C      15     Get CREATE code into P
724 F6998 892      ?P=      2      Create code=2?
725 F699B 50       GOYES   INIT10   Yes...pattern is zero
726 F699D A7D      B=B-1 W      No...pattern is "FFFFFF"
727 F69A0 20       INIT10 P=      0      Reset P=0
728 F69A2 7E70     GOSUB  SENDIT   Now send the pattern!
729 F69A6 1537     A=DAT1 W      D1 unchanged by SENDIT!
730 F69AA AF8      B=A      W      Restore B[W]
731 F69AD 01       RTN      Carry set if error, else clear
732 *****
733 *****
734 **
735 ** Name:          WRITIT - Write data from RAM to the mailbox
736 **
737 ** Category:     PILI/O
738 **
739 ** Purpose:
740 **      Output data to the Diamond, given a buffer of data in
741 **      RAM and a pointer (D1) to the buffer
742 **
743 ** Entry:
744 **      DO: Diamond mailbox
745 **      D1: Data buffer start
746 **      A[A]: Number of bytes of data to send from at D1
747 **      Loop is addressed, set up for this transfer
748 **      ST(=LoopOK) set if should abort on one ATTN, else clear
749 **
750 ** Exit:
751 **      Carry clear:
752 **      Transfer complete, D1 points past end of buffer,
753 **      A[A]="000FF", P unchanged from entry
754 **      Carry set: Error - P is the error number, A[A] is the
755 **      number of data bytes not sent (may be low by up to 3)
756 **      (If Attn key hit ONCE, then carry set, P=0)
757 **
758 ** Calls:        PUTX,PUTD,CK=RTN
759 **
760 ** Uses.....

```

```

761      ** Exclusive: A[A],C[W],D1
762      ** Inclusive: A[A],C[W],D1,ST[3:0]
763      **
764      ** Stk lvls:  1 (PUTX)(PUTD)(CK=ATN)
765      **
766      ** NOTE: this routine can be SLIGHTLY speeded up by calling
767      ** PUTX one statement later (after the CPEX 15)...at the
768      ** cost of setting P=0 unconditionally
769      **
770      ** History:
771      **
772      **      Date          Programmer          Modification
773      **      -----          -
774      **      09/27/83      NZ          Installed fix of SR for Memory
775      **                                     Lost during OUTPUT and/or PRINT
776      **                                     (The bug was that WRITIT did not
777      **                                     check carry from PUTD, therefore
778      **                                     would return with carry clear,
779      **                                     but P= =eABORT or =ePIL)
780      **      09/21/83      NZ          Updated documentation
781      **      07/21/83      NZ          Added status for don't abort for
782      **                                     single ATTN hit
783      **      03/15/83      NZ          Added P=0 if ATNFLAG=F
784      **      11/24/82      NZ          Added documentation
785      **
786      *****
787      *****
788 F69AF 870 =WRITIT ?ST=1 =Attn
789 F69B2 E1      GOYES WRITII1      ATTN hit at least once...check!
790 F69B4 132 WRITIO  ADOEX
791 F69B7 182      DO=DO- 3      See if three bytes to send
792 F69BA 4F1      GOC   WRITII2      No...transfer remaining bytes
793 F69BD 132      ADOEX
794      *
795      * Have three bytes to send
796      *
797 F69C0 15F5      C=DAT1 6      Read three
798 F69C4 175      D1=D1+ 6      Point to next
799 F69C7 7CC0      GOSUB  PUTX      Send them
800 F69CB 53E      GONC   WRITIT      Go unless Attn hit more than once
801 F69CE 02      RTNSC          Error!
802      *
803      *
804 F69D0 7F20 WRITII1 GOSUB  CK=ATN
805 F69D4 4FD      GOC   WRITIO      Not ATTN key...continue
806
807 F69D7 572      GONC   P=0:SC      Go always (PACK 9/27/83 NZ)
808      *
809      * P= 0      Attn key ONCE
810      * RTNSC      Attn key interrupt...exit!
811      *
812      *
813 F69DA 162 WRITII2 DO=DO+ 3      Correct for over-subtracting
814 F69DD 132      ADOEX
815 F69E0 A6C WRITII3 A=A-1 B      If carry, than done

```

```
816 F69E3 4D6      GDC   WRIT14      Done!
817 F69E6 14F      C=DAT1 B         Read it...
818 F69E9 171      D1=D1+ 2        Next byte...
819 F69EC 7351     GOSUB  PUTD      Send it!
820                *
821                * Following RTNC is bug fix on 9/27/83 by NZ
822                *
823 F69F0 400      RTNC              Error...set carry
824                *
825 F69F3 860      ?ST=0 =Attn
826 F69F6 AE       GOYES WRIT13      Loop back if not interrupt
827 F69F8 7700     GOSUB  CK=ATN
828 F69FC 43E      GDC   WRIT13      Loop back if not interrupt
829 F69FF 20      P=0:SC P= 0       Attn key DNCE
830 F6A01 02      RTNSC            Attn key interrupt...exit!
831                *-
832                *-
833                *
834                * Moved to location below by NZ on 9/27/83 as part of bug fix
835                *
836                *WRIT14 RTNCC              Done...return with carry clear!
837                *-
838                *-
839                *
840                * CK=ATN will return with carry set if OK to continue, clear
841                * if time to abort transmission
842                *
843 F6A03 860      =CK=ATN ?ST=0 =LoopOK      Should I check ATNFLG?
844 F6A06 00      RTNYES          No...say OK
845 F6A08 136      =CK=ATn CDOEX   Save DO in C[A]
846 F6A0B 1B00     DO=(5) =ATNFLG
      000
847 F6A12 1564     C=DATO S
848 F6A16 134      DO=C            Restore DO
849 F6A19 A4E      C=C-1 S        If carry, ATNFLG was zero
850 F6A1C 01      RTN
851                *****
852                *****
853                **
854                ** Name:      SENDIT - Send a 1 or 2 char sequence from B[W]
855                ** Name:      SENDI+ - Find mailbox, send a sequence of chars
856                **
857                ** Category:  PILI/O
858                **
859                ** Purpose:
860                **      Send a sequence of 1 or 2 characters (in B[7:0])
861                **      Number of characters to send in A[A]
862                **
863                ** Entry:
864                **      A[A]=count of characters
865                **      B[7:0]=sequence (B[B]=first char, B[3:2]=second char,
866                **      B[5:4]=first char, B[7:6]=second char)
867                **      DO points to mailbox
868                **      ST(=LoopOK) set if abort on 1 ATTN, else clear
869                **
```

```

870      ** Exit:
871      **      Carry set if Attn or error, else clear
872      **      If carry set and P=0, then ATTN key hit ONCE
873      **
874      ** Calls:      PUTX,PUTD,CK=ATN (SENDI+ also calls GETMBX)
875      **
876      ** Uses.....
877      ** Exclusive: A[A],C[W]
878      ** Inclusive: A[A],C[W],ST[3:0]
879      **
880      ** Stk lvls:   1 (PUTX)(PUTD)(CK=ATN)(GETMBX)
881      **
882      ** NOTE: This routine can be speeded up SLIGHTLY...see WRITIT
883      ** documentation)
884      **
885      ** History:
886      **
887      **      Date      Programmer      Modification
888      **      -----      -
889      **      09/27/83      NZ      Packed code (needed for WRITIT fix)
890      **      09/21/83      NZ      Updated documentation
891      **      03/15/83      NZ      Added P=0 for Attn key ONCE
892      **      11/24/82      NZ      Added documentation
893      **
894      ** *****
895      ** *****
896 F6A1E 8E00 =SENDI+ GOSUBL =GETMBX
           00
897 F6A24 870 =SENDIT ?ST=1 =Attn      Check if immediate exit
898 F6A27 C2      GOYES SENDI1
899 F6A29 132 SENDIO ADOEX
900 F6A2C 185      DO=DO- 6
901 F6A2F 4D2      GOC SENDI2      Less than 6 left
902 F6A32 132      ADOEX
903 F6A35 AF9      C=B W
904 F6A38 7B50     GOSUB PUTX      Send first 3 chars
905 F6A3C 400      RTNC      Attn
906 F6A3F AF9      C=B W
907 F6A42 BF6      CSR W
908 F6A45 BF6      CSR W
909 F6A48 7B40     GOSUB PUTX      Send next 3 chars
910 F6A4C 57D      GONC SENDIT     Loop back!
911 F6A4F 02      RTNSC      Error!
912      **
913      **
914 F6A51 03      WRITIA RTNCC      Moved here 9/27/83 by NZ
915      **
916      **
917 F6A53 7CAF     SENDI1 GOSUB CK=ATN
918 F6A57 41D      GOC SENDIO      Not ATTN key...continue
919 F6A5A 54A     P=0:sc GONC P=0:SC   Packed 9/27/83 by NZ
920      **
921      **      P= 0      Attn key ONCE
922      **      RTNSC      Attn key interrupt...exit!
923      **

```

```
924          *-
925 F6A5D 165 SENDI2 DO=DO+ 6
926 F6A60 132      ADOEX
927 F6A63 A6C SENDI3 A=A-1 B
928 F6A66 4E2      GOC SENDI4      Done if carry
929 F6A69 AE9      C=B B
930 F6A6C 73D0     GOSUB PUTD      Send first byte
931 F6A70 400      RTNC      Attn
932 F6A73 A6C      A=A-1 B
933 F6A76 4E1      GOC SENDI4      Done if carry
934 F6A79 D9       C=B A
935 F6A7B F6       CSR A
936 F6A7D F6       CSR A
937 F6A7F 70C0     GOSUB PUTD      Send second byte
938 F6A83 400      RTNC
939 F6A86 860      ?ST=0 =Attn
940 F6A89 AD       GOYES SENDI3     Loop back if not interrupt
941 F6A8B 747F     GOSUB CK=ATN
942 F6A8F 43D      GOC SENDI3     Not ATTN key...continue
943 F6A92 57C      GONC P=0:sc    Packed 9/27/83 by NZ
944          *
945          *      P= 0      Attn key ONCE
946          *      RTNSC     Attn key interrupt...exit!
947          *-
948          *-
949 F6A95 03 SENDI4 RTNCC      Done!
950          *****
951          *****
952          **
953          ** Name:      PUTX - Send 3 bytes of data from C[5:0] to loop
954          **
955          ** Category:  PILI/O
956          **
957          ** Purpose:
958          **      Output three bytes from C[5:0] to PIL
959          **
960          ** Entry:
961          **      C[5:0] is the three data bytes (C[B] is first byte)
962          **      DO: HPIL mailbox
963          **
964          ** Exit:
965          **      Carry clear: done
966          **      Carry set: error (P is error #)
967          **
968          ** Calls:      None
969          **
970          ** Uses.....
971          **      Inclusive: C[W],ST[3:0]
972          **
973          ** Stk lvls:  0
974          **
975          ** History:
976          **
977          **      Date      Programmer      Modification
978          **      -----      -----      -----
```

```
979      ** 03/15/83      NZ      Removed check for Attn at PUTX5
980      **
981      ** 03/07/83      NZ      Added flag to ignore error bit
982      ** 03/04/83      NZ      Reordered code to check sERROR
983      **
984      ** 03/02/83      NZ      Added check for sERROR if Attn is
985      **
986      ** 11/24/82      NZ      Added documentation
987      **
988      *****
989      *****
990 F6A97 80FF =PUTX  CPEX  15      Save P in C[S]
991 F6A9B 26      P=      6
992 F6A9D 3181    LCHEX  18      Long transfer bits...
993 F6AA1 166    PUTXx  DO=DO+ oOUTHs
994 F6AA4 80DF    P=C      15      Restore P
995 F6AA8 870    ?ST=1  =Attn
996 F6AAB D1      GOYES  PUTX3    Check for immediate abort!
997 F6AAD 0B      PUTX1  CSTEM
998 F6AAF 15E0    C=DATO 1      Read the handshake
999 F6AB3 0B      CSTEM
1000 F6AB5 871    ?ST=1  NRD      NRD?
1001 F6AB8 01      GOYES  PUTX3    Yes...wait!
1002 F6ABA 870    ?ST#0  MAV
1003 F6ABD B0      GOYES  PUTX3
1004 F6ABF 186    PUTEx  DO=DO- oOUTHs
1005      *
1006      * Ready to send it now (coast is clear)
1007      *
1008 F6AC2 15C7    DATO=C 8
1009 F6AC6 03      RTNCC
1010      *-
1011      *-
1012 F6AC8 850    PUTX3  ST=1  sPUTX    Flag for return routine
1013      *
1014      * If here, not ready yet...check for ATTN
1015      *
1016 F6ACB 851    PUTX4  ST=1  sCHKER    DO check error bit
1017 F6ACE      PUTX5
1018      *
1019      * Check =ATNFLG in RAM...
1020      *
1021      * Save the message in C[12:5] to check ATNFLG
1022      *
1023 F6ACE BF2      CSL    W
1024 F6AD1 BF2      CSL    W
1025 F6AD4 BF2      CSL    W
1026 F6AD7 BF2      CSL    W
1027 F6ADA BF2      CSL    W      Now message in C[12:5]
1028 F6ADD 136      CDOEX
1029 F6AE0 1B00    DO=(5) =ATNFLG
      000
1030 F6AE7 1564    C=DATO S
1031 F6AEB 134      DO=C      Restore DO
1032      *
```

```

1033 F6AEE 161          DO=DO+ (oINST)-(oOUTHS)
1034 F6AF1 15E0        C=DATO 1          Read the status nibble &check err
1035 F6AF5 181          DO=DO- (oINST)-(oOUTHS)
1036 F6AF8 0B          CSTEM
1037 F6AFA 870          ?ST=1 =sERROR
1038 F6AFD 20          GOYES PUTx0
1039 F6AFF 0B          PUTx0 CSTEM          Carry SET if error bit set
1040 *
1041 F6B01 BF6          CSR W            Restore message to C[7:0]
1042 F6B04 BF6          CSR W
1043 F6B07 BF6          CSR W
1044 F6B0A BF6          CSR W
1045 F6B0D BF6          CSR W            Now ATNFLG is in C[8]
1046 F6B10 80FA        CPEX 10
1047 F6B14 570          GONC PUTx1       No carry...sERROR clear
1048 F6B17 871          ?ST=1 sCHKER     Check error bit?
1049 F6B1A C0          GOYES PUTx.       Yes...error!
1050 *
1051 * If sCHKER=0, then ignore the error bit
1052 *
1053 F6B1C 890          PUTx1 ?P= 0       ATTN key?
1054 F6B1F E0          GOYES PUTx3       No...continue
1055 F6B21 0C          P=P+1
1056 F6B23 490          GOC PUTx3         Attn key, hit only ONCE
1057 *
1058 * ATTN key hit!
1059 *
1060 F6B26 186          PUTx. DO=DO- oOUTHS
1061 F6B29 20          P= =eABORT        Aborted by ATTN key
1062 F6B2B 02          RTNSC
1063 *_
1064 *_
1065 F6B2D 80FA        PUTx3 CPEX 10     Restore P!
1066 F6B31 861          PUTX6 ?ST=0 sCHKER Is this PUTN?
1067 F6B34 B0          GOYES PUTX7       Yes...loop
1068 F6B36 860          ?ST#1 sPUTX
1069 F6B39 C2          GOYES PUTE1       Loop again
1070 F6B3B 617F        GOTO PUTX1        (Out of range)
1071 *_
1072 *_
1073 F6B3F 6650        PUTX7 GOTO PUTN1   Continue with PUTN
1074 *****
1075 *****
1076 **
1077 ** Name:          PUTD - Put a single data byte on the loop
1078 **
1079 ** Category:      PILI/O
1080 **
1081 ** Purpose:
1082 **          Send a single data byte on the loop (Check NRD first)
1083 **
1084 ** Entry:
1085 **          C[B] contains the data byte
1086 **          DO points to the HPIL mailbox
1087 **

```



```
1088      ** Exit:
1089      **      Handshake nibble in ST[3:0]
1090      **      Carry set if error, clear if OK
1091      **
1092      ** Calls:      None
1093      **
1094      ** Uses.....
1095      ** Inclusive: C[W],ST[3:0]
1096      **
1097      ** Stk lvls:  0
1098      **
1099      ** History:
1100      **
1101      **      Date      Programmer      Modification
1102      **      -----      -
1103      **      02/18/83      NZ      Changed to share code with PUTX
1104      **      11/24/82      NZ      Added documentation
1105      **
1106      **
1107      **
1108 F6B43 80FF =PUTD  CPEX  15
1109 F6B47 22      P=    2
1110 F6B49 3500      LC(6) #140000      This is a single data frame
1111      0041
1111 F6B51 6F4F      GOTO  PUTXx      Continue with common code in PUTX
1112      *****
1113      *****
1114      **
1115      ** Name:      PUTE - Put extended message (6 nibbles)
1116      ** Name:      PUTEX - Put extended message (6 nibs + 2 hs)
1117      **
1118      ** Category:  PILI/O
1119      **
1120      ** Purpose:
1121      **      PUTE:Put extended mailbox message (given full 6 nibs)
1122      **      PUTEX:Put a full message, INCLUDING HANDSHAKE!!!!
1123      **
1124      ** Entry:
1125      **      PUTE: C[5:0] is message
1126      **      PUTEX: C[7:0] is message
1127      **      DO points to the mailbox
1128      **
1129      ** Exit:
1130      **      Carry clear: OK (P=0 for PUTX)
1131      **      Carry set: error (P=error #)
1132      **
1133      ** Calls:      None
1134      **
1135      ** Uses.....
1136      ** Inclusive: C,ST[3:0] (PUTE sets P=0)
1137      **
1138      ** Stk lvls:  0
1139      **
1140      ** History:
1141      **
```

```

1142      **      Date      Programmer      Modification
1143      **      -----      -----      -----
1144      **      02/18/83      NZ      Packed by sharing code with PUTX
1145      **      11/24/82      NZ      Added documentation
1146      **
1147      *****
1148      *****
1149 F6B55 26 =PUTE P= 6
1150 F6B57 3101 LCHEX 10
1151 F6B58 20 P= 0
1152 F6B5D =PUTEX
1153 F6B5D 166 DO=DO+ oOUTHS
1154 F6B60 870 ?ST=1 =Attn
1155 F6B63 31 GOYES PUTE2 Check for immediate abort
1156 F6B65 0B PUTE1 CSTEM
1157 F6B67 15E0 C=DATO 1 Read handshake nibble
1158 F6B68 0B CSTEM
1159 F6B6D 870 ?ST#0 MARV
1160 F6B70 60 GOYES PUTE2
1161 F6B72 6C4F PUTEx. GOTO PUTEx Can be GONC if it will reach!
1162 * _
1163 * _
1164 *
1165 * Looping...check ATTN flag
1166 *
1167 F6B76 840 PUTE2 ST=0 sPUTX
1168 F6B79 615F GOTO PUTX4 Check for ATTN flag, return:PUTE1
1169 *****
1170 *****
1171 **
1172 ** Name: PUTEN - Put message in C[5:0], don't check error
1173 ** Name: PUTCN - Put message in C[3:0], don't check error
1174 ** Name: PUTC+N - Put message in C[B], don't check error
1175 **
1176 ** Category: PILI/O
1177 **
1178 ** Purpose:
1179 ** Put a message without checking for the Diamond error
1180 ** bit (otherwise same as PUTE)
1181 **
1182 ** Entry:
1183 ** DO points to the HPIL mailbox
1184 **
1185 ** PUTEN: Message in C[5:0]
1186 ** PUTCN: Message in C[3:0]
1187 ** PUTC+N: Message in C[B]
1188 **
1189 ** Exit:
1190 ** Carry clear:
1191 ** Handshake nibble in ST[3:0]
1192 ** Carry set:
1193 ** P=error #
1194 **
1195 ** Calls: None
1196 **

```

```
1197      ** Uses.....
1198      ** Exclusive: C[W]
1199      ** Inclusive: C[W],ST[3:0]
1200      **
1201      ** Stk lvls:  0
1202      **
1203      ** History:
1204      **
1205      **      Date      Programmer      Modification
1206      **      -----      -
1207      **      09/21/83      NZ      Added documentation
1208      **
1209      ****
1210      ****
1211 F6B7D F2  =PUTC+N CSL  A      PUTC+ except don't check error
1212 F6B7F F2          CSL  A
1213 F6B81 F2  =PUTCN CSL  A      PUTC except don't check error
1214 F6B83 BF2        CSL  W
1215 F6B86 26  =PUTEN P=   6      PUTE except don't check error
1216 F6B88 3101      LCHEX 10
1217 F6B8C 20        P=   0
1218 F6B8E 166      DO=DO+ oOUTHs
1219 F6B91 870      ?ST=1 =Attn
1220 F6B94 21        GOYES PUTN2
1221 F6B96 0B  PUTN1  CSTEM
1222 F6B98 15E0      C=DATO 1      Read handshake
1223 F6B9C 0B        CSTEM
1224 F6B9E 870      ?ST#0 MAV      Message available?
1225 F6BA1 50        GOYES PUTN2      No...wait loop
1226 F6BA3 5EC      GONC  PUTEx.      Go always...jump to finish
1227      * _
1228      * _
1229 F6BA6 841  PUTN2  ST=0  sCHKER      Don't check error!
1230 F6BA9 642F      GOTO  PUTX5
1231      ****
1232      ****
1233      **
1234      ** Name:      PUTC+ - Put a command (1 byte) to the mailbox
1235      ** Name:      PUTC - Put a command (2 bytes) to the mailbox
1236      **
1237      ** Category:  PILI/O
1238      **
1239      ** Purpose:
1240      **      Put a command (1 or 2 bytes) to the mailbox
1241      **
1242      ** Entry:
1243      **      DO points to the HPIL mailbox
1244      **      PUTC+: C[B] contains the command to send (1 byte)
1245      **      PUTC: C[3:0] contains the command to send (2 bytes)
1246      **
1247      ** Exit:
1248      **      Same as PUTE
1249      **
1250      ** Calls:      None
1251      **
```

```
1252      ** Uses.....
1253      ** Inclusive: C[W],ST[3:0],P
1254      **
1255      ** Stk lvls:  0
1256      **
1257      ** History:
1258      **
1259      **      Date      Programmer      Modification
1260      **      -----      -
1261      **      09/21/83      NZ      Updated documentation
1262      **      11/24/82      NZ      Added documentation
1263      **
1264      ****
1265      ****
1266 F6BAD F2 =PUTC+  CSL  A
1267 F6BAF F2          CSL  A
1268 F6BB1 F2 =PUTC  CSL  A
1269 F6BB3 BF2        CSL  W
1270 F6BB6 6E9F      GOTO  PUTE      Continue as if PUTE
1271      ****
1272      ****
1273      **
1274      ** Name:          DDT,DDL - Send a Device Dependent Command
1275      **
1276      ** Category:     PILI/O
1277      **
1278      ** Purpose:
1279      **      Send a DDL/DDT as determined by P (these routines are
1280      **      only good for DDL/DDT 0-15)
1281      **
1282      ** Entry:
1283      **      P contains the DDL/DDT number desired
1284      **      Loop is set up
1285      **      DO @ mailbox
1286      **
1287      ** Exit:
1288      **      Same as PUTE
1289      **
1290      ** Calls:         None
1291      **
1292      ** Uses.....
1293      ** Inclusive: C[W],ST[3:0],P
1294      **
1295      ** Stk lvls:  0
1296      **
1297      ** History:
1298      **
1299      **      Date      Programmer      Modification
1300      **      -----      -
1301      **      11/24/82      NZ      Added documentation
1302      **
1303      ****
1304      ****
1305 F6BBA 80F0 =DDL  CPEX  0
1306 F6BBE 21          P=    1
```

```
1307 F6BC0 3200      LC(3) (=mCMD3)+#A  DDL
      0
1308 F6BC5 6BEF      GOTO  PUTC
1309                *-
1310                *-
1311 F6BC9 80F0 =DDT  CPEX  0
1312 F6BCD 21        P=    1
1313 F6BCF 3200      LC(3) (=mCMD3)+#C  DDT
      0
1314 F6BD4 6CDF      GOTO  PUTC
1315 F6BD8          END
```

ATNFLG	Ext	-	252	846	1029					
Attn	Ext	-	246	788	825	897	939	995	1154	1219
BADRD1	Abs	1009454 #F672E	- 139	130						
=CHECKD	Abs	1009764 #F6864	- 498							
=CHKEND	Abs	1009793 #F6881	- 508							
=CK=ATN	Abs	1010179 #F6A03	- 843	804	827	917	941			
=CK=ATn	Abs	1010184 #F6A08	- 845							
=DDL	Abs	1010618 #F6BBA	- 1305							
=DDT	Abs	1010633 #F6BC9	- 1311							
FRAME+	Ext	-	441	498	508					
FRAME-	Ext	-	128	644						
FUNCR1	Ext	-	709							
=GET	Abs	1009638 #F67E6	- 318	496	506					
GET1	Abs	1009641 #F67E9	- 320	267						
GET2	Abs	1009654 #F67F6	- 328	315						
GET9	Abs	1009669 #F6805	- 338	324						
=GETD	Abs	1009757 #F685D	- 496							
GETD1	Abs	1009775 #F686F	- 501	500	510	511				
=GETEND	Abs	1009786 #F687A	- 506							
GETERO	Abs	1009708 #F682C	- 437	432						
GETER3	Abs	1009749 #F6855	- 453	447						
=GETERR	Abs	1009702 #F6826	- 435							
=GETHS2	Abs	1009676 #F680C	- 371							
=GETID	Abs	1009827 #F68A3	- 574							
GETID!	Abs	1009985 #F6941	- 637	622						
GETID#	Abs	1009972 #F6934	- 633	628						
GETID%	Abs	1009982 #F693E	- 636	626						
GETID*	Abs	1009919 #F68FF	- 607	616						
=GETID+	Abs	1009807 #F688F	- 564							
GETID-	Abs	1009932 #F690C	- 612	608	610					
GETIDO	Abs	1009835 #F68AB	- 576	565						
GETID1	Abs	1009864 #F68C8	- 584	599						
GETID2	Abs	1009871 #F68CF	- 586	593						
GETID3	Abs	1009903 #F68EF	- 601	658						
GETID4	Abs	1009989 #F6945	- 641	585						
GETID5	Abs	1010018 #F6962	- 655	646	648					
GETID6	Abs	1010025 #F6969	- 657	662						
GETID^	Abs	1009962 #F692A	- 627	630						
GETID\$	Abs	1009917 #F68FD	- 606	604						
GETMBX	Ext	-	896							
GETNO	Abs	1009619 #F67D3	- 309	265						
=GETNE	Abs	1009616 #F67D0	- 308	439						
=GETST	Abs	1009692 #F681C	- 430							
=GETST-	Abs	1009715 #F6833	- 439	443						
GETST2	Abs	1009749 #F6855	- 452	140						
=GETX	Abs	1009477 #F6745	- 198	105	584					
GETX.	Abs	1009602 #F67C2	- 264	247	256	258				
GETX1	Abs	1009480 #F6748	- 199	268						
GETX2	Abs	1009493 #F6755	- 205							
GETX3	Abs	1009516 #F676C	- 215	210						
GETX4	Abs	1009525 #F6775	- 222	221						
GETXE	Abs	1009529 #F6779	- 227	203						
GETXNE	Abs	1009535 #F677F	- 229	314						
GETx.	Abs	1009532 #F677C	- 228	339						
GETx..	Abs	1009557 #F6795	- 241	240						

Input Parameters

Source file name is NZ&IOR::MS

Listing file name is NZ/IOR:TI:ML::-1

Object file name is NZ%IOR:TI:MS::-1

Initial flag settings are

	111111
	0123456789012345

Errors

None

Saturn Assembler News

```

1      *
2      *      N N ZZZZ & FFFF RRRR A
3      *      N N Z && F R R A A
4      *      NN N Z && F R R A A
5      *      N N N Z & FFFF RRRR A A
6      *      N NN Z &&& F R R A A A A
7      *      N N Z && F R R A A
8      *      N N ZZZZ &&& F R R A A
9      *
10     *
11     TITLE PIL Frame Routines<831012.1534>
12 F6BD8 ABS #F6BD8 TIXHP6 address (fixed)
13     *****
14     *****
15     **
16     ** Name: FRAMEE - Encode an HPIL frame from its mnemonic
17     **
18     ** Category: PILUTL
19     **
20     ** Purpose:
21     ** HPIL frame encode (given the ASCII for the frame and a
22     ** value, produce the appropriate 11-bit frame)
23     **
24     ** Entry:
25     ** C[S] is length of ASCII character string
26     ** C[S:0] is the ASCII character string
27     ** A[B] is the value included with the frame (if none, 0)
28     **
29     ** Exit:
30     ** P=0
31     ** Carry clear: C[X] is the frame value
32     ** B[B] is the mask value for the frame
33     ** C[S] is WP length of name
34     ** Carry set: Error...not found
35     **
36     ** Calls: None
37     **
38     ** Uses.....
39     ** Inclusive: B[W],C[W],P
40     **
41     ** Stk lvls: 1 (Internal push)
42     **
43     ** History:
44     **
45     ** Date Programmer Modification
46     ** -----
47     ** 09/26/83 NZ Updated documentation
48     **
49     *****
50     *****
51 F6BD8 =FRAMEE
52 *
53 * C[5:0] is the ASCII frame value now
54 *
55 F6BD8 AF5 B=C W Copy the ASCII to B[W] for now

```

```

56 F6BDB 7000      GOSUB FRAMSb
57 F6BDF 07  FRAMSb C=RSTK      Now C[A] has the address of FRAMSb
58 F6BE1 136      CDOEX      ...now in DO.
59 F6BE4 06      RSTK=C      Save DO on the stack...
60                *
61                * Swap value of frame # into DO, address of FRAMSb into A[A]...
62                *
63 F6BE6 132      ADOEX
64 F6BE9 20      P=      0
65 F6BEB 346A    LC(5) (FRAMET)-(FRAMSb)+#4  Offset to table + #4
        000
66 F6BF2 CA      A=A+C  A
67 F6BF4 132      ADOEX      Restore A[A], set DO to table+4
68                *
69                * Now DO points to the frame table, A is the frame #
70                *
71 F6BF7 1567    FRAME1 C=DATO W      Read the ASCII for the current frame
72 F6BFB 80D0    P=C      0
73                *
74                * Now P is the frame length
75                *
76 F6BFF BF6      CSR      W      Shift off the length nibble
77 F6C02 890      ?P=      0      If length=0, not found...
78 F6C05 27      GOYES  FRAME9      Not found!
79                *
80                * Now have a valid ASCII string in C[5:0]
81                *
82 F6C07 911      ?B=C  WP
83 F6C0A 11      GOYES  FRAME2      Found a match!
84                *
85                * This does not match...try again!
86                *
87 F6C0C 164      DO=DO+ 5      Skip frame bits and text length
88 F6C0F 136      CDOEX
89 F6C12 809      C+P+1      Add text length to DO
90 F6C15 136      CDOEX
91 F6C18 5ED      GONC   FRAME1      Go always
92                *
93                *
94 F6C1B      FRAME2
95                *
96                * When here, had an ASCII match!
97                *
98 F6C1B 80FF    CPEX   15      Save length (P) in C[S]
99                *
100                * Preset B[X] to #FFF (For mask)
101                *
102 F6C1F D1      B=0      A
103 F6C21 CD      B=B-1  A      B[X]=#FFF
104 F6C23 183      DO=DO- 4      Point to start of entry...
105 F6C26 15E3    C=DATO  4      ...and read the frame value+info
106 F6C2A 23      P=      3      Point to the status nibble
107 F6C2C A06      C=C+C  P      Is this a command bits only frame?
108 F6C2F 5B0      GONC   FRAME3      No...continue
109                *

```

```

110      * Copy the low 8 bits from A[B]!
111      *
112 F6C32 AE6      C=A   B
113 F6C35 AE1      B=0   B      Clear low 8 bits of mask
114 F6C38 473      GOC   FRAME8  Exit, carry cleared by FRAME8
115      *_-
116      *_-
117 F6C3B A06     FRAME3 C=C+C  P      Is this a low 5 bits only?
118 F6C3E 532      GONC  FRAME4  No...continue
119      *
120      * Need to copy the low 5 bits of A[B] into C[B]
121      *
122 F6C41 D5      B=C   A      Temporary storage!
123 F6C43 20      P=    0
124 F6C45 320E    LCHEX  FE0      Mask for low 5 bits
      F
125 F6C4A 0EF1    B=B&C  A      Now B[X] is the high bits of frame
126 F6C4E FE      C=-C-1 A      One's complement of C[X]
127 F6C50 0EF2    C=A&C  A      Now C[X] is the low bits of frame
128 F6C54 0EF9    B=C!B  A      Now B[X] is the full frame
129 F6C58 320E    LCHEX  FE0      Mask value
      F
130 F6C5D DD      BCEX   A      Mask in B[X], Frame in C[X]
131      *
132      * C=-C-1 above cleared the carry unconditionally
133      *
134 F6C5F 501      GONC  FRAME8  Go always-exit, clear carry
135      *_-
136      *_-
137 F6C62 A06     FRAME4 C=C+C  P      Low 4 bits?
138 F6C65 5A0      GONC  FRAME8  No...full frame!
139      *
140      * This is a low 4 bits case...
141      *
142 F6C68 20      P=    0
143 F6C6A A86      C=A   P
144 F6C6D A81      B=0   P      Clear low 4 bits of mask
145      *
146      * Now C[X] is the frame...clear carry, then restore data
147      *
148 F6C70          FRAME8
149 F6C70 BED      B=-B-1 B      Set B[B] to mask for frame
150 F6C73 21      P=    1
151 F6C75 0D      P=P-1      Now P=0, carry is clear
152      *
153      * Now restore the data
154      *
155 F6C77 136     FRAME9 CDOEX      These instructions don't alter carry
156 F6C7A 07      C=RSTK      Restore DO value
157 F6C7C 136     CDOEX
158 F6C7F 01      RTN
159      *****
160      *****
161      **
162      ** Name:          FRAMET - Frame table format

```

```

163      **
164      ** Category:  LOCAL
165      **
166      ** Purpose:
167      **   Table of entries for frame encoding/decoding
168      **   (ASCII vs frame value)
169      **
170      ** Detail:
171      **   Format of entries as seen in RAM:
172      **
173      **   Length (nibbles)      Definition
174      **   -----
175      **           3             Frame value (least sig nib first)
176      **           1             Control bits:
177      **                           8: Command bits only
178      **                           4: High 6 bits only
179      **                           2: High 7 bits only
180      **                           0: All bits meaningful
181      **           1             Text length (WP value)
182      **   (Length+1)          Text of frame
183      **
184      **   As read into the R register:
185      **   A[<--Text-->,<--length-->,<--control-->,<--frame-->]
186      **   nib:15.....5,4.....4,3.....3,2.....0
187      **
188      ****
189      ****
190 F6C81  =FRAMET
191      *
192      Command EQU 8
193      High6   EQU 4
194      High7   EQU 2
195      Allbit  EQU 0
196      *
197      * Frame classes (no subdivisions)
198      *
199 F6C81 000      NIBHEX 000      DATA
200 F6C84 8       CON(1) Command
201 F6C85 7       NIBHEX 7       Length of DATA
202 F6C86 4414   NIBASC \DATA\
      4514
203      *
204 F6C8E 002      NIBHEX 002
205 F6C91 8       CON(1) Command
206 F6C92 5       NIBHEX 5       Length of END
207 F6C93 54E4   NIBASC \END\
      44      END
208      *
209 F6C99 006      NIBHEX 006
210 F6C9C 8       CON(1) Command
211 F6C9D 5       NIBHEX 5       Length of IDY
212 F6C9E 9444   NIBASC \IDY\
      95      IDY
213      *
214      * Command class...

```

```
215 *
216 F6CA4 F34 NIBHEX F34
217 F6CA7 0 CON(1) Allbit
218 F6CA8 5 NIBHEX 5 Length of UNL
219 F6CA9 55E4 NIBASC \UNL\ UNL
      C4

220 *
221 F6CAF 024 NIBHEX 024
222 F6CB2 4 CON(1) High6
223 F6CB3 B NIBHEX B Length of LISTEN
224 F6CB4 C494 NIBASC \LISTEN\ LISTEN
      3545
      54E4

225 *
226 F6CC0 F54 NIBHEX F54
227 F6CC3 0 CON(1) Allbit
228 F6CC4 5 NIBHEX 5 Length of UNT
229 F6CC5 55E4 NIBASC \UNT\ UNT
      45

230 *
231 F6CCB 044 NIBHEX 044
232 F6CCE 4 CON(1) High6
233 F6CCF 7 NIBHEX 7 Length of TALK
234 F6CD0 4514 NIBASC \TALK\ TALK
      C4B4

235 *
236 F6CD8 064 NIBHEX 064
237 F6CDB 4 CON(1) High6
238 F6CDC 5 NIBHEX 5 Length of SAD
239 F6CDD 3514 NIBASC \SAD\ SAD
      44

240 *
241 F6CE3 0A4 NIBHEX 0A4
242 F6CE6 4 CON(1) High6
243 F6CE7 5 NIBHEX 5 Length of DDL
244 F6CE8 4444 NIBASC \DDL\ DDL
      C4

245 *
246 F6CEE 0C4 NIBHEX 0C4
247 F6CF1 4 CON(1) High6
248 F6CF2 5 NIBHEX 5 Length of DDT
249 F6CF3 4444 NIBASC \DDT\ DDT
      45

250 *
251 * Command class continues below...
252 *
253 * Ready class...
254 *
255 F6CF9 005 NIBHEX 005
256 F6CFC 8 CON(1) Command
257 F6CFD 5 NIBHEX 5 Length of RDY
258 F6CFE 2544 NIBASC \RDY\ RDY
      95

259 *
260 * End of Ready class!
```

```
261      *
262      * At this point, only CommanD frames are left...
263      *
264 F6D04 094      NIBHEX 094
265 F6D07 0       CON(1) Allbit
266 F6D08 5       NIBHEX 5           Length of IFC
267 F6D09 9464   NIBASC \IFC\           IFC
      34
268      *
269 F6D0F B94      NIBHEX B94
270 F6D12 0       CON(1) Allbit
271 F6D13 5       NIBHEX 5           Length of LPD
272 F6D14 C405   NIBASC \LPD\          LPD
      44
273      *
274 F6D1A 104      NIBHEX 104
275 F6D1D 0       CON(1) Allbit
276 F6D1E 5       NIBHEX 5           Length of GTL
277 F6D1F 7445   NIBASC \GTL\          GTL
      C4
278      *
279 F6D25 404      NIBHEX 404
280 F6D28 0       CON(1) Allbit
281 F6D29 5       NIBHEX 5           Length of SDC
282 F6D2A 3544   NIBASC \SDC\          SDC
      34
283      *
284      * End of all defined commands
285      *
286 F6D30 004      NIBHEX 004
287 F6D33 8       CON(1) Comand
288 F6D34 5       NIBHEX 5           Length of CMD
289 F6D35 34D4   NIBASC \CMD\          CMD
      44
290      *
291      * Following are special case, ASCII search match only!!!!
292      * (Will never match on any other search because high bit set)
293      *
294 F6D3B 20F      NIBHEX 20F
295 F6D3E 0       CON(1) Allbit
296 F6D3F 5       NIBHEX 5           Length of MLA
297 F6D40 D4C4   NIBASC \MLA\          MLA (My listen address)
      14
298      *
299 F6D46 40F      NIBHEX 40F
300 F6D49 0       CON(1) Allbit
301 F6D4A 5       NIBHEX 5           Length of MTA
302 F6D4B D445   NIBASC \MTA\          MTA (My talk address)
      14
303      *
304      * Now all frame types should be complete...put a null entry
305      * to end a text search
306      *
307 F6D51 000      NIBHEX 000
308 F6D54 0       CON(1) Allbit
```

```
309 F6D55 0          NIBHEX 0          Length of last entry (0)
310                *
311                * End of the table!
312                *
313 F6D56          END
```


Allbit	Abs	0	#00000	-	195	217	227	265	270	275	280	295
					300	308						
Comand	Abs	8	#00008	-	192	200	205	210	256	287		
FRAME1	Abs	1010679	#F6BF7	-	71	91						
FRAME2	Abs	1010715	#F6C1B	-	94	83						
FRAME3	Abs	1010747	#F6C3B	-	117	108						
FRAME4	Abs	1010786	#F6C62	-	137	118						
FRAME8	Abs	1010800	#F6C70	-	148	114	134	138				
FRAME9	Abs	1010807	#F6C77	-	155	78						
=FRAMEE	Abs	1010648	#F6BD8	-	51							
=FRAMET	Abs	1010817	#F6C81	-	190	65						
FRAMsb	Abs	1010655	#F6BDF	-	57	56	65					
High6	Abs	4	#00004	-	193	222	232	237	242	247		
High7	Abs	2	#00002	-	194							

Input Parameters

Source file name is NZ&FRA::MS

Listing file name is NZ/FRA:TI:ML::-1

Object file name is NZ\FRA:TI:MS::-1

Initial flag settings are
111111
0123456789012345

Errors

None

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```
1 *
2 *      N  N  ZZZZZ  &    L    00000  W  W
3 *      N  N      Z  & &  L    0  0  W  W
4 *      NN N    Z  & &  L    0  0  W  W
5 *      N N N    Z    &    L    0  0  W W W
6 *      N NN  Z    & & &  L    0  0  W W W
7 *      N  N  Z    & &  L    0  0  WW WW
8 *      N  N  ZZZZZ  && &  LLLLL 00000  W  W
9 *
10 *
```

```
11          TITLE  Low-level USER HP-IL <830927.1414>
12 F6D56      ABS   #F6D56          TIZHP6 address (fixed)
13 *****
14 *****
15 **
16 ** Name:          FLOAT!,FLOAT+ - Convert a hex value to floating
17 **
18 ** Category:     CONVRT
19 **
20 ** Purpose:
21 **      Converts a hex number into a floating point #
22 **
23 ** Entry:
24 **      FLOAT!: C[W] is the hex value
25 **      FLOAT+: A[W] is the hex value
26 **
27 ** Exit:
28 **      Carry set if value is zero, else clear
29 **      C[W] is the floating number
30 **
31 ** Calls:        HTODX
32 **
33 ** Uses.....
34 **      Exclusive: A[W],      C[W],P
35 **      Inclusive: A[W],B[W],C[W],P
36 **
37 ** Stk lvls:    1 (HTODX)
38 **
39 ** Algorithm:
40 **      FLOAT!:Copy C[W] to A[W]
41 **      FLOAT+:Convert A[W] to decimal (HTODX)
42 **      If result is zero, then return, carry set
43 **      Set exponent value (P) to 15 initially
44 **      FLOAT1:Shift result one digit left
45 **      Decrement exponent
46 **      If most significant digit of result = 0 then
47 **          goto FLOAT1
48 **      Shift result right one digit (most sig = 0)
49 **      Put exponent in C[0]
50 **      Return, carry clear (non-zero)
51 **
52 ** History:
53 **
54 **      Date      Programmer      Modification
55 **      -----      -
```

```
56      ** 11/19/82      NZ      Added documentation
57      **
58      ****
59      ****
60 F6D56 AFA  =FLOAT! A=C      W
61 F6D59 8E00 =FLOAT+ GOSUBL =HTODX      Result in B
      00
62 F6D5F AF9      C=B      W
63 F6D62 97A  =FLOAT- ?C=0      W      Is initial value 0?
64 F6D65 00      RTNYES      Yes...done!
65 F6D67 2F      P=      15      Initialize exponent to 15
66 F6D69 BF2  FLOAT1      CSL      W      Shift result left one digit
67 F6D6C 0D      P=P-1      Decrement exponent
68 F6D6E 94A      ?C=0      S      Is most significant digit zero?
69 F6D71 8F      GOYES      FLOAT1      Yes...loop back for more
70 F6D73 BF6      CSR      W      No...undo last shift (C[S]=0)
71 F6D76 AB2      C=0      X      Clear exponent field
72 F6D79 80F0     CPEX      0      Set C[0] to exponent value
73 F6D7D 20      P=      0      (Unnecessary instruction)
74 F6D7F 03      RTNCC      Return, carry clear (non-zero)
75      ****
76      ****
77      **
78      ** Name:      POP1N - Pop one numeric value from MTHSTK
79      **
80      ** Category:  GETUTL
81      **
82      ** Purpose:
83      **      (Same as mainframe POP1N)
84      **
85      ** Entry:
86      **      D1 points to top of stack
87      **
88      ** Exit:
89      **      DECIMAL MODE!!!
90      **      P=0
91      **      If not numeric, jumps to ERRORX
92      **      A[W] is real part, R0 is imaginary (if complex)
93      **      Carry clear if real, carry set if complex
94      **
95      ** Calls:      None
96      **
97      ** Uses.....
98      **      Inclusive: A[W],B[0],R0,D1,P
99      **
100     ** Stk lvls:  0
101     **
102     ** History:
103     **
104     **      Date      Programmer      Modification
105     **      -----      -----      -----
106     **      11/19/82      NZ      Added documentation
107     **
108     ****
109     ****
```

```

110 F6D81 05 =POP1N SETDEC
111 F6D83 20 P= O
112 F6D85 A81 B=0 P
113 F6D88 A0D B=B-1 P Set B[0]=9
114 F6D8B 1537 A=DAT1 W Read the item
115 F6D8F 980 ?A>B P
116 F6D92 40 GOYES POP1N# Check if complex or otherwise
117 F6D94 03 RTNCC
118 *-
119 *-
120 F6D96 04 POP1N# SETHEX
121 F6D98 B04 A=A+1 P
122 F6D9B B04 A=A+1 P
123 F6D9E 96C ?A#0 B Check if complex (OE)
124 F6DA1 71 GOYES POP1NE Error...type conflict
125 F6DA3 171 D1=D1+ 2
126 F6DA6 1537 A=DAT1 W Read in imaginary part
127 F6DAA 17F D1=D1+ 16
128 F6DAD 100 R0=A Save in part in R0
129 F6DB0 1537 A=DAT1 W Read in real part
130 F6DB4 05 SETDEC
131 F6DB6 02 RTNSC Return with carry SET
132 *-
133 *-
134 F6DB8 20 POP1NE P= =eNNUMR Not numeric
135 F6DBA 8C00 Errorx GOLONG =ERRORX
00

```

```

136 *****
137 *****
138 **
139 ** Name: RESET - Reset the Diamond processor
140 **
141 ** Category: STExec
142 **
143 ** Purpose:
144 ** Reset an HPIL mailbox (Diamond), set up default parms
145 **
146 ** Entry:
147 ** None
148 **
149 ** Exit:
150 ** Through NXTSTM
151 **
152 ** Calls: GTYPRM,GETLOP,FNDMB-,GETERR,CHKST+
153 **
154 ** Uses.....
155 ** Exclusive: A, C, P
156 ** Inclusive: A,B,C,D,R0,R1,R2,R3,R4,D0,D1,P,ST[11:0],FUNCxx
157 **
158 ** Stk lvls: 6 (GTYPRM)
159 **
160 ** History:
161 **
162 ** Date Programmer Modification
163 ** -----

```

```

164      ** 09/26/83      NZ      Updated documentation
165      ** 06/24/83      NZ      Changed to wake up diamond and
166      **                                     REPORT any errors it found
167      ** 11/19/82      NZ      Added documentation
168      **
169      ****
170      ****
171 F6DC0 0000      REL(5) =RESETd
           0
172 F6DC5 0000      REL(5) =RESETp
           0
173 F6DCA          =RESET
174 F6DCA AC2      C=0      S      Clear C[S]
175 F6DCD 14A      A=DATO B      Check if a loop # given
176 F6DD0 3100      LC(2) =tCOMMA
177 F6DD4 962      ?A=C      B
178 F6DD7 11      GOYES RESETO      Not loop expression...skip it
179 F6DD9 8E00      GOSUBL =GTYPRM      Get (type) loop # from RAM
           00
180 F6DDF 453      GOC      Resete      If out of range, error
181 F6DE2 8E00      GOSUBL =GETLOP      Get loop # into C[S]
           00
182 F6DE8          RESETO
183 F6DE8 8E00      GOSUBL =FNDMB-      Clear DISPLAY, etc; FNDMBX
           00
184 F6DEE 462      GOC      Resete      If not found, error!
185 F6DF1 AF2      C=0      W
186 F6DF4 27      P=      7
187 F6DF6 308      LCHEX 8      Reset Diamond
188 F6DF9 15C8      DATO=C 9      Clear the NRD bit, too!
189 F6DFD 7000      GOSUB  =GETERR      Check if any errors
190 F6E01 431      GOC      Resete      Errors!
191 F6E04 8E00      GOSUBL =CHKST+      Set up parameters for Diamond
           00
192 F6E0A 4A0      GOC      Resete      Error
193 F6E0D 8C00 Nxtstm GOLONG =nXTSTM      Next BASIC statement
           00
194      * _
195      * _
196 F6E13 20 Resetr P= =eRANGE      (Unnecessary instruction)
197 F6E15 64AF Resete GOTO Errorx
198 F6E19          END
  
```

CHKST+	Ext		-	191				
ERRORX	Ext		-	135				
Errorx	Abs	1011130	#F6DBA	-	135	197		
=FLOAT!	Abs	1011030	#F6D56	-	60			
=FLOAT+	Abs	1011033	#F6D59	-	61			
=FLOAT-	Abs	1011042	#F6D62	-	63			
FLOAT1	Abs	1011049	#F6D69	-	66	69		
FNDMB-	Ext		-	183				
GETERR	Ext		-	189				
GETLOP	Ext		-	181				
GTYPRI	Ext		-	179				
HTODX	Ext		-	61				
Nxtstn	Abs	1011213	#F6E0D	-	193			
=POP1N	Abs	1011073	#F6D81	-	110			
POP1N#	Abs	1011094	#F6D96	-	120	116		
POP1NE	Abs	1011128	#F6DB8	-	134	124		
=RESET	Abs	1011146	#F6DCA	-	173			
RESET0	Abs	1011176	#F6DE8	-	182	178		
RESETd	Ext		-	171				
RESETp	Ext		-	172				
Resete	Abs	1011221	#F6E15	-	197	180	184	190
Resetr	Abs	1011219	#F6E13	-	196			192
eNNUMR	Ext		-	134				
eRANGE	Ext		-	196				
nXTSTM	Ext		-	193				
tCOMMA	Ext		-	176				

Input Parameters

Source file name is NZ&LOW::MS

Listing file name is NZ/LOW:TI:ML::-1

Object file name is NZXLOW:TI:MS::-1

Initial flag settings are
111111
0123456789012345

Errors

None

Saturn Assembler News


```

1      *
2      *
3      *      N  N  ZZZZZ  &      FFFFF  X  X  QQQ
4      *      N  N      Z  & &  F      X  X  Q  Q
5      *      NN N      Z  & &  F      X X  Q  Q
6      *      N N N      Z  &      FFFF      X  Q  Q
7      *      N NN  Z      & & & F      X X  Q Q Q
8      *      N  N  Z      & &  F      X  X  Q  Q
9      *      N  N  ZZZZZ  && & F      X  X  QQ Q
10     *
11     *

```

```

12             TITLE  File Execution <840113.1351>
13 F6E19      ABS      #F6E19      TI%HP6 address (fixed)
14     ****
15     ****
16     **
17     ** Name:      GETDID - Get device ID (specifier)
18     ** Name:      GETDIX - Get device ID (String expr on stack)
19     **
20     ** Category:  FILUTL
21     **
22     ** Purpose:
23     **      GETDID fetches a device ID, given DO pointing to the
24     **      ID in program memory
25     **
26     ** Entry:
27     **      DO points to the ID in program memory
28     **
29     ** Exit:
30     **      Carry clear: Address/type in D[X], device type/ID in B
31     **      If D[X]=0, then device id = "" OR *
32     **      P=0
33     **      FUNCDO contains the DO value after evaluating ID
34     **      Carry set: error, P=error number
35     **
36     ** Calls:      GETSTR, PROCLT, NXTCHR, BAKCHR, PROCST, TSAVDO, START
37     **
38     ** Uses.....
39     ** Inclusive:  A-D, R0-R4, DO, D1, P, STMTD1[3:0], STMTR1, FUNCxx,
40     **            ST[11:0], all RAM that EXPEXC is permitted to use
41     **
42     ** Stk lvls:  GETDID: 6 (GETSTR)
43     ** Stk lvls:  GETDIX: 4 (PROCST)
44     **
45     ** History:
46     **
47     **      Date      Programmer      Modification
48     **      -----      -
49     **      05/02/83      NZ      Added flag for colon/semicolon
50     **                                     required to GETDIX, added GETDI+
51     **      03/18/83      NZ      Changed GETDIX to use NXTCHR,
52     **                                     removed SavedO code
53     **      03/17/83      NZ      Changed register usage (+STMTD1,
54     **                                     remove STMTR0)
55     **      03/15/83      NZ      Returned exit conditions to those

```

```

56      **      originally given (D[A])
57      ** 03/01/83      NZ      Changed GETDIX to use PROCLT
58      ** 11/04/82      NZ      Added documentation
59      **
60      ****
61      ****
62      TermRq EQU      0      Status bit for terminator required
63      *
64 F6E19 8E00 =GETDID GOSUBL =GETSTR      Get string/literal-sets =ST(sSTK)
        00
65 F6E1F 400      RTNC      If carry, ERROR
66 F6E22 870      ?ST=1 =sSTK
67 F6E25 D0      GOYES GETDI1      String expression
68      *
69      * Literal expression in memory
70      *
71 F6E27 7834      GOSUB PROCLT      Process literal
72 F6E2B D7      D=C      A      Put device type into D[A]
73 F6E2D 555      GONC GETDI5      If no carry, finish it up
74 F6E30 02      RTNSC      If carry, error
75      *-
76      *-
77 F6E32      GETDI1
78      *
79      * This is a string expression
80      * (Start of string in D1, D[A] @ end of string)
81      *
82 F6E32 8A8      ?A=0      A
83 F6E35 C4      GOYES GETDI4      Null string
84 F6E37 840 =GETDIX ST=0      TermRq      Terminator (colon/semic) optional
85 F6E3A 7B56 GETDI+ GOSUB Nxtchr      Read the first char
86 F6E3E 4E3      GOC GETDI3      End of string...error
87      *
88      * Is it a ":"?
89      *
90 F6E41 31A3      LCASC \:\
91 F6E45 962      ?A=C      B      Is it a colon?
92 F6E48 41      GOYES GETDIO      Yes...Nxtchr was OK
93 F6E4A 31E2      LCASC \.\
94 F6E4E 962      ?A=C      B      Is it a volume label?
95 F6E51 31      GOYES GETDI2      Yes...process volume label
96 F6E53 870      ?ST=1      TermRq      Was a terminator required?
97 F6E56 72      GOYES GETDI3      Yes...bad device spec
98 F6E58 7276      GOSUB Bakchr      No...back it up
99 F6E5C 70F0 GETDIO GOSUB PROCST      Process string entry point
100 F6E60 6700      GOTO GETDCK
101      *-
102      *-
103 F6E64 7B91 GETDI2 GOSUB PRSTv1      Yes...process volume label
104      *
105      * Fall into GETDCK
106      *
107 F6E68 400 GETDCK RTNC      If carry, error
108 F6E6B 7A26      GOSUB Nxtchr      Check to be sure no more data
109 F6E6F D7      D=C      A      Put address in D[A]

```

```

110 F6E71 411      GOC   GETDI5      If carry, end of string
111 F6E74 3102     LCASC  \ \
112 F6E78 962      ?A=C   B           Is the next char a blank?
113 F6E7B 80       GOYES  GETDI5      Yes...accept it
114 F6E7D 20       GETDI3 P=         =eDSPEC     Illegal device id
115 F6E7F 02       RTNSC
116              *-
117              *-
118 F6E81 D3       GETDI4 D=0   A
119 F6E83 8E00     GETDI5 GOSUBL =TSAVDO  Save D0 in FUNCDO
      00
120 F6E89 850      ST=1   =sDevOK     If here, device is OK
121 F6E8C 8AB      ?D=0   A
122 F6E8F EE       GOYES  GETDI3      If D=0, then "", "*", or *
123 F6E91 8E00     GOSUBL =START   Find out the tape address
      00
124 F6E97 400      RTNC
125 F6E9A 8C00     GOLONG =SETUP   Error
      00

```

```

126 *****
127 *****
128 **
129 ** Name:      GETPIL - Evaluate an HPIL file specifier
130 ** Name:      GETPI+ - Get an HPIL file specifier from stack
131 **
132 ** Category:  FILUTL
133 **
134 ** Purpose:
135 **   This routine extracts the file name and the device
136 **   and returns with the device type/device ID in B[W],
137 **   address/type in D[X]
138 **
139 ** Entry:
140 **   D0 points to the file specifier in program memory
141 **
142 ** Exit:
143 **   ST(sDevOK) set if device spec was ok, else clear
144 **   Carry clear:
145 **   Filename in R0, R4[15:12]
146 **   Device type in B[X]/B[W], address in D[X]
147 **   If address = X00, then this is a * or a ""
148 **   RVMEME collapsed back to starting point
149 **   Carry set:
150 **   Error (P,C[0] are error code)
151 **
152 ** Calls:      GETSTR,FXQPIL,NXTCHR,PROCLT,PROCST,ASRC4,D1=AVS,
153 **             D1@AVE,CSRC12,GETDI5,ASLC12
154 **
155 ** Uses.....
156 **   Inclusive: A-D,R0-R4,D0,D1,P,STMTD1[3:0],STMTR1,ST[11:0],
157 **             FUNCxx,all RAM that EXPEXC is permitted to use
158 **
159 ** Stk lvls:   6 (GETSTR)
160 **
161 ** History:

```

```

162      **
163      **      Date      Programmer      Modification
164      **      -----      -----      -----
165      **      05/01/83      NZ      Changed GOSUB GETDIX to GETDI+,
166      **                                     added ST=1 TermRq
167      **      03/17/83      NZ      Changed STMT usage (+D1, -R0)
168      **      03/01/83      NZ      Changed GOYES GETDI2 to GETDIX,
169      **                                     added call to GETDCK
170      **      11/04/82      NZ      Added documentation
171      **
172      ****
173      ****
174 F6EA0 8E00 =GETPIL GOSUBL =GETSTR      Get string/literal
      00
175 F6EA6 400      RTNC      Error
176 F6EA9 7735 =GETPI+ GOSUB FXQPIL
177      *
178      * FXQPIL returns with filename (blank-filled) in R0,A[3:0]
179      * (If carry set, A,R0 are zeroed out)
180      *
181      * ST(sSTK) is set if reading from the stack, clear if prog mem
182      *
183      * Now the filename is in A and R0
184      *
185      * Move the last two characters to A[15:12], than to R4
186      *
187 F6EAD 8E00      GOSUBL =ASRC4
      00
188 F6EB3 11C      C=R4
189 F6EB6 2B      P=      11
190 F6EB8 A9E      ACEX      WP
191 F6EBB 104      R4=A
192      *
193      * If sSTK is 1, then reading from the stack...process stack
194      *
195 F6EBE 20      P=      0
196 F6EC0 840      ST=0 =sDevOK      Device spec NOT ok until shown so
197 F6EC3 860      ?ST=0 =sSTK      Stack?
198 F6EC6 90      GOYES GETPI1      No...continue...
199 F6EC8 850      ST=1 TermRq      Terminator (:;) required
200 F6ECB 6E6F      GOTO GETDI+      Read it from the stack
201      *-
202      *-
203      *
204      * Need to save filename on stack to protect from PROCLT
205      *
206 F6ECF 8E00 GETPI1 GOSUBL =D1=AVS      Set D1 = AVMEMS
      00
207 F6ED5 143      A=DAT1 A      A[A] is @ AVMEMS
208 F6ED8 D2      C=0 A
209 F6EDA 3141      LC(2) 20      20 nibs for the filename
210 F6EDE D5      B=C A      Save in B[A] for now
211 F6EE0 8E00 GOSUBL =D1@AVE      Set D1 @ AVMEME, C[A] = AVMEME
      00
212 F6EE6 137      CD1EX      D1=AVMEME,C[A] @ AVMEME

```

```
213 F6EE9 E9          C=C-B A          C[A] is proposed new AVMEME
214 F6EEB 8B6         ?A>C A          Enough memory?
215 F6EEE A5          GOYES GETPIH     No...insufficient memory
216 F6EF0 145         DAT1=C A         Yes...write out new AVMEME
217 F6EF3 135         D1=C             Set D1 @ AVMEME
218 F6EF6 118         C=RO
219 F6EF9 1557        DAT1=C W         Write out first 8 chars of name
220 F6EFD 17F         D1=D1+ 16
221 F6F00 11C         C=R4
222 F6F03 8E00        GOSUBL =CSRC12
                00
223 F6F09 15D3        DAT1=C 4         Write out last 2 chars of name
224                *
225                * Done saving name on stack
226                *
227 F6F0D 7253        GOSUB PROCLT     Process literal
228 F6F11 400         RTNC             Error (leaves info on MTHSTK)
229 F6F14 D7          D=C A           Put device type into D[A]
230 F6F16 796F        GOSUB GETDI5     Check it and set it up
231 F6F1A 400         RTNC
232                *
233                * Now restore the filename from stack
234                *
235 F6F1D 06          RSTK=C           Save C[A] on RSTK
236 F6F1F 8E00        GOSUBL =D1@AVE   (C[A] = AVMEME)
                00
237 F6F25 1537        A=DAT1 W
238 F6F29 17F         D1=D1+ 16
239 F6F2C 100         R0=A            Restore first 8 chars to R0
240 F6F2F 143         A=DAT1 A
241 F6F32 8E00        GOSUBL =ASLC12   Put last 2 chars in R4[15:12]
                00
242 F6F38 104         R4=A
243 F6F3B 173         D1=D1+ 4
244 F6F3E 137         CD1EX           Set D1 = AVMEME
245 F6F41 145         DAT1=C A         Write out new AVMEME (pop 20)
246 F6F44 07          C=RSTK           Restore C[A]
247                *
248                * Done restoring levels now
249                *
250 F6F46 03          RTNCC
251                *
252                *
253 F6F48 20          GETPIH P=        =eNORAM
254 F6F4A 02          RTNSC           Error...no memory
255                *****
256                *****
257                **
258                ** Name:      PROCST - Process string device specifier
259                **
260                ** Category:  FILUTL
261                **
262                ** Purpose:
263                **      Process a device specifier from a string expression
264                **
```

```

265      ** Entry:
266      **      ST(sSTK)=1
267      **      R0[W], R4[15:12] are filename
268      **      D1 points to next item of string
269      **      D[A] is the end of the string
270      **      HEXMODE
271      **
272      ** Exit:
273      **      Carry set if error (P,C[0] are error number)
274      **      Carry clear:
275      **          P=0
276      **          Device type/device id in B[X]/B[W]
277      **          IF device type="*", *, or "" THEN C[X]=0
278      **          ELSEIF address, THEN C[X] is address+loop*1024
279      **          ELSEIF LOOP, THEN C[X] is "9F"+loop*4096
280      **          ELSEIF NULL, THEN C[B] is "7F"
281      **          ELSEIF volume label THEN C[X] is "5F"+loop*4096
282      **          ELSEIF device type THEN C[X] is "3F"+loop*4096
283      **          ELSEIF device id THEN C[X] is "1F"+loop*4096
284      **
285      ** Calls:      NXTCHR,BAKCHR,UCRANG,GETDVW,PROCDW,GTYPST,GADRST
286      **
287      ** Uses.....
288      ** Exclusive: A[W],B[W],C[W],R1,R2,  P
289      ** Inclusive: A[W],B[W],C[W],R1,R2,D1,P
290      **
291      ** Stk lvls:   3 (GETDVW)
292      **
293      ** History:
294      **
295      **      Date      Programmer      Modification
296      **      -----      -
297      **      11/04/82      NZ              Added documentation
298      **
299      ****
300      ****
301 F6F4C 20 PRSTed P=      =eDSPEC      Error...device spec
302 F6F4E 02          RTNSC
303          *
304          *
305 F6F50          =PROCST          Process string device spec
306 F6F50 7545          GOSUB  Nxtchr
307 F6F54 47F          GOC    PRSTed          No device spec
308 F6F57 7C95          GOSUB  Ucrang          Convert upper case, check [A-Z]
309 F6F5B 497          GOC    PRST30         Not in [A-Z]
310          *
311          * Character IS in [A-Z]...continue
312          *
313          * Assign word, reserved word, or device id
314          *
315 F6F5E 7C65          GOSUB  Bakchr          Back past the character
316 F6F62 7262          GOSUB  GETDVW          Get device word
317 F6F66 45E          GOC    PRSTed          Bad device word (Error)
318 F6F69 78A2          GOSUB  PROCDW          Process device word
319 F6F6D 460          GOC    PRST10         If carry, takes a seq number

```

```

320 F6F70 6F90      GOTO  PRST90      If no carry, does NOT take seq #
321                *_-
322                *_-
323                *
324                * Now process sequence #
325                *
326 F6F74 109 PRST10 R1=C      Save type in R1
327 F6F77 AF9      C=B      W
328 F6F7A 10A      R2=C      Save type/ID in R2
329                *
330                * Get sequence #
331                *
332 F6F7D 7815      GOSUB  Nxtchr
333 F6F81 4A3      GOC    PRST25      No sequence number...continue
334 F6F84 20       P=      0
335 F6F86 3182      LCASC  \\ \
336 F6F8A 966      ?A#C   B
337 F6F8D B2       GOYES  PRST20      No sequence #...back up, continue
338                *
339                * This has a sequence number...get it
340                *
341 F6F8F 75F0      GOSUB  GTYPST      Get type
342 F6F93 400      RTNC                    Error
343 F6F96 7FF4      GOSUB  Nxtchr
344 F6F9A 41B      GOC    PRSTed      No closing ")"...error
345                *
346                * Check for closing parenthesis
347                *
348 F6F9D 3192      LCASC  \\ \
349 F6FA1 966      ?A#C   B
350 F6FA4 8A       GOYES  PRSTed      Error...no closing ")"
351                *
352                * Closed properly...check its range
353                *
354                * First convert to zero-based count
355                *
356 F6FA6 D9       C=B      A      Copy 2 digits to C[A]
357 F6FA8 CE       C=C-1    A      convert to zero-based
358 F6FAA 490      GOC    PRSTeR      Range error
359 F6FAD 21       P=      1      Check that C[1]=0
360 F6FAF 90A      ?C=0    P
361 F6FB2 C0       GOYES  PRST27      Go always...continue
362                *
363 F6FB4 20 PRSTeR P=      =eRANGE
364 F6FB6 02      RTNSC
365                *_-
366                *_-
367 F6FB8 7215 PRST20 GOSUB  Bakchr      Back up 1 character
368 F6FBC D2 PRST25 C=0    A
369                *
370                * Now C[B] is sequence #
371                *
372 F6FBE 112 PRST27 A=R2      Recall type/ID
373 F6FC1 AF8      B=A      W
374 F6FC4 111      A=R1

```

```

375 F6FC7 F2          CSL  A
376 F6FC9 F2          CSL  A          Sequence # is in C[XS] now
377 F6FCB AE6        C=A  B          Type/ID in C[B] now
378 F6FCE 21         P=   1
379 F6FD0 0D         P=P-1          Clear the carry...
380 F6FD2 5D3        GONC  PRST90      Done
381                *-
382                *-
383 F6FD5 31A2 PRST30 LCASC  \*\
384 F6FD9 966        ?A#C B          Is this a "*"?
385 F6FDC 70         GOYES PRST40      No...continue
386                *
387                * Device spec is "*"
388                *
389 F6FDE D2          C=0  A          Yes...continue with C[A]=0
390 F6FE0 5F2        GONC  PRST90      Go always...carry clear
391                *-
392                *-
393 F6FE3 3152 PRST40 LCASC  \% \
394 F6FE7 966        ?A#C B          Is this a device type?
395 F6FEA D0         GOYES PRST50      No...must be address
396                *
397                * Device type
398                *
399 F6FEC 7890        GOSUB GTYPST      Get type from stack
400 F6FF0 4F1        GOC   PRST90      If carry, error
401 F6FF3 608F       GOTO  PRST10      Process sequence #
402                *-
403                *-
404 F6FF7          PRST50
405                *
406                * Address...back up to first character
407                *
408 F6FF7 73D4        GOSUB Bakchr      Back up 1 character
409 F6FFB 7AF0        GOSUB GADRST      Get address from stack
410 F6FFF 6010       GOTO  PRST90      Carry indicates status
411                *-
412                *-
413                *
414                * Process string volume spec
415                *
416 F7003 71C1 PRSTv1 GOSUB GETDVW      Get volume word (get device word)
417 F7007 400        RTNC
418 F700A D2         C=0  A          Clear high nibbles of C[A]
419 F700C 3100       LC(2) =Vollbl     Volume label identifier
420                *
421                * Check if a loop spec here...
422                *
423 F7010 400 PRST90 RTNC
424 F7013 109        R1=C
425 F7016 AF9        C=B  W
426 F7019 10A        R2=C          Save device in R2
427 F701C 797A       GOSUB Nxtchr
428 F7020 4C5        GOC   PROCex     Exit...done
429 F7023 31A3       LCASC  \:\

```



```
430 F7027 966      ?RMC   B
431 F702A F4       GOYES  PROCeX      Not a loop spec...exit
432                *
433                * Have a loop spec
434                *
435                * Process string loop spec
436                *
437 F702C 7850     GOSUB  GTYPST      Get type from stack
438 F7030 400      RTNC          Error (Bad loop #)
439                *
440                * Now loop # is in B[A]
441                *
442 F7033 3130     LC(2)   3          ...maximum value is 3
443 F7037 9E1      ?B>C   B
444 F703A 90       GOYES  PRSTer      Out of range
445 F703C D9       C=B     A          Copy back to C[B]
446 F703E CE       C=C-1  A          Convert to zero-based count
447 F7040 560     GONC   PRSTEX      If no carry, all OK
448                *
449                * If carry, out of range
450                *
451 F7043 20      PRSTer  P=      =eRANGE
452 F7045 02      RTNSC
453                *
454                *
455                *
456                * Now integrate loop spec with device spec
457                *
458 F7047 112     PRSTEX  A=R2
459 F704A AF8     B=A     W          Restore device ID
460 F704D 111     A=R1
461 F7050 816     CSRC
462 F7053 310E   LCHEX  EO          Recall type
463 F7057 0E6A   C=A!C  B          Save loop # in C[S]
464 F705B B66     C=C+1  B          Check if not address
465 F705E 812     CSLC
466 F7061 F2     CSL    A
467 F7063 F2     CSL    A
468 F7065 4C0     GOC    PROCna      If carry, not address
469                *
470                * Address...multiply times 4
471                *
472 F7068 C6      C=C+C  A
473 F706A C6      C=C+C  A
474 F706C 0E3A   C=C!A  X          Now C[X] is loop #, address
475 F7070 03     RTNCC
476                *
477                *
478 F7072 F2     PROCna  CSL    A          Loop # in C[3], device in C[X]
479 F7074 AB6     C=A     X
480 F7077 03     RTNCC
481                *
482                *
483 F7079 7154   PROCeX  GOSUB  Bakchr      Back up last character fetch
484 F707D 11A   PROCeX  C=R2          Recall device
```

```

485 F7080 AF5          B=C    W
486 F7083 119          C=R1
487 F7086 03          RTNCC          Recall type/address
488                    Done
489                    *****
490                    **
491                    ** Name:      GTYPST - Get type from stack
492                    **
493                    ** Category:  FILUTL
494                    **
495                    ** Purpose:
496                    **      Given a pointer to the start of the type, return the
497                    **      numeric value of the type
498                    **
499                    ** Entry:
500                    **      D1 @ first digit of type
501                    **      D[A] @ end of specifier
502                    **
503                    ** Exit:
504                    **      Carry clear:
505                    **      Type in B[X], D1 @ first unused item
506                    **      C[X]=(-DevTyp)
507                    **      P=0
508                    **      Carry set:
509                    **      error (P, C[0] are error code)
510                    **
511                    ** Calls:      NXTCHR,BAKCHR,DTOH,RANGEN
512                    **
513                    ** Uses.....
514                    ** Exclusive: A[W],B[W],C[W], P
515                    ** Inclusive: A[W],B[W],C[W],D1,P
516                    **
517                    ** Stk lvls:  1 (NXTCHR)(BAKCHR)(DTOH)(RANGEN)
518                    **
519                    ** History:
520                    **
521                    **      Date      Programmer      Modification
522                    **      -----      -
523                    **      11/04/82      NZ              Added documentation
524                    **
525                    *****
526                    *****
527 F7088 AF1  =GTYPST B=0    W          Clear B[W] (where total is built)
528 F708B 7A04 GTYPS1  GOSUB  Nxtchr    Get next character
529 F708F 405          GOC    GTYPS5   End of string
530 F7092 7234          GOSUB  Rangen    Check if in [0-9]
531 F7096 401          GOC    GTYPS3   No...done?
532                    *
533                    * New digit...add it in
534                    *
535 F7099 F1          BSL    A
536 F709B A88          B=A    P          Append new digit here
537 F709E 959          ?B=0   M          If non-zero, too big
538 F70A1 AE          GOYES  GTYPS1   Zero...continue
539                    *

```

```

540      * Out of range
541      *
542 F70A3 20  GTYPS2 P=      =eRANGE
543 F70A5 02          RTNSC
544      *-
545      *-
546 F70A7 31E2 GTYPS3 LCASC  \.
547 F70AB 966          ?ANC  B
548 F70AE E2          GOYES GTYPS4      Not a period...exit
549      *
550      * Got a period...continue
551      *
552 F70B0 75E3          GOSUB Nxtchr
553 F70B4 4B2          GOC   GTYPS5      End of string
554 F70B7 7D04          GOSUB Rangen     Check if in [0-9]
555 F70BB 402          GOC   GTYPS4      No...exit
556 F70BE 05          SETDEC
557 F70C0 A04          A=A+A P         Check if round UP
558 F70C3 550          GONC  GTYPS.      No...exit
559 F70C6 B35          B=B+1 X
560 F70C9 04  GTYPS.  SETHEX          (jump to here has carry CLEAR!)
561 F70CB 47D          GOC   GTYPS2      Error...overflow
562      *
563      * Loop to skip trailing digits
564      *
565 F70CE 77C3 GTYPSd  GOSUB Nxtchr
566 F70D2 4D0          GOC   GTYPS5      End of string
567 F70D5 7FE3          GOSUB Rangen     Check if digit
568 F70D9 54F          GONC  GTYPSd      Yes...continue
569      *
570 F70DC 7EE3 GTYPS4  GOSUB Bakchr     Back up past the last character
571 F70E0 AF4  GTYPS5  A=B   W         Convert it to HEX now
572 F70E3 8E00      00  GOSUBL =DTON
573      *
574      * Now the type is in C (in HEX)
575      *
576 F70E9 D1          B=0   A         Check if in [0,255]
577 F70EB AED          BCEX  B         (B[A] is value if C=0)
578 F70EE 8AE          ?C#0  A
579 F70F1 2B          GOYES GTYPS2      Out of range
580      *
581      * C[A] is zero to get here
582      *
583 F70F3 3100          LC(2) =DevTyp     Device type
584 F70F7 03          RTNCC
585      *****
586      *****
587      **
588      ** Name:      GADRST - Get address from stack
589      **
590      ** Category:  FILUTL
591      **
592      ** Purpose:
593      **          Similar to GTYPS2, except that the first 2 digits

```

```

594      **      after the decimal point, if any, are used as the
595      **      secondary address
596      **
597      ** Entry:
598      **      D1 @ first character
599      **      D[A] @ end of spec
600      **
601      ** Exit:
602      **      Carry clear:
603      **      C[X] is address
604      **      D1 @ first unused character
605      **      Skips trailing digits
606      **      P=0
607      **      Carry set:
608      **      P, C[0] are error code
609      **
610      ** Calls:      NXTCHR,BAKCHR,RANGEN,DTOH,CSRC2
611      **
612      ** Uses.....
613      ** Exclusive: A,B,C,  P
614      ** Inclusive: A,B,C,D1,P
615      **
616      ** Stk lvls:  1 (NXTCHR)(BAKCHR)(RANGEN)(DTOH)(CSRC2)
617      **
618      ** Algorithm:
619      **      Read a number from the stack until non-digit OR full;
620      **      Check if "."...if not, return
621      **      Get another number from the stack (2 digits)
622      **      Combine the two numbers as one address, return
623      **
624      ** History:
625      **
626      **      Date      Programmer      Modification
627      **      -----      -
628      **      12/21/83      NZ      Changed order of BSL A, ?B=0 XS
629      **
630      **
631      **
632      **
633      **
634      **
635      **
636      **      11/04/82      NZ      Added documentation
637      **
638      **
639      **
640 F70F9 AF1 =GADRST B=0 W Clear B[W] to start
641 F70FC 7993 GADRST1 GOSUB Nxtchr Get first item
642 F7100 442 GOC GADRST. End of string...continue process
643 F7103 71C3 GOSUB Rangen Check if in [0-9]
644 F7107 401 GOC GADRST2 No...check further
645 F710A F1 BSL A
646 F710C A88 B=A P Copy this digit in
647 F710F 929 ?B=0 XS Overflow?
648 F7112 AE GOYES GADRST1 No...continue

```

```

649 F7114 20  GADRS0 P=      =eRANGE
650 F7116 02          RTNSC
651          *-
652          *-
653 F7118          GADRS2
654          *
655          * Got a non-digit...if not a decimal point, done
656          *
657 F7118 31E2          LCASC  \.\  
658 F711C 962          ?A=C  B  
659 F711F 60          GOYES  GADRS.      "."...continue
660          *
661 F7121 79A3          GOSUB  Bakchr      Back up for next step
662          *
663          * Decinal point...get secondary address
664          *
665 F7125 AF4  GADRS.  A=B    W  
666 F7128 8E00  GOSUBL  =DTON      Convert primary address to hex
        OO
667          *
668          * Hex value in C[B] now
669          *
670 F712E 8E00  GOSUBL  =CSRC2      Use C[15:14] as temp storage
        OO
671          *
672          * Primary address in C[15:14] now
673          *
674 F7134 AF5          B=C    W      Copy to B[15:14]
675 F7137 D1          B=0    A      Clear B[0]
676 F7139 E5          B=B+1  A      Set B[0]=1 (Flag for 2 digits)
677 F713B 7A53  GADRS3  GOSUB  Nxtchr      Get next character
678 F713F 434          GOC    GADRS4      End...manipulate it
679 F7142 7283          GOSUB  Rangen      Check if in [0-9]
680 F7146 483          GOC    GADRSb      No...back up, manipulate it
681 F7149 F1          BSL    A
682 F714B A88          B=A    P      Copy to B
683 F714E 929          ?B=0  XS      Done yet?
684 F7151 AE          GOYES  GADRS3      No...continue
685          *
686          * Reached here by reading 2 digits after decimal point
687          *
688 F7153 7243          GOSUB  Nxtchr      Get next digit for rounding
689 F7157 493          GOC    GADRS6      No next digit...continue
690 F715A 7A63          GOSUB  Rangen      Check if in [0-9]
691 F715E 4E2          GOC    GADRS5      Not a digit...back it up
692 F7161 05          SETDEC
693 F7163 A04          A=A+A  P      Check if rounding needed
694 F7166 550          GONC  GADRSs      Skip other digits
695 F7169 B65          B=B+1  B      Round UP
696 F716C 04  GADRSs  SETHEX
697 F716E 45A          GOC    GADRS0      Out of range (If B=B+1 carry)
698 F7171 7423          GOSUB  Nxtchr      Read next character
699 F7175 4B1          GOC    GADRS6      (End of string)
700 F7178 7C43          GOSUB  Rangen      Check if a digit
701 F717C 5FE          GONC  GADRSs      Yes...skip the next one

```

```
702          *                               No...fall through to GADRSb
703 F717F 7B43 GADRSb  GOSUB  Bakchr      Back up the last NXTCHR
704 F7183          GADRS4
705          *
706          * Reached here before two digits
707          *
708          * B[X] cannot be zero to get here...at least one digit of B[X]
709          * must be 1 (from flag set before GADRS3)
710          *
711 F7183 92D          ?B#0  XS          Done yet?
712 F7186 B0          GOYES GADRS6      Yes
713 F7188 F1          BSL  A          Shift in a zero
714 F718A 58F          GONC  GADRS4      Go always
715          *
716          *
717 F718D 7D33 GADRS5  GOSUB  Bakchr      Back up the last NXTCHR
718 F7191          GADRS6
719          *
720          * Now B[B] is secondary address in decimal...convert to hex
721          *
722 F7191 D0          A=0  A
723 F7193 AE4        A=B  B
724 F7196 8E00      GOSUBL =D10H
       OO
725 F719C AE5          B=C  B
726          *
727          * Now B[B] is secondary address in hex, B[15:14] is primary
728          *
729 F719F 31F1          LC(2) 31
730 F71A3 9E1          ?B>C  B          >31?
731 F71A6 6C          GOYES GADRSs      Too big for secondary!(Jump jump)
732 F71A8 811          BSLC
733 F71AB 811          BSLC          Now B[B] is primary address
734 F71AE 9E9          ?B>=C B          >30?
735 F71B1 BB          GOYES GADRSs      Too big for primary! (Jump jump)
736 F71B3 969          ?B=0  B
737 F71B6 6B          GOYES GADRSs      Zero is NOT a legal primary addr
738          *
739          * B[B] is primary, B[3:2] is secondary
740          *
741 F71B8 D2          C=0  A          Clear C[XS]
742 F71BA AED          CBEX  B          Copy primary to C[B], zero B[B]
743 F71BD F5          BSR  A          Secondary in B[2:1]
744 F71BF A35        B=B+B  X          Secondary*2 in B[2:1]
745 F71C2 0E3D      C=C!B  X          Primary, secondary in C[X]
746          *
747          * Now address is in C[A]
748          *
749 F71C6 03          RTNCC
750          *****
751          *****
752          **
753          ** Name:          GETDVW - Get device word
754          **
755          ** Category:      FILUTL
```

```

756      **
757      ** Purpose:
758      **     Get a device word, given a pointer to the word
759      **
760      ** Entry:
761      **     ST(=sSTK)=0:
762      **     D0 points to first letter of device word in memory
763      **     ST(=sSTK)=1:
764      **     D1 points to first letter of device word on stack
765      **     D[A] points to the end of the specifier
766      **
767      ** Exit:
768      **     Carry clear:
769      **     Device word in B[W], zero-filled, first letter in B[B]
770      **     P=0, carry clear if no error
771      **     D0/D1 @ next character
772      **     Carry set:
773      **     Error (P, C[0] are error code)
774      **
775      ** Calls:      NXTCHR,BAKCHR,UCRANG,RANGEN
776      **
777      ** Uses.....
778      ** Exclusive:  B[W],          P
779      ** Inclusive: R[A],B[W],C[A],D0,D1,P (sSTK=0: D0; sSTK=1: D1)
780      **
781      ** Stk lvs:   2 (UCRANG)
782      **
783      ** History:
784      **
785      **      Date      Programmer      Modification
786      **      -----      -
787      **      11/04/82      NZ          Added documentation
788      **
789      ** *****
790      ** *****
791 F71C8 AF1 =GETDVM B=0 W
792 F71CB 7AC2 GOSUB Nxtchr Read first character
793 F71CF 4E2 GOC GETDV2 Should NEVER happen...
794      *
795      * First character MUST be in [A-Z] or [a-z]
796      *
797 F71D2 7123 GETDVO GOSUB Ucrang Convert to upper case&check [A-Z]
798 F71D6 432 GOC GETDV- Done (not in [A-Z])
799 F71D9 AE8 GETDV1 B=A B Copy to B[B]...
800 F71DC 815 BSRC ...rotate to B[15:14]...
801 F71DF 815 BSRC
802 F71E2 96D ?B#0 B ...and check if room for more
803 F71E5 31 GOYES GETDVR No room...done
804 F71E7 7ER2 GOSUB Nxtchr Get next character
805 F71EB 421 GOC GETDV2 Done...justify it
806 F71EE 76D2 GOSUB Rangen Check if this is numeric...
807 F71F2 56E GONC GETDV1 ...yes...save it
808 F71F5 4CD GOC GETDVO Go always (Check if in [A-Z])
809      *-
810      *-

```

```
811 F71F8 03  GETDVR  RTNCC          Return, carry clear
812          * _
813          * _
814 F71FA 70D2 GETDV-  GOSUB  Bakchr    Back up this character
815 F71FE 97D  GETDV2  ?B#0   W          If whole word is zero, Error
816 F7201 60          GOYES  GETDV3    Not zero...continue
817 F7203 20          P=     =eDSPEC   Bad device word
818 F7205 02          RTNSC
819          * _
820          * _
821 F7207 96D  GETDV3  ?B#0   B          If B[B] is non-zero, done
822 F720A EE          GOYES  GETDVR    Return, clear carry
823          *
824          * If blank-filling is desired, do LCASC \ \; B=C B here
825          *
826 F720C 815          BSRC
827 F720F 815          BSRC
828 F7212 54F          GONC   GETDV3    Go always
829          *****
830          *****
831          **
832          ** Name:          PROCDW - Process device word
833          **
834          ** Category:     FILUTL
835          **
836          ** Purpose:
837          **   Given a device word in B[W], figure out what it is
838          **   (ASSIGN WORD, RESERVED WORD, NULL, LOOP, DEVICE ID)
839          **
840          ** Entry:
841          **   B[W] contains the device word
842          **
843          ** Exit:
844          **   P=0
845          **   Carry set if sequence number is permissable after this
846          **   Carry clear if sequence number is not permissable
847          **
848          ** Calls:        CHKAI0,ROMTYP,(PRDWSb)
849          **
850          ** Uses.....
851          ** Exclusive:      C[W],P
852          ** Inclusive:     A[A],B[B],C[W],P
853          **
854          ** Stk lvls:     2 (CHKAI0)(ROMTYP)
855          **
856          ** Detail:
857          **   Try in following order: ASSIGN WORD, RESERVED WORD,
858          **   NULL,LOOP,(other=DEVICE ID)
859          **
860          ** History:
861          **
862          **   Date          Programmer          Modification
863          **   -----          -
864          **   04/28/83      NZ          Changed LOOP and NULL to check
865          **                                     all 8 characters
```



```
866      ** 11/04/82      NZ      Added documentation
867      **
868      ****
869      ****
870 F7215 8E00 =PROCDW GOSUBL =CHKAI0      Check if ASSIGNIO
      00
871 F721B 500      RTNNC      If carry clear, found it
872 F721E 8E00      GOSUBL =ROMTYP      Check if reserved word
      00
873      *
874      * Carry indicates whether found or not (If not, ID)
875      *
876 F7224 533      GONC  PRDW30      Found...return, set carry
877 F7227 AF2      C=0  W      Clear high nibbles of C first
878 F722A 37E4      LCASC  \LLUN\      Check if device type="NULL"
      55C4
      C4
879 F7234 7220      GOSUB  PRDWsb      (Check for match)
880      *
881      * If carry clear, this is "NULL"
882      *
883 F7238 3100      LC(2) =Null      This is the "NULL" device?
884 F723C 500      RTNNC      If no carry, NULL
885 F723F 37C4      LCASC  \POOL\      Check if device type="LOOP"
      F4F4
      05
886 F7249 7D00      GOSUB  PRDWsb      (Check for match)
887 F724D 3100      LC(2) =Loop
888 F7251 560      GONC  PRDW30      If no carry, this is LOOP
889 F7254 3100      LC(2) =DevID      C[4:2] is zero
890 F7258 02  PRDW30 RTNSC
891      *-
892      *-
893 F725A 975  PRDWsb ?B#C  W
894 F725D 20  GOYES  PRDWs1
895 F725F D2  PRDWs1 C=0  A
896 F7261 01  RTN
897      ****
898      ****
899      **
900      ** Name:      PROCLT - Process literal device spec
901      **
902      ** Category:  FILUTL
903      **
904      ** Purpose:
905      **      Given a pointer to a device spec in memory, process it
906      **
907      ** Entry:
908      **      DO @ device spec
909      **
910      ** Exit:
911      **      Carry clear:
912      **      P=0
913      **      Device type/device id in B[X]/B[W]
914      **      IF device type="*", *, or "" THEN C[X]=0
```

```

915      **      ELSEIF address THEN C[X] is address+loop*1024
916      **      ELSEIF LOOP then C[X] is "9F"+loop*4096
917      **      ELSEIF NULL then C[B] is "7F"
918      **      ELSEIF volume label THEN C[X] is "5F"+loop*4096
919      **      ELSEIF device type THEN C[X] is "3F"+loop*4096
920      **      ELSEIF device ID THEN C[X] is "1F"+loop*4096
921      **      Carry set:
922      **      Error (P, C[0] are error code)
923      **
924      ** Calls:      NXTCHR, BAKCHR, GETDVW, PROCDW, SAVEAC, EXPEX+,
925      **              GHXBXT, GADRR+, RESTST, SAVE2C, RESTD1, REST2C
926      **
927      ** Uses.....
928      ** Exclusive: A,B,C,      R1,R2,      DO,      P
929      ** Inclusive: A,B,C,D,RO,R1,R2,R3,R4,DO,D1,P,STMTD1[3:0],STMTR1,
930      **              FUNCxx, all RAM available to FCNS
931      **
932      ** Stk lvls:   4 (EXPEX+ {saves a level on GOSUB stack first})
933      **
934      ** History:
935      **
936      **      Date      Programmer      Modification
937      **      -----      -
938      **      09/28/83      NZ      Updated documentation
939      **      04/12/83      NZ      Fixed loop # processing
940      **      03/17/83      NZ      Changed to use STMTD1, not STMTR0
941      **      03/01/83      NZ      Reworked volume label code
942      **      02/07/83      NZ      Added status save in EXPEX+ call
943      **      11/04/82      NZ      Added documentation
944      **
945      ** *****
946      ** *****
947 F7263 7232 =PROCLT GOSUB Nxtchr
948      *
949      * Should have carry ONLY if next token is EOL (Error)
950      *
951 F7267 4D0      GOC      PRLT05
952 F726A 20      P=      0      (This P=0 is not needed-NXTCHR)
953 F726C 3100      LC(2) =tCOLON
954 F7270 962      ?A=C      B      Is this a ":"?
955 F7273 60      GOYES      PROCld      Yes...continue
956 F7275 6E31 PRLT05      GOTO      PRLTer      Error
957      *-
958      *-
959      *
960      * Process literal device spec
961      *
962 F7279 14A      PROCld      A=DATO      B      Read it directly (can be tSEMIC)
963 F727C 161      DO=DO+ 2      Skip it
964 F727F 3100      LC(2) =tLITRL
965 F7283 962      ?A=C      B      Is this a literal?
966 F7286 60      GOYES      PRLT12      Yes...get device word
967 F7288 6470      GOTO      PRLT50      No...continue checking
968      *-
969      *-

```

```

970      *
971      * Literal device spec
972      *
973 F728C 783F PRLT12 GOSUB GETDVW      Get device word
974 F7290 400      RTNC                Error
975 F7293 7E7F      GOSUB PROCDW      Process device word
976 F7297 450      GOC   PRLT15      Sequence number IS acceptable
977 F729A 5E5      GONC   PRLT9.     Go always...NOT acceptable
978      *_-
979      *_-
980      *
981      * Now save it, get sequence #
982      *
983 F729D 7221 PRLT15 GOSUB SAVEAC      Save C[3:0] in STMTD1,B in STMTR1
984      *
985      * Process literal sequence number
986      *
987 F72A1 74F1      GOSUB Nxtchr
988 F72A5 453      GOC   PRLT25      No next character...exit
989 F72A8 3100      LC(2) =tCOLON
990 F72AC 966      ?ANC   B
991 F72AF 82        GOYES PRLT20      Back up...not a sequence #
992      *
993      * Sequence # found
994      *
995 F72B1 7F12      GOSUB Expex+      Get the type expression
996 F72B5 76E1      GOSUB Restst      Restore status bits
997 F72B9 8E00      GOSUBL =GHEXBT    Get type (sequence) from RAM
998 F72BF 400      RTNC                Error
999      *
1000      * Now B[A] is the sequence #
1001      *
1002 F72C2 CD        B=B-1 A            If carry, error
1003 F72C4 4E0      GOC   PRLteR      Error (zero)
1004 F72C7 21        P=   1
1005 F72C9 90D      ?B#0 P
1006 F72CC 70        GOYES PRLteR      Error (too big)
1007 F72CE 20        P=   0
1008 F72D0 5C0      GONC   PRLT30     Go always
1009      *_-
1010      *_-
1011 F72D3 20        PRLteR P=   =eRANGE
1012 F72D5 02        RTNSC
1013      *_-
1014      *_-
1015 F72D7 73F1 PRLT20 GOSUB Bakchr
1016 F72DB D1        PRLT25 B=0 A            Put sequence # in B[A](=0)
1017      *
1018      * Now B[A] is sequence #
1019      *
1020 F72DD 133 PRLT30 AD1EX
1021 F72E0 8E00      GOSUBL =RESTD1    Restore type/address...
1022 F72E6 133      AD1EX                ...to A[A]

```

```

1023      *
1024      * Now A[A] is type, B[B] is sequence #
1025      *
1026 F72E9 8E00      GOSUBL =REST2C      Restore acc/dev ID to C[W]
           00
1027 F72EF AFD      BCEX   W      Seq # to C[A], acc/dev ID to B[W]
1028      *
1029      * Now A[A] is type; B[W] is acc/dev ID; C[A] is seq #
1030      *
1031 F72F2 F2      CSL   A
1032 F72F4 F2      CSL   A      Sequence # in C[XS] now
1033 F72F6 AE6      C=A   B      Restore type
1034 F72F9 6C50 PRLT9.  GOTO   PRLT90      Check for loop spec now
1035      *_-
1036      *_-
1037 F72FD      PRLT50
1038      *
1039      * Not a literal...check for volume label
1040      *
1041 F72FD 3100      LC(2) =tSEMIC
1042 F7301 966      ?A#C   B
1043 F7304 21      GOYES  PRLT60
1044      *
1045      * This is a volume label
1046      *
1047 F7306 7EBE      GOSUB  GETDVW      Get volume label (Get device word)
1048 F730A 400      RTNC
           If carry, error
1049 F730D D2      C=0   A
1050 F730F 3100      LC(2) =VolLbl      Indicate volume label
1051 F7313 524      GONC   PRLT90      Go always...check for loop spec
1052      *_-
1053      *_-
1054 F7316 3100 PRLT60 LC(2) =t%      Check if device type
1055 F731A 966      ?A#C   B
1056 F731D 71      GOYES  PRLT70      Not device type...check "*"
1057      *
1058      * Type...get it
1059      *
1060 F731F 71B1      GOSUB  Expex+      Get the type expression from RAM
1061 F7323 7871      GOSUB  Restst      Restore status bits
1062 F7327 8E00      GOSUBL =GHEXBT      Get HEX byte from RAM
           00
1063 F732D 400      RTNC      Error
1064 F7330 6C6F      GOTO   PRLT15      Finish it up
1065      *_-
1066      *_-
1067 F7334 3100 PRLT70 LC(2) =t*
1068 F7338 966      ?A#C   B
1069 F733B 60      GOYES  PRLT75
1070 F733D D2      C=0   A      This is "*"
1071 F733F 03      RTNCC
1072      *_-
1073      *_-
1074 F7341 7981 PRLT75 GOSUB  Bakchr      Back up to start of expression
1075      *

```

```
1076          * Address
1077          *
1078 F7345 7B81      GOSUB Expex+      Get address expression from RAM
1079 F7349 7251      GOSUB Restst      Restore status bits
1080 F734D 8E00      GOSUBL =GADRR+      Get address from RAM
          00
1081 F7353 400          RTNC          Carry indicates error state
1082          *
1083          * Entry point to check for literal loop spec
1084          *
1085 F7356 14A PRLI90 A=DAT0 B      Read next character directly
1086          *
1087          * Before LC, save C[A] on RSTK (C[A] is device spec info)
1088          *
1089 F7359 06          RSTK=C          Save C[A] on RSTK
1090 F735B 3100      LC(2) =tSEMIC      Is it a tSEMIC (loop number)?
1091 F735F 966          ?RMC B
1092 F7362 20          GOYES PRLT95      Exit after restoring C
1093 F7364 07 PRLT95 C=RSTK      Restore C (if carry, done!)
1094 F7366 415          GOC PRLTex      Exit (Done)
1095 F7369 161          DO=DO+ 2      Skip the tSEMIC
1096          *
1097          * Need to save B and C from EXPEX+
1098          *
1099 F736C 7350      GOSUB SAVEAC      Save C[3:0] in STMTD1,B in STMTR1
1100          *
1101          * Process literal loop spec
1102          *
1103 F7370 7061      GOSUB Expex+      Get loop # expression from RAM
1104 F7374 7721      GOSUB Restst      Restore status bits
1105 F7378 8E00      GOSUBL =GHEXBT      Get HEX byte from RAM
          00
1106 F737E 400          RTNC          Error
1107          *
1108          * Now B[A] is the loop # + 1
1109          *
1110 F7381 3130      LC(2) 3
1111 F7385 9E1          ?B>C B
1112 F7388 90          GOYES PRLler      Error...too big
1113 F738A D9          C=B A          Return loop # in C[0]
1114 F738C CE          C=C-1 A      Offset for zero-based count
1115 F738E 560          GONC PRLTxx      If carry, zero (error-too small)
1116 F7391 20 PRLler P= =eRANGE
1117 F7393 02          RTNSC
1118          *
1119          *
1120 F7395 10A PRLTxx R2=C          Save loop # in R2
1121 F7398 137          CD1EX
1122 F739B 8E00      GOSUBL =RESTD1      Restore type/address
          00
1123 F73A1 137          CD1EX
1124 F73A4 109          R1=C          Type in R1
1125 F73A7 8E00      GOSUBL =REST2C
          00
1126 F73AD 12A          CR2EX          Device ID in R2, loop # in C[0]
```

```
1127 F73B0 669C      GOTO  PRSTEX      Finish it up
1128                *_-
1129                *_-
1130 F73B4 20        PRLTer P=         =eDSPEC      Device spec error
1131 F73B6 02                RTNSC
1132                *_-
1133                *_-
1134 F73B8 10A        PRLTex R2=C       Save C[W] in R2...
1135 F73BB AF9                C=B   W          Put B[W] into R2[W] also
1136 F73BE 12A                CR2EX          ...restore C[W], set R2=B[W]
1137 F73C1 03                RTNCC
1138                *_-
1139                *_-
1140 F73C3                SAVEAC
1141                *
1142                * Preserve STMTD1[4]
1143                *
1144 F73C3 137                CD1EX          Save C[A] in D1
1145 F73C6 06                RSTK=C       Save D1 on RSTK
1146 F73C8 137                CD1EX          Restore C[A]
1147 F73CB 1F00          D1=(5) =STMTD1
1148                000
1148 F73D2 15D3          DAT1=C 4      Write out the low 4 nibs ONLY
1149 F73D6 07                C=RSTK       Restore D1 from RSTK...
1150 F73D8 135                D1=C        ...done
1151 F73DB AF9                C=B   W
1152 F73DE 8C00          GOLONG =SAVE2C Save B[W] in STMR1
1153                00
1153                *****
1154                *****
1155                **
1156                ** Name:      FXQPIL - Get a file name from memory (file spec)
1157                **
1158                ** Category:  FILUTL
1159                **
1160                ** Purpose:
1161                **      Fetch a filename from program memory
1162                **
1163                ** Entry:
1164                **      Exit conditions from GETSTR
1165                **      (ST[sSTK]=0: literal in memory, =1:string on stack)
1166                **      (P=0)
1167                **
1168                ** Exit:
1169                **      D0/D1 set to first non-character item
1170                **      Carry clear (filename found):
1171                **      RO[W] is the first 8 chars, A[3:0] the last 2
1172                **      (Both are blank-filled)
1173                **      Carry set (no filename found):
1174                **      A,RO are zeroed
1175                **
1176                ** Calls:      FXQPnH,FXQPn+
1177                **
1178                ** Uses.....
1179                ** Exclusive: A[W],      C[W],RO,      P
```

```

1180      ** Inclusive: A[W],B[W],C[W],RO,DO,D1,P
1181      **
1182      ** Stk lvls:  3 (FXQPnm)
1183      **
1184      ** Algorithm:
1185      **   Check if literal and no file name; if so, return zero
1186      **   Get the first 8 chars; put in RO; if reached end, set
1187      **   A[3:0]=\  \, return
1188      **   Get last 2 chars; put in A[3:0]; return
1189      **
1190      ** History:
1191      **
1192      **   Date      Programmer      Modification
1193      **   -----      -
1194      ** 11/04/82      NZ          Added documentation
1195      **
1196      ****
1197      ****
1198 F73E4 AF2 =FXQPIL C=0  W
1199 F73E7 108      RO=C          Preclear file name (for null str)
1200 F73EA 860      ?ST=0  =sSTK      String expression?
1201 F73ED 70      GOYES  FXQP30     No...literal
1202      *
1203      * Check if this is a null string...if so, return
1204      *
1205 F73EF 8A8      ?R=0  A
1206 F73F2 33      GOYES  FXQP50     Null string
1207      *
1208      * Now get the characters of the name until not in [A-Z]
1209      * or string length exhausted (Build the string in B[W])
1210      *
1211      * This is also the entry point for reading from program memory
1212      *
1213 F73F4 2F  FXQP30  P= 15
1214 F73F6 308      LC(1) 8          C[S] is character counter
1215 F73F9 7E20     GOSUB  FXQPnm     Get the name until B is full
1216      *                               or END is reached or bad char
1217 F73FD AF4      A=B  W
1218 F7400 100      RO=A
1219 F7403 4F0      GOC   FXQP40     Carry if END or bad char
1220      *
1221      * A[B],B[W] contain first 8 chars...copy to RO
1222      *
1223 F7406 2F      P= 15
1224 F7408 302      LC(1) 2          Two more characters MAX
1225 F740B 7F10     GOSUB  FXQPn+     Get the last 2 chars of name
1226 F740F D4      A=B  A          Copy characters to A[3:0]
1227      *
1228      * Have a FULL filename now! (Next char better be ":")
1229      * (D1 is at next character)
1230      *
1231 F7411 03      RTNCC          Return with it all set up
1232      *
1233      *
1234 F7413      FXQP40

```

```
1235      *
1236      * Filename with less than 8 chars in A[W], B[W]
1237      *
1238 F7413 3302      LCASC \ \
           02
1239 F7419 DA      A=C      A      Set last 2 characters to blanks
1240 F741B 118     C=R0      Get back first 8 chars to test
1241 F741E 8AA     ?C=0     A
1242 F7421 40      GOYES    FXQP50      Yes...zero it all
1243 F7423 03      RTNCC      Next character @ D1
1244      * _
1245      * _
1246 F7425      FXQP50
1247      *
1248      * No chars in name...set full name equal to zero
1249      *
1250 F7425 D0      A=0      A      Clear the last 2 chars
1251 F7427 20      P=      =eDSPEC      Bad device spec
1252 F7429 02      RTNSC
1253      *****
1254      *****
1255      **
1256      ** Name:      FXQPnm - Read chars from memory/stack (count)
1257      **
1258      ** Category:  FILUTL
1259      **
1260      ** Purpose:
1261      **      Read characters from either the stack or program
1262      **      memory until either a count is exceeded or an end is
1263      **      reached
1264      **
1265      ** Entry:
1266      **      C[S] is byte count
1267      **      sSTK is set for STACK, clear for literal
1268      **      If ST[=sSTK]=1, D1 points to string, D[A] is end
1269      **      If ST[=sSTK]=0, D0 points to the literal
1270      **
1271      ** Exit:
1272      **      B[W] contains the filename (IF sFirst=1 AND bad char,B=0)
1273      **      Carry set if reached END or bad char, clear if count
1274      **      D0/D1 set to first character not used
1275      **      A[S] is the original byte count
1276      **      P=0
1277      **
1278      ** Calls:      NXTCHR,BAKCHR,UCRANG,RANGEN,BLANKC
1279      **
1280      ** Uses.....
1281      ** Exclusive: A[X],B[W],C[W],      P,ST[sFirst]
1282      ** Inclusive: A[W],B[W],C[W],D0,D1,P,ST[sFirst]
1283      **
1284      ** Stk lvls:  2 (UCRANG)
1285      **
1286      ** Detail:
1287      **      Reads characters until either:
1288      **      1) Count is reached
```



```

1289      **          2) A character NOT in [A-Z] is found
1290      **
1291      ** History:
1292      **
1293      **      Date      Programmer      Modification
1294      **      -----      -
1295      **      04/29/83      NZ          Changed GOC after NXTCHR @ FXQPn1
1296      **                                     to skip the BAKCHR @ FXQPn3
1297      **      03/19/83      NZ          Changed FXQPnm and FXQPn+ so that
1298      **                                     FXQPnm sets =sFirst, FXQPn+ does
1299      **                                     not change =sFirst
1300      **      11/04/82      NZ          Added documentation
1301      **      01/20/83      NZ          Added check for sFirst AND bad ch
1302      **
1303      **
1304      **
1305 F742B 850 =FXQPnm ST=1 =sFirst      Entry for first char
1306 F742E ACA =FXQPn+ A=C   S          Save count in A[S]
1307 F7431 8E00 GOSUBL =BLANKC      Initially blanks
1308 F7437 AF5      B=C   W
1309 F743A AC6      C=R   S          Use count in C[S], Save in A[S]
1310 F743D 7850 FXQPn1 GOSUB Nxtchr      Get next character in A[B]
1311 F7441 433      GOC   FXQPn-      END
1312 F7444 7FA0      GOSUB Ucrang      Convert to upper case
1313 F7448 5E0      GONC   FXQPn2      If carry clear, IS in [A-Z]
1314      *
1315      * Character not in [A-Z]...if this is First, Error
1316      *
1317 F744B 870      ?ST=1 =sFirst
1318 F744E 32      GOYES FXQPn3      Error! (Bad first character)
1319 F7450 7470      GOSUB Rangen      Check if this is a digit
1320 F7454 4C1      GOC   FXQPn3      Not a digit...error
1321      *
1322      * Have a valid character here
1323      *
1324 F7457 840 FXQPn2 ST=0 =sFirst      Clear for later chars
1325 F745A AE8      B=R   B          Save in B[B]...
1326 F745D 815      BSRC
1327 F7460 815      BSRC          Rotate the character to B[15:14]
1328 F7463 A4E      C=C-1 S          Do more?
1329 F7466 94E      ?C#0 S
1330 F7469 4D      GOYES FXQPn1      Yes...loop back
1331      *
1332      * Count reached
1333      *
1334      * Use A[XS] to indicate carry/no carry on exit
1335      *
1336 F746B AAO      A=0   XS
1337 F746E 541      GONC   FXQPn4      Go always
1338      *-
1339      *-
1340 F7471      FXQPn3
1341      *
1342      * Reached END/bad char

```

```

1343          *
1344 F7471 7950          GOSUB  Bakchr      Back up to last character
1345 F7475 AAO  FXQPn-  A=0      XS
1346 F7478 A2C          A=A-1    XS      Set A[XS]="F"
1347 F747B 860          ?ST=0    =sFirst  Is this the first char?
1348 F747E 50          GOYES   FXQPn4    No...continue
1349 F7480 AF1          B=0      W      Yes...set B[W]=0
1350 F7483 942  FXQPn4  ?A=C      S
1351 F7486 E0          GOYES   FXQPn5    Done
1352 F7488 811          BSLC
1353 F748B 811          BSLC
1354 F748E B46          C=C+1    S
1355 F7491 51F          GONC    FXQPn4    Go always
1356          *-
1357          *-
1358 F7494 B24  FXQPn5  A=A+1  XS      Set carry with A[XS]
1359 F7497 01          RTN
1360          *-
1361          *-
1362 F7499 8C00  Nxtchr  GOLONG  =NXTCHR
          00
1363          *-
1364          *-
1365 F749F 8E00  Restst  GOSUBL  =TSAVDO    Save D0 in function scratch
          00
1366 F74A5 8F00          GOSBVL  =POPUPD    Pop GOSUB stack into D[A]
          000
1367 F74AC 07          C=RSTK
1368 F74AE DF          CDEX   A
1369 F74B0 06          RSTK=C    Restore second level
1370 F74B2 DB          C=D      A
1371 F74B4 06          RSTK=C    Restore calling level
1372 F74B6 8E00          GOSUBL  =D1@AVE    Set D1 at AVMEME
          00
1373 F74BC 8E00          GOSUBL  =TRESDO    Restore D0 from function scratch
          00
1374 F74C2 8C00          GOLONG  =RESTST
          00
1375          *-
1376          *-
1377 F74C8 8C00  Rangen  GOLONG  =RANGEN
          00
1378          *-
1379          *-
1380 F74CE 8C00  Bakchr  GOLONG  =BAKCHR
          00
1381          *-
1382          *-
1383 F74D4 07  Expext+  C=RSTK    Save calling level in A[A]
1384 F74D6 DA          A=C      A
1385 F74D8 07          C=RSTK    Pop second level to C[A]
1386 F74DA DE          ACEX   A    Second level to A[A], call to C[A]
1387 F74DC 06          RSTK=C    Push calling level back on stack
1388 F74DE 8E00          GOSUBL  =TSAVDO    Save D0 first
          00

```

```
1389 F74E4 8F00      GOSBVL =PSHMCR      Push microcode return on GOSUB
      000
1390 F74EB 8E00      GOSUBL =TRESDO      Restore DO
      00
1391 F74F1 8C00      GOLONG =EXPEX+
      00
1392          *-
1393          *-
1394 F74F7 8C00 =Ucrang GOLONG =UCRANG
      00
1395 F74FD          END
```

ASLC12	Ext	-	241								
ASRC4	Ext	-	187								
BAKCHR	Ext	-	1380								
BLANKC	Ext	-	1307								
Bakchr	Abs	1012942 #F74CE	- 1380	98	315	367	408	483	570	661	
			703	717	814	1015	1074	1344			
CHKAI0	Ext	-	870								
CSRC12	Ext	-	222								
CSRC2	Ext	-	670								
D1=AVS	Ext	-	206								
D1@AVE	Ext	-	211	236	1372						
DT0H	Ext	-	572	666	724						
DevID	Ext	-	889								
DevTyp	Ext	-	583								
EXPEX+	Ext	-	1391								
Expex+	Abs	1012948 #F74D4	- 1383	995	1060	1078	1103				
FXQP30	Abs	1012724 #F73F4	- 1213	1201							
FXQP40	Abs	1012755 #F7413	- 1234	1219							
FXQP50	Abs	1012773 #F7425	- 1246	1206	1242						
=FXQPIL	Abs	1012708 #F73E4	- 1198	176							
=FXQPn+	Abs	1012782 #F742E	- 1306	1225							
FXQPn-	Abs	1012853 #F7475	- 1345	1311							
FXQPn1	Abs	1012797 #F743D	- 1310	1330							
FXQPn2	Abs	1012823 #F7457	- 1324	1313							
FXQPn3	Abs	1012849 #F7471	- 1340	1318	1320						
FXQPn4	Abs	1012867 #F7483	- 1350	1337	1348	1355					
FXQPn5	Abs	1012884 #F7494	- 1358	1351							
=FXQPnm	Abs	1012779 #F742B	- 1305	1215							
GADRR+	Ext	-	1080								
GADRS.	Abs	1012005 #F7125	- 665	642	659						
GADRS1	Abs	1011964 #F70FC	- 641	648							
GADRS2	Abs	1011992 #F7118	- 653	644							
GADRS3	Abs	1012027 #F713B	- 677	684							
GADRS4	Abs	1012099 #F7183	- 704	678	714						
GADRS5	Abs	1012109 #F718D	- 717	691							
GADRS6	Abs	1012113 #F7191	- 718	689	699	712					
=GADRST	Abs	1011961 #F70F9	- 640	409							
GADRsb	Abs	1012095 #F717F	- 703	680							
GADRSo	Abs	1011988 #F7114	- 649	697							
GADRss	Abs	1012076 #F716C	- 696	694	701	731	735	737			
GETDCK	Abs	1011304 #F6E68	- 107	100							
GETDI+	Abs	1011258 #F6E3A	- 85	200							
GETDI0	Abs	1011292 #F6E5C	- 99	92							
GETDI1	Abs	1011250 #F6E32	- 77	67							
GETDI2	Abs	1011300 #F6E64	- 103	95							
GETDI3	Abs	1011325 #F6E7D	- 114	86	97	122					
GETDI4	Abs	1011329 #F6E81	- 118	83							
GETDI5	Abs	1011331 #F6E83	- 119	73	110	113	230				
=GETDID	Abs	1011225 #F6E19	- 64								
=GETDIX	Abs	1011255 #F6E37	- 84								
GETDV-	Abs	1012218 #F71FA	- 814	798							
GETDV0	Abs	1012178 #F71D2	- 797	808							
GETDV1	Abs	1012185 #F71D9	- 799	807							
GETDV2	Abs	1012222 #F71FE	- 815	793	805						
GETDV3	Abs	1012231 #F7207	- 821	816	828						

PRST30	Abs	1011669	#F6FD5	-	383	309						
PRST40	Abs	1011683	#F6FE3	-	393	385						
PRST50	Abs	1011703	#F6FF7	-	404	395						
PRST90	Abs	1011728	#F7010	-	423	320	380	390	400	410		
PRSTEX	Abs	1011783	#F7047	-	458	447	1127					
PRSTeR	Abs	1011636	#F6FB4	-	363	358						
PRSTed	Abs	1011532	#F6F4C	-	301	307	317	344	350			
PRSTer	Abs	1011779	#F7043	-	451	444						
PRSTv1	Abs	1011715	#F7003	-	416	103						
PSHMCR	Ext			-	1389							
RANGEN	Ext			-	1377							
REST2C	Ext			-	1026	1125						
RESTD1	Ext			-	1021	1122						
RESTST	Ext			-	1374							
ROMTYP	Ext			-	872							
Rangen	Abs	1012936	#F74C8	-	1377	530	554	567	643	679	690	700
				-	806	1319						
Restst	Abs	1012895	#F749F	-	1365	996	1061	1079	1104			
SAVE2C	Ext			-	1152							
SAVEAC	Abs	1012675	#F73C3	-	1140	983	1099					
SETUP	Ext			-	125							
START	Ext			-	123							
STMTD1	Ext			-	1147							
TRESDO	Ext			-	1373	1390						
TSAVDO	Ext			-	119	1365	1388					
TermRq	Abs	0	#00000	-	62	84	96	199				
UCRANG	Ext			-	1394							
=Ucrang	Abs	1012983	#F74F7	-	1394	308	797	1312				
Vollbl	Ext			-	419	1050						
eDSPEC	Ext			-	114	301	817	1130	1251			
eNORAM	Ext			-	253							
eRANGE	Ext			-	363	451	542	649	1011	1116		
sDevOK	Ext			-	120	196						
sFirst	Ext			-	1305	1317	1324	1347				
sSTK	Ext			-	66	197	1200					
t%	Ext			-	1054							
t*	Ext			-	1067							
tCOLON	Ext			-	953	989						
tLITRL	Ext			-	964							
tSEMIC	Ext			-	1041	1090						

Input Parameters

Source file name is NZ&FXQ::MS

Listing file name is NZ/FXQ:TI:ML::-1

Object file name is NZFXQ:TI:MS::-1

Initial flag settings are
 111111
 0123456789012345

Errors

None

Saturn Assembler News

```
1      *
2      *      N  N  ZZZZZ  &      PPPP  A  RRRR
3      *      N  N      Z  & &  P  P  A  A  R  R
4      *      NN N      Z  & &  P  P  A  A  R  R
5      *      N N N      Z  &      PPPP  A  A  RRRR
6      *      N NN  Z      & & & P      AAAAA R R
7      *      N  N  Z      & &  P      A  A  R  R
8      *      N  N  ZZZZZ  && & P      A  A  R  R
9      *
10     TITLE  NZ'S PARSE ROUTINES <831128.2333>
11 F74FD  ABS  #F74FD      TI%HP6 address (fixed)
12     *
13     * Status bits for Parse routines
14     *
15     * Global (BASIC System)
16     *
17     =InvalE EQU  0      Invalid expression if set
18     =Digit EQU   1      Digit found (CATCHR)
19     =SpChar EQU  2      Special char found (CATCHR)
20     =NumExp EQU  3      Numeric expression if set
21     *
22     * LOCAL (Used only in HPIL)
23     *
24     * ST(10) MUST be clear for any error exits! (Implied LET error)
25     *
26     =StarOK EQU  10     "*" OK (in device parse)
27     =StrOK EQU   StarOK  String OK (FRAME Spec parse)
28     =ExprOK EQU   8      Expression OK (SEND parse)
29     =EolOK EQU   9      EOL OK (in SEND parse)
30     =OptDev EQU   8      Device Spec is optional (Dev parse)
31     ****
32     ****
33     **
34     ** Name:          PRNTSp - Parse the PRINTER IS statement
35     **
36     ** Category:     STPARS
37     **
38     ** Purpose:
39     **      Parse the PRINTER IS (and DISPLAY IS) statement
40     **
41     ** Entry:
42     **      D1 points to the ASCII character string
43     **      D0 points to the location where the tokens go
44     **      D[A] is the end of available memory
45     **      P=0
46     **
47     ** Exit:
48     **      D0 positioned past the last token output by this routine
49     **      D1 positioned past the last character accepted
50     **      P=0
51     **      Exits through ERRORP if error
52     **
53     ** Calls:        NTOKEN,<DVCPy*>
54     **
55     ** Uses.....
```



```
56      ** Inclusive: A,B,C,D[15:5],RO,R1,R2,DO,D1,P,ST[11,10,8,7,3:0],
57      **          FUNCDO,PRMCNT[0]
58      **
59      ** Stk lvls:  5 (DVCPy*)
60      **
61      ** History:
62      **
63      **      Date      Programmer      Modification
64      **      -----      -
65      **      11/23/83      NZ          Added documentation
66      **
67      ****
68      ****
69 F74FD 7F36 =PRNTSp GOSUB Ntoken      Get next token
70 F7501 3100      LC(2) =tIS      "IS" token
71 F7505 966      ?A#C      B      Was the next token "IS"?
72 F7508 36      GOYES PRNTPe      No..."IS" missing...error
73 F750A 6CA4      GOTO DVCPy*      Yes...device spec, "*" permitted
74      ****
75      ****
76      **
77      ** Name:      OUTPp - Parse the OUTPUT statement
78      ** Name:      ENTERp - Parse the ENTER statement
79      **
80      ** Category:  STPARS
81      **
82      ** Purpose:
83      **
84      **
85      ** Entry:
86      **      D1 points to the ASCII character string
87      **      D0 points to the location where the tokens go
88      **      D[A] is the end of available memory
89      **      P=0
90      **
91      ** Exit:
92      **      D1 positioned past last token output by this routine
93      **      D1 positioned past last character accepted
94      **      P=0
95      **      Exits through ERRORP if error
96      **
97      ** Calls:      DVCPn*,OUTpCK,OUTBYT,USINGp,<DISPP>,<READP5>
98      **
99      ** Uses.....
100     ** Inclusive: A,B,C,D[15:5],RO-R2,DO,D1,P,ST[11,10,8,7,3:0],
101     **          FUNCDO,PRMCNT[0]
102     **
103     ** Stk lvls:  6 (DVCPn*)
104     **
105     ** History:
106     **
107     **      Date      Programmer      Modification
108     **      -----      -
109     **      11/23/83      NZ          Added documentation
110     **
```

```
111 *****
112 *****
113 *
114 * OUTPUT parse
115 *
116 F750E 7E94 =OUTPp GOSUB DVCPn* Parse device, "*" not permitted
117 F7512 7130 GOSUB OUTpCK See what is following...
118 F7516 8D00 GOVLNG =DISPP Continue with DISPLAY parse
    000
119 *-
120 *-
121 *
122 * ENTER parse
123 *
124 F751D 7F84 =ENTERp GOSUB DVCPn* Parse device, "*" not permitted
125 F7521 7220 GOSUB OUTpCK See what is following...
126 F7525 8F00 GOSBVL =USINGp Try to parse USING
    000
127 F752C 450 GOC ENTR10 Parsed USING...don't change D1
128 F752F 171 D1=D1+ 2 No USING...skip semicolon
129 F7532 3100 ENTR10 LC(2) =tSEMIC Output tSEMIC
130 F7536 7185 GOSUB OUTBYT
131 F753A 858 ST=1 8
132 F753D 849 ST=0 9
133 F7540 8D00 GOVLNG =READP5
    000
134 *-
135 *-
136 *
137 * OUTPUT and ENTER share a common syntax for device spec; both
138 * must be followed by one of the following:
139 * 1. USING
140 * 2. Semicolon
141 * 3. End of line
142 *
143 F7547 75F5 OUTpCK GOSUB Ntoken Get next token
144 F754B 3100 LC(2) =tUSING
145 F754F 962 ?A=C B Is it tUSING?
146 F7552 D0 GOYES chkOK Yes...accept it
147 F7554 3100 LC(2) =tSEMIC
148 F7558 962 ?A=C B Is it tSEMIC?
149 F755B 40 GOYES chkOK Yes...accept it
150 *
151 * Not USING or Semicolon; if not EDL, then excess chars
152 *
153 F755D 07 C=RSTK Return to main parse driver
154 *
155 F755F 3100 chkOK LC(2) =t@ Output a t@ to terminate the
156 F7563 7455 GOSUB OUTBYT device specifier
157 F7567 63B5 GOTO RESPTR Restore the pointer (Ntoken)
158 *-
159 *-
160 F756B 20 PRNTPe P= =eSYNTx "IS" token missing
161 F756D 6051 GOTO Errorp Syntax error (restore pointer)
162 *****
```

```

163 *****
164 **
165 ** Name:      INITp - Parse the INITIALIZE statement
166 **
167 ** Category:  STPARS
168 **
169 ** Purpose:
170 **   Parse the INITIALIZE statement
171 **
172 ** Entry:
173 **   D1 points to the ASCII character string
174 **   D0 points to the location where the tokens go
175 **   D[A] is the end of available memory
176 **   P=0
177 **
178 ** Exit:
179 **   D0 positioned past last token output by this routine
180 **   D1 positioned past last character accepted
181 **   P=0
182 **   Exits through ERRORP if error
183 **
184 ** Calls:     CONWUC, FILSp, NTOKEN, ?A=CM+, CKNUM, <RESPTR>,
185 **           <ERROR!>, <ERRORP>
186 **
187 ** Uses.....
188 ** Inclusive: A,B,C,D[15:5],R0-R4,DO,D1,P,ST[11,7,3:0],FUNCD0,
189 **           PRMCNT[0]
190 **
191 ** Stk lvls:  6 (FILSp)
192 **
193 ** History:
194 **
195 **   Date      Programmer      Modification
196 **   -----      -
197 **   11/28/83    NZ              Added documentation
198 **
199 *****
200 *****
201 F7571 7756 =INITp  GOSUB  CONWUC      Convert word to upper case
202 F7575 AF6   C=A      W
203 F7578 3594 LCASC  \EZI\      End of INITIAL(IZE) keyword
204           A554
205 F7580 976   ?A#C    W
206 F7583 44    GOYES  INITp1      "IZE" missing - ERROR...
207 F7585 175   D1=D1+ 6      Skip IZE
208 *
209 * Now have "INITIALIZE"
210 *
210 F7588 7BC2 GOSUB  FILSp      Parse filespec (with string?)
211 F758C 580   GONC   INITP.    No error...continue
212 F758F 8C00 Error! GOLONG =ERROR! Error with FILSp
213           00
214 *
215 F7595 831  INITP.  ?XM=0

```

```
216 F7598 80          GOYES  INITPO      OK
217 F759A 20  MSGPAR  P=      =eMSPAR  Missing parameter
218 F759C 6121       GOTO    Errorp     Error
219                *_-
220                *_-
221 F75A0 7C95  INITPO  GOSUB  Ntoken   Next TOKEN
222 F75A4          INITP2
223 F75A4 8E00       GOSUBL  =?A=CM+
      00
224 F75AA 5D0        GONC   INITPR     No comma token...rtn, carry clear
225 F75AD 7D05       GOSUB  OUT1TK     Comma token...output it
226                *
227                * Entry for <XWORD> <numeric expression>
228                *
229 F75B1            =XWRD1p
230 F75B1 72B4       GOSUB  CKNUM     Check numeric expression
231 F75B5 4D0        GOC    INITPE     Error jump
232 F75B8 6265  =INITPR  GOTO    RESPTR   Restore parse pointer
233                *_-
234                *_-
235                *
236                * Entry for <XWORD> <Expr> [, <Expr>]
237                *
238 F75BC            =STANp+
239 F75BC 77A4       GOSUB  CKNUM     Check numeric expression
240 F75C0 53E        GONC   INITP2     Valid numeric...continue
241 F75C3 6AFO  INITPE  GOTO    Errorp     Parse error
242                *_-
243                *_-
244 F75C7 20  INITP1  P=      =eSYNTx   Syntax error (No IZE)
245 F75C9 6AFO       GOTO    Errorp     Parse error
246                *****
247                *****
248                **
249                ** Name:          STANDp - Parse the STANDBY statement
250                **
251                ** Category:     STPARS
252                **
253                ** Purpose:
254                **      Parse the STANDBY statement
255                **
256                ** Entry:
257                **      D1 points to the ASCII character string
258                **      D0 points to the location where the tokens go
259                **      D[A] is the end of available memory
260                **      P=0
261                **
262                ** Exit:
263                **      D0 positioned past last token output by this routine
264                **      D1 positioned past last character accepted
265                **      P=0
266                **      Exits through ERRORP if error
267                **
268                ** Calls:         LOOP#p, WRDSCN, CKNUM, <RESPTR>
269                **
```

```
270      ** Uses.....
271      ** Inclusive: A,B,C,D[15:5],R0-R3,D0,D1,P,ST[11,7,3:0],FUNCD0,
272      **                PRMCNT[0]
273      **
274      ** Stk lvls:   6 (LOOP#p)
275      **
276      ** History:
277      **
278      **      Date      Programmer      Modification
279      **      -----      -
280      **      11/28/83      NZ              Added documentation
281      **
282      ****
283      ****
284 F75CD 7B61 =STANDp GOSUB  LOOP#p      Parse optional loop #
285 F75D1 7EB5      GOSUB  wrdscn      Check for ON/OFF
286 F75D5 00      CON(2) =tON
287 F75D7 7D3      REL(3) RTNCC      ON...done
288 F75DA 00      CON(2) =tOFF
289 F75DC 2D3      REL(3) RTNCC      OFF...done
290 F75DF 00      CON(2) 0          Neither ON nor OFF...get num expr
291 F75E1 7635      GOSUB  RESPTR      (Restore input pointer first)
292 F75E5 66DF      GOTO   STANp+      Parse 1 or 2 expressions
293      ****
294      ****
295      **
296      ** Name:          LOCALp - Parse the LOCAL [LOCKOUT] statement
297      **
298      ** Category:     STPARS
299      **
300      ** Purpose:
301      **      Parse the LOCAL or LOCAL LOCKOUT statement
302      **
303      ** Entry:
304      **      D1 points to the ASCII character string
305      **      D0 points to the location where the tokens go
306      **      D[A] is the end of available memory
307      **      P=0
308      **
309      ** Exit:
310      **      D0 positioned past last token output by this routine
311      **      D1 positioned past last character accepted
312      **      P=0
313      **      Exits through ERRORP if error
314      **
315      ** Calls:        NTOKEN,OUT3TK,SVDOD1,CKNUM,RSDOD1,RESPTR,
316      **                <CLEARp>,<OUTBYT>
317      **
318      ** Uses.....
319      ** Inclusive: A,B,C,D[15:5],R0-R3,D0,D1,P,ST[11,7,3:0],FUNCD0,
320      **                PRMCNT[0]
321      **
322      ** Stk lvls:     5 (CKNUM)(<CLEARp>)
323      **
324      ** History:
```

```

325      **
326      **      Date      Programmer      Modification
327      **      -----      -----      -----
328      **      11/28/83      NZ      Added documentation
329      **
330      ****
331      ****
332 F75E9      =LOCALp
333 F75E9 7355      GOSUB  Ntoken
334 F75ED AF6      C=A      W      Set high nibbles for compare
335      ***
336      *      LC(6) (=tLOCKO)~(=LEXPIL)~(=tXWORD)
337      *
338 F75F0 35      NIBHEX 35      LC(6)
339 F75F2 00      CON(2) =tXWORD      ...
340 F75F4 00      CON(2) =LEXPIL      ..
341 F75F6 00      CON(2) =tLOCKO      .
342      *
343      ***
344 F75F8 976      ?A#C      W      Is it LOCAL LOCKOUT?
345 F75FB F1      GOYES      LOCLp1      No...restore, use REMOTE parse
346      *
347      * This is LOCAL LOCKOUT...output the token, check for loop #
348      *
349 F75FD 7EC4      GOSUB  oUT3TK      Output 3 byte token
350 F7601 7E84      Loopp  GOSUB  SVDOD1      Save D0, D1 in R2
351 F7605 7E54      GOSUB  CKNUM      Check if numeric expr follows
352 F7609 20      P=      0      Regardless of carry, want P=0
353 F760B 5CA      GONC   INITPR      If good expr, done after RESPTR
354 F760E 7894      GOSUB  RSDOD1      Restore D0, D1 from R2
355      *
356      * Not a loop expression...put out a tCOMMA instead
357      *
358 F7612 3100      LC(2) =tCOMMA
359 F7616 6AA4      GOTO   OUTBYT      Don't restore D1 (already correct)
360      *
361      *
362 F761A 7DF4      LOCLp1 GOSUB  RESPTR      Restore token pointer
363      *
364      * Fall into CLEARp
365      *
366      ****
367      ****
368      **
369      ** Name:      CLEARp - Parse the CLEAR statement
370      ** Name:      REMOTp - Parse the REMOTE statement
371      ** Name:      TRIGp - Parse the TRIGGER statement
372      **
373      ** Category:  STPARS
374      **
375      ** Purpose:
376      **      Parse CLEAR/REMOTE/TRIGGER/LOCAL statement
377      **
378      ** Entry:
379      **      D1 points to the ASCII character string

```

```
380      **      D0 points to the location where the tokens go
381      **      D[A] is the end of available memory
382      **      P=0
383      **
384      ** Exit:
385      **      D0 positioned past last token output by this routine
386      **      D1 positioned past last character accepted
387      **      P=0
388      **      Exits through ERRORP if error
389      **
390      ** Calls:      EXPPAR
391      **
392      ** Uses.....
393      ** Inclusive: A,B,C,D[15:5],R0,R1,D0,D1,P,ST[11,7,3:0],FUNCD0,
394      **             PRMCNT[0]
395      **
396      ** Stk lvls:
397      **
398      ** History:
399      **
400      **      Date      Programmer      Modification
401      **      -----      -
402      **      11/28/83      NZ      Added documentation
403      **
404      *****
405      *****
406      *
407      * Code above falls into this routine
408      *
409 F761E      =CLEARp
410 F761E      =REMOTp
411 F761E      =TRIGp
412 F761E 858      ST=1      OptDev      Device spec not required
413 F7621 84A      ST=0      =StarOK      No "*" allowed
414 F7624 6893     GOTO      DVCSPc      Device address parse
415      *****
416      *****
417      **
418      ** Name:      RESETp - Parse the RESET HPIL statement
419      **
420      ** Category:  STPARS
421      **
422      ** Purpose:
423      **      Parse the RESET HPIL statement
424      **
425      ** Entry:
426      **      D1 points to the ASCII character string
427      **      D0 points to the location where the tokens go
428      **      D[A] is the end of available memory
429      **      P=0
430      **
431      ** Exit:
432      **      D0 positioned past last token output by this routine
433      **      D1 positioned past last character accepted
434      **      P=0
```

```
435      **      Exits through ERRORP if error
436      **
437      ** Calls:      BLANK,CONWUC,<Loopp>
438      **
439      ** Uses.....
440      ** Inclusive:  A,B,C,D[15:5],R0-R3,D0,D1,P,ST[11,7,3:0],FUNCDO,
441      **              PRMCNT[0]
442      **
443      ** Stk lvls:   5 (<Loopp>)
444      **
445      ** History:
446      **
447      **      Date      Programmer      Modification
448      **      -----      -
449      **      11/28/83      NZ              Added documentation
450      **
451      *****
452      *****
453 F7628 7EF4 =RESETp GOSUB BLANK
454 F762C 7C95      GOSUB CONWUC      Convert word to upper case
455 F7630 AF6      C=A      W      Copy upper nibs for compare
456 F7633 3784      LCASC  \LIPH\
      0594
      C4
457 F763D 976      ?R#C  W
458 F7640 A2      GOYES  Errorx
459      *
460      * HPIL...leave as HPIL "RESET"
461      *
462 F7642 177      D1=D1+ 8
463 F7645 58B      GONC  Loopp      Go always...check for loop #
464      *****
465      *****
466      **
467      ** Name:      OFFp - Parse OFF INTR/OFF IO
468      **
469      ** Category:  STPARS
470      **
471      ** Purpose:
472      **      Parse the tokens following tOFF (HPIL) for INTR or IO
473      **
474      ** Entry:
475      **      D1 points to the ASCII character string
476      **      D0 points to the location where the tokens go
477      **      D[A] is the end of available memory
478      **      P=0
479      **
480      ** Exit:
481      **      D0 positioned past last token output by this routine
482      **      D1 positioned past last character accepted
483      **      P=0
484      **      Exits through REST* if error
485      **
486      ** Calls:      WRDSCN
487      **
```



```
488      ** Uses.....
489      ** Inclusive: A,B,C,R0,R1,R2,D0,D1,P,ST[11,3:0]
490      **
491      ** Stk lvls:  4 (WRDSCN)
492      **
493      ** History:
494      **
495      **      Date      Programmer      Modification
496      **      -----      -
497      **      11/28/83      NZ      Added documentation
498      **
499      ****
500      ****
501 F7648 7745 =OFFIOp GOSUB wrdscn
502 F764C 00      CON(2) =tXWORD
503 F764E 00      CON(2) =LEXPIL
504 F7650 00      CON(2) =tINTRR
505 F7652 420     REL(3) IOp20
506 F7655 00      CON(2) 00
507      *
508      * If is not OFF INTR try OFF IO...
509      *
510 F7657 70C4      GOSUB RESPTR
511      *
512      * Fall into IOp
513      *
514      ****
515      ****
516      **
517      ** Name:      IOp - Parse "IO" token
518      **
519      ** Category:  PARUTL
520      **
521      ** Purpose:
522      **      Accept the "IO" token from the input stream (used for
523      **      OFF IO, RESTORE IO, ASSIGN IO)
524      **
525      ** Entry:
526      **      D1 points to the ASCII character string
527      **      D0 points to the location where the tokens go
528      **      D[A] is the end of available memory
529      **      P=0
530      **
531      ** Exit:
532      **      D0 positioned past last token output by this routine
533      **      D1 positioned past last character accepted
534      **      P=0
535      **      Exits through REST* if error
536      **
537      ** Calls:      WRDSCN,<REST*>
538      **
539      ** Uses.....
540      ** Inclusive: A,B,C,R0,R1,R2,D0,D1,P,ST[11,3:0]
541      **
542      ** Stk lvls:  4 (WRDSCN)
```

```
543      **
544      ** History:
545      **
546      **      Date      Programmer      Modification
547      **      -----      -
548      **      11/28/83      NZ      Added documentation
549      **
550      ****
551      ****
552      *
553      * Code above falls into this routine
554      *
555 F765B 7435 =I0p  GOSUB wrdscn      Get next token
556 F765F 00      CON(2) =tXWORD
557 F7661 00      CON(2) =LEXPIL
558 F7663 00      CON(2) =tIO
559 F7665 E00     REL(3) I0p10
560 F7668 00      CON(2) 00
561 F766A 20 Errorx P= 0
562 F766C 8000 GOVLNG =REST*      Restart parse as if never matched
      000
563      *_-
564      *_-
565 F7673 185 I0p10 DO=DO- 6      Return (Don't output the token)
566 F7676 03 I0p20 RTNCC
567      ****
568      ****
569      **
570      ** Name:      ONINTp - Parse the ON INTR GOTO/GOSUB statement
571      **
572      ** Category:  STPARS
573      **
574      ** Purpose:
575      **      Parse the ON INTR GOTO/GOSUB statement
576      **
577      ** Entry:
578      **      D1 points to the ASCII character string
579      **      D0 points to the location where the tokens go
580      **      D[A] is the end of available memory
581      **      P=0
582      **
583      ** Exit:
584      **      D0 positioned past last token output by this routine
585      **      D1 positioned past last character accepted
586      **      P=0
587      **      Exits through REST* if error
588      **
589      ** Calls:      WRDSCN,NTOKEN,<REST*>
590      **
591      ** Uses.....
592      **      Inclusive: A,B,C,R0,R1,R2,D0,D1,P,ST[11,3:0]
593      **
594      ** Stk lvls:  4 (WRDSCN)
595      **
596      ** History:
```

```

597      **
598      **      Date      Programmer      Modification
599      **      -----      -----      -----
600      **      11/28/83      NZ      Added documentation
601      **
602      *****
603      *****
604 F7678 7715 =ONINTp GOSUB wrdscn
605 F767C 00      CON(2) =tXWORD
606 F767E 00      CON(2) =LEXPIL
607 F7680 00      CON(2) =tINTRR
608 F7682 900     REL(3) ONINp1
609 F7685 00      CON(2) 00
610 F7687 62EF    GOTO  Errorx
611      **
612      **
613 F768B 185     ONINp1 DO=DO- 6      Don't output the INTR token
614 F768E 7EA4    GOSUB  Ntoken
615 F7692 858     ST=1  8      Set ON ERROR flag (single branch)
616 F7695 8D00    GOVLNG =ONP40
        000
617      *****
618      *****
619      **
620      ** Name:      ASGNp - Parse the ASSIGN IO statement
621      **
622      ** Category:  STPARS
623      **
624      ** Purpose:
625      **      Parse the ASSIGN IO statement
626      **
627      ** Entry:
628      **      D1 points to the ASCII character string
629      **      DO points to the location where the tokens go
630      **      D[A] is the end of available memory
631      **      P=0
632      **
633      ** Exit:
634      **      DO positioned past last token output by this routine
635      **      D1 positioned past last character accepted
636      **      P=0
637      **      Exits through ERRORP if error
638      **
639      ** Calls:      IOp,CKSTR,NTOKEN,OUTBYT,<RESPTR>,<ERRORP>
640      **
641      ** Uses.....
642      ** Inclusive: A,B,C,D[15:5],R0,R1,R2,DO,D1,P,ST[11,7,3:0],
643      **      FUNCDO,PRMCNT[0]
644      **
645      ** Stk lvls:  5 (CKSTR)(IOp)
646      **
647      ** History:
648      **
649      **      Date      Programmer      Modification
650      **      -----      -----      -----

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651      ** 11/28/83      NZ      Added documentation
652      **
653      ****
654      ****
655 F769C 7BBF =ASGNp  GOSUB  IOp      First check for "IO"
656      *
657      * If IOp returns, found "IO"
658      *
659 F76A0 70E3      GOSUB  CKSTR      Check for valid string (carry=NO)
660 F76A4 5F1      GONC   ASGNp2     Valid...restore pointer, done
661 F76A7 7594      GOSUB  Ntoken     Get the token
662 F76AB 3100      LC(2)  =t*
663 F76AF 966      ?A#C   B
664 F76B2 A0      GOYES  ASGNp1     Error...illegal parameter
665 F76B4 7C05      GOSUB  OUT:      ASSIGN IO *...output the tCOLON,
666 F76B8 6204      GOTO   OUTBYT    Output the t*, return, carry clear
667      *_-
668      *_-
669 F76BC 20      ASGNp1  P=      =eILPAr      Illegal parameter
670 F76BE 8C00  Errorp  GOLONG =ERRORP      Error...restore pointer, exit
      OO
671      *_-
672      *_-
673 F76C4 6654  ASGNp2  GOTO   RESPTR
674      ****
675      ****
676      **
677      ** Name:      SENDp - Parse the SEND statement
678      **
679      ** Category:  STPARS
680      **
681      ** Purpose:
682      **      Parse the SEND statement
683      **
684      ** Entry:
685      **      D1 points to the ASCII character string
686      **      D0 points to the location where the tokens go
687      **      D[A] is the end of available memory
688      **      P=0
689      **
690      ** Exit:
691      **      D0 positioned past last token output by this routine
692      **      D1 positioned past last character accepted
693      **      P=0
694      **      Exits through ERRORP if error
695      **
696      ** Calls:      LOOP#p, FRASPP, ST!NOp, ?A=CM+, RESPTR, BLANK, CONWUC,
697      **      OUTBYT, OUTNBS
698      **
699      ** Uses.....
700      ** Inclusive: A,B,C, D[15:5], R0-R3, D0, D1, P, ST[11:7, 3:0], FUNCDO,
701      **      PRMCNT[0]
702      **
703      ** Stk lvls:  6 (LOOP#p)
704      **

```

```
705      ** Algorithm:
706      **      SENDp: Parse optional loop #                (LOOP#p)
707      **
708      **      SENDP1: Attempt to parse a frame spec        (FRASPP)
709      **              If successful frame spec, goto SENDP1
710      **
711      **              If expression is not permitted here, goto SENDP5
712      **              Attempt to parse a string or number  (ST!NOp)
713      **              If unsuccessful, goto SENDP5
714      **
715      **      SENDP2: Check if a comma follows (more expr) (?A=CM+)
716      **              If no comma, goto SENDP3 (check for EOL)
717      **              Attempt to parse a string or number  (ST!NOp)
718      **              If successful, goto SENDP2
719      **
720      **      SENDlp: While character is a blank, back up one char
721      **              Goto SENDP5
722      **
723      **      SENDP3: Restore input pointer                  (RESPTR)
724      **              Get next character                    (BLANK )
725      **
726      **              If EOL is permitted here, then
727      **              Read next 3 characters
728      **              If characters = "EOL" then output "EOL"
729      **              Get next character
730      **              endif
731      **
732      **      SENDP4: Attempt to parse a frame spec        (FRASPP)
733      **              If successful, goto SENDP1
734      **
735      **      SENDP5: Clear ST[10] (Implied LET flag)
736      **              RTNCC
737      **
738      ** History:
739      **
740      **      Date      Programmer      Modification
741      **      -----      -
742      **      11/28/83      NZ              Updated documentation
743      **
744      ** *****
745      ** *****
746      ** *
747      ** Syntax:
748      ** SEND [<loop #>;] { <keyword> [ <num expr> | <str expr> [ ,
749      **   <num expr> | <str expr> ]* ] }*
750      **
751      **   (num expr is not be allowed for some of the keywords)
752      **   (str expr is not be allowed for some of the keywords)
753      **
754      ** Definitions:
755      **   <keyword> ::= DATA | END | IDY | UNL | LISTEN | UNT |
756      **               TALK | SAD | DDL | DDT | RDY | IFC | LPD | GTL |
757      **               SDC | CMD | MLA | MTA
758      **   <num expr> ::= numeric expression
759      **   <str expr> ::= string expression
```

```

760      *      <loop #> ::= numeric expression in the range [1,3]
761      *
762 F76C8 =SENDp
763      *
764      * LOOP#p compiles either <nothing> or <tSEMIC><num expr><tCOMMA>
765      * It also calls BLANK, leaving the next char in A[B]
766      *
767 F76C8 7070      GOSUB LOOP#p      Parse loop number, if any
768      *
769      * ST(8) (=ExprOK) is clear from the entry to SEND parse
770      *
771      * FRASPP compiles <tCOLON><text string>. If not a valid frame,
772      * returns with DO restored, carry SET.
773      * A[B] is the next item, D1 points to the next item
774      * If carry is CLEAR, FRASPP sets/clears ST(StrOK), ST(EolOK).
775      * If carry is SET, FRASPP does not alter ST(StrOK),ST(EolOK).
776      *
777 F76CC 7990 SENDP1 GOSUB FRASPP      Frame spec parse
778 F76D0 5BF      GONC SENDP1      If valid frame spec, try another
779      *
780      * ST(ExprOK) indicates if an expression makes sense here. If
781      * it is not set and FRASPP returned with carry set, this is
782      * a parse error!! (Expression following a frame spec that does
783      * not take an expression)
784      *
785 F76D3 868      ?ST=0 =ExprOK      Does an expression make sense?
786 F76D6 16      GOYES SENDP5      No...exit! (Anything else: error)
787      *****
788      *
789      * ST!NOp compiles {<tCOMMA> followed by <str expr>|<num expr>}
790      * if no error has been detected; a string expression is
791      * accepted only if ST(StrOK) is SET, else errors on string.
792      * An EOL is accepted if and only if ST(EolOK) is true.
793      * An expression is accepted if and only if ST(ExprOK) is true.
794      * A[B] is next token on return from ST!NOp; carry indicates
795      * status (Carry set=error; carry clear=accepted, compiled)
796      *
797 F76D8 7051      GOSUB ST!NOp      Parse initial string | number
798 F76DC 4A5      GOC SENDP5      No expression specified...done
799      *
800      * One expression given...check if another expression follows
801      *
802 F76DF 7000 SENDP2 GOSUB =?A=CM+
803 F76E3 571      GONC SENDP3      No comma follows...check EOL
804      *
805      * Found a comma...MUST find another expression!
806      *
807 F76E6 7241      GOSUB ST!NOp      Parse string | number
808 F76EA 54F      GONC SENDP2      Valid...check for another!
809      *
810      * Didn't find a valid expression...back up to the comma
811      *
812      * (ST!NOp leaves C[B]=\ \)
813      *
814 F76ED 1C1 SEND1p D1=D1- 2

```

```

815 F76F0 14B      A=DAT1 B
816 F76F3 962      ?A=C B
817 F76F6 7F       GOYES SEND1p
818 F76F8 5E3      GONC SENDP5      Go always
819                *
820                *
821 F76FB 7C14 SENDP3 GOSUB RESPTR      Restore pointer...
822 F76FF 7724      GOSUB BLANK      ...Skip blanks, read in character
823 F7703 869       ?ST=0 =EolOK     Is EOL permitted here?
824 F7706 A2        GOYES SENDP4     No...continue
825                *
826                * Check if this is EOL (If so, output it and get next frame)
827                *
828 F7708 70C4      GOSUB CONWUC     Convert to upper case
829 F770C AF6       C=A W           (To facilitate compare)
830 F770F 3554      LCASC \LOE\     EOL
      F4C4
831 F7717 976       ?A#C W
832 F771A 61        GOYES SENDP4     Not EOL...continue
833 F771C 175       D1=D1+ 6       Skip EOL
834 F771F 71A4      GOSUB OUT:      Output 1 byte from C[B]
835 F7723 AEE       ACEX B
836 F7726 25        P= 5
837 F7728 7DA3      GOSUB oUTNBS    Output 6 nibbles from A[5:0]
838 F772C 7AF3      GOSUB BLANK     Skip to next token
839                *
840                * If here, MUST have another frame spec, else error!
841                *
842 F7730 7530 SENDP4 GOSUB FRASPP
843 F7734 579       GONC SENDP1     Found frame spec...continue
844                *
845                * NOT a frame spec...unrecognized type
846                *
847                * Fall through to return to parse driver
848                *
849 F7737 84A SENDP5 ST=0 =StrOK      Clear this bit for LINE PARSE
850 F773A 03        RTNCC
851                *****
852                *****
853                **
854                ** Name: LOOP#p - Parse an optional HPIL loop specifier
855                **
856                ** Category: PARUTL
857                **
858                ** Purpose:
859                ** Parse an optional loop number...if one present, output
860                ** the tokens for it
861                **
862                ** Exit:
863                ** A[B] is next char, D1 points at next character
864                ** If <loop #> found, compiled code generated
865                **
866                ** Entry:
867                ** D1 points to the ASCII character string
868                ** D0 points to the location where the tokens go

```

```

869      **      D[A] is the end of available memory
870      **      P=0
871      **
872      ** Exit:
873      **      A[B] is next character (at D1)
874      **      D0 positioned past last token output by this routine
875      **      D1 positioned past last character accepted
876      **      P=0
877      **      Carry clear
878      **
879      ** Calls:      SVDOD1,OUTBYT,CKNUM,OUT1TK,RSDOD1,BLANK
880      **
881      ** Uses.....
882      ** Inclusive: A,B,C,D[15:5],R0-R3,D0,D1,P,ST[11,7,3:0],FUNCD0,
883      **             PRMCNT[0]
884      **
885      ** Stk lvls:  5 (CKNUM)
886      **
887      ** History:
888      **
889      **      Date      Programmer      Modification
890      **      -----      -
891      **      11/28/83      NZ              Updated documentation
892      **
893      ****
894      ****
895      *
896      * Syntax:
897      *   Input stream: [ <num expr> ; ]
898      *   Compiled code: [ <tSEMIC> <num expr> <tSEMIC> ]
899      *
900 F773C 7353 =LOOP#p GOSUB  SVDOD1      Save D0, D1
901 F7740 20      P=      0
902 F7742 3100      LC(2) =tSEMIC
903 F7746 7173      GOSUB  OUTBYT      Output the semicolon in case OK
904 F774A 7913      GOSUB  CKNUM      Check numeric expression
905 F774E 421      GOC    LOOP#1      Not good...restore,nchar, return
906      *
907      * This was a valid numeric expression (B[B] is ntoken)
908      *
909      * Check for trailing semicolon...
910      *
911 F7751 3100      LC(2) =tSEMIC
912 F7755 966      ?ANC  B
913 F7758 90      GOYES  LOOP#1      Not semicolon...don't accept!
914      *
915      * Output a trailing tSEMIC!
916      *
917 F775A 7063      GOSUB  OUT1TK      (tSEMIC in A[B] now)
918 F775E 560      GONC  LOOP#2      Go always...get next char
919      *-
920      *-
921 F7761      LOOP#1
922      *
923      * Restore D0, D1; then get next char

```



```
924      *
925 F7761 7543      GOSUB  RSDOD1      Restore D0, D1
926 F7765 64C3 LOOP#2  GOTO   BLANK      Get next character
927      *****
928      *****
929      **
930      ** Name:          FRASPP - Parse an HPIL frame specifier
931      **
932      ** Category:     PARUTL
933      **
934      ** Purpose:
935      **     Frame spec parse for HPIL frame descriptors
936      **
937      ** Entry:
938      **     A[B] is next character (at D1)
939      **     D1 points to the ASCII character string
940      **     D0 points to the location where the tokens go
941      **     D[A] is the end of available memory
942      **     P=0
943      **
944      ** Exit:
945      **     A[B] is next item (at D1)
946      **     If carry set, not valid input (D0,D1 restored)
947      **     If carry clear, output <tCOLON><text string>.
948      **         ST(StrOK) is set if string OK next, clear if not
949      **         ST(EolOK) is set if EOL is OK next, else clear
950      **         ST(ExprOK) is set if expression makes sense next
951      **     D0 positioned past last token output by this routine
952      **     D1 positioned past last character accepted
953      **     P=0
954      **
955      ** Calls:         UCRANG,OUTBYT,FRAMEE,OUTNBS,<BLANK>
956      **
957      ** Uses.....
958      ** Inclusive: A,B,C,R0,R1,P
959      **
960      ** Stk lvls:     2 (UCRANG)(OUTBYT)(FRAMEE)(OUTNBS)
961      **
962      ** History:
963      **
964      **     Date          Programmer          Modification
965      **     -----          -
966      **     11/28/83      NZ              Updated documentation
967      **
968      *****
969      *****
970      *
971      * Syntax:
972      *   Input stream: <alpha text string>
973      *   Token output: <tCOLON> <validated text string>
974      *
975 F7769 7000 =FRASPP GOSUB  =Ucrang      Check if valid input...
976 F776D 400      RTNC                    If carry, not valid input!
977 F7770 7054      GOSUB  OUT:            Output a tCOLON before frame spec
978 F7774 AEE      ACEX   B                (OUTBYT does ACEX B)
```

```

979 F7777 133          AD1EX
980 F777A 101          R1=A          Save input pointer in R1
981 F777D 133          AD1EX          (A,D1 unchanged)
982                    *
983                    * A[B] is first character...continue until not in [A-Z]
984                    * D1 points at first character
985                    *
986 F7780 AC2          C=0      S          Count in C[S]
987 F7783 814  FRASP1 ASRC
988 F7786 814          ASRC          Save characters in high nibbles
989 F7789 B46          C=C+1  S
990 F778C 171          D1=D1+ 2          Point to next character
991 F778F 14B          A=DAT1 B
992 F7792 7000        GOSUB =Ucrang     Check if in [A-Z]
993 F7796 5CE          GONC   FRASP1     Yes...continue
994                    *
995                    * Got a character NOT in [A-Z]...rotate text, check it
996                    *
997 F7799 80DF        P=C      15          Use P for the character count!
998 F779D 0D          P=P-1          Decrement for base zero carry
999 F779F 810  FRASP2 ASLC
1000 F77A2 810          ASLC          Shift one character
1001 F77A5 0D          P=P-1
1002 F77A7 57F        GONC   FRASP2     If no carry, not done shifting
1003                    *
1004                    * Now A[W] is the text, C[S] is the length in bytes
1005                    *
1006 F77AA A46          C=C+C  S
1007 F77AD A4E          C=C-1  S          Offset for zero-based count
1008 F77B0 80DF        P=C      15
1009 F77B4 A96          C=A     WP          C[W] is now set up for FRAMEE
1010 F77B7 108          R0=C          Save text in R0
1011 F77BA D0          A=0     A          Clear A[B] for FRAMEE
1012 F77BC 8E00        GOSUBL =FRAMEE
      00
1013 F77C2 4E5          GOC     FRASP3     Error...not a valid frame
1014                    *
1015                    * C[S] is the length of the frame
1016                    *
1017                    * Valid frame...write it out, return
1018                    *
1019 F77C5 110          A=R0
1020 F77C8 ACA          A=C      S          Write out only the specified nibs
1021                    *
1022                    * Set D1 past the last ACCEPTED character
1023                    *
1024 F77CB 80DF        P=C      15          Set P=WP value of length
1025 F77CF 119          C=R1          Set the input pointer past frame
1026 F77D2 809          C+P+1        Skip the chars
1027 F77D5 135          D1=C          Set D1 just past the characters
1028                    *
1029 F77D8 AF6          C=A     W          Copy high nibbles of A[W] to C[W]
1030 F77DB 84A          ST=0      =StrOK     String NOT ok unless CMD/DATA
1031 F77DE 849          ST=0      =EolOK     EOL NOT ok except after DATA
1032 F77E1 848          ST=0      =ExprOK     Expression not OK unless mask#0

```

```

1033 F77E4 969      ?B=0  B
1034 F77E7 50      GOYES FRASPx      Mask IS zero...expression not OK
1035 F77E9 858      ST=1  =ExprOK     Non-zero mask...expression OK
1036 F77EC 2F      FRASPx P= 15
1037 F77EE 3653    LC(7) (\DMC\)*16+5 C[S]=5, C[5:0]="CMD" (reversed)
      4D44
      4
1038 F77F7 972      ?A=C  W
1039 F77FA 51      GOYES FRASPy      Match...StrOK
1040
1041      *
1042      * Following instruction is too big for LC(x)
1043      * LC(9) (\ATAD\)*16+7 C[S]=7, C[7:0]="DATA" (reversed)
1044 F77FC 387      NIBHEX 387      LC(9)..7
1045 F77FF 4414    NIBASC \DATA\
      4514
1046
1047      *
1048 F7807 976      ?#C   W
1049 F780A 80      GOYES FRASPn
1050 F780C 859      ST=1  =EolOK     EOL is OK here
1051 F780F 85A      FRASPy ST=1  =StrOK   String expression OK here
1052 F7812 AC6      FRASPn C=A   S
1053 F7815 80DF     P=C   15
1054 F7819 7CB2     GOSUB oUTNBS     Output the nibbles in A[WP]
1055 F781D 6C03     GOTO  BLANK      Skip to next non-blank char
1056
1057      *
1058      *
1059      *
1060 F7821 181      DO=DO- 2      Back up over tCOLON
1061 F7824 119      C=R1          Restore D1 (Input pointer)...
1062 F7827 135      D1=C          ...from R1
1063 F782A 02      RTNSC        Return with carry SET (bad frame)
1064      *****
1065      *****
1066      **
1067      ** Name:          ST!NOp - Parse a string or numeric expression
1068      **
1069      ** Category:     PARUTL
1070      **
1071      ** Purpose:
1072      ** Parse either a string or numeric expression (String OK
1073      ** only if ST(StrOK) is set
1074      **
1075      ** Entry:
1076      ** D1 points to the ASCII character string
1077      ** D0 points to the location where the tokens go
1078      ** D[A] is the end of available memory
1079      ** P=0
1080      **
1081      ** Exit:
1082      ** Next token in A[B] if carry clear, next char if set
1083      ** Carry clear if accepted; <tCOMMA><expr> compiled
1084      ** Carry set if error; pointers restored

```

```
1085      **      DO positioned past last token output by this routine
1086      **      D1 positioned past last character accepted
1087      **      P=0
1088      **
1089      ** Calls:      SVDOD1,OUTBYT,EXPPAR,RSDOD1,BLANK
1090      **
1091      ** Uses.....
1092      ** Inclusive: A,B,C,D[15:5],R0-R2,DO,D1,P,ST[11,7,3:0],FUNCD0,
1093      **              PRMCNT[0]
1094      **
1095      ** Stk lvls:   4 (EXPPAR)
1096      **
1097      ** History:
1098      **
1099      **      Date      Programmer      Modification
1100      **      -----      -
1101      **      11/28/83      NZ              Updated documentation
1102      **
1103      ****
1104      ****
1105      *
1106      * Syntax:
1107      *   Input stream: <num expr> | <str expr>
1108      *   Token output: <tCOMMA> <legal expr>
1109      *
1110 F782C  =ST!NOp
1111      *
1112      * First save DO,D1 in R2,R3
1113      *
1114 F782C 7362      GOSUB  SVDOD1      Save DO, D1
1115 F7830 3100      LC(2)  =tCOMMA
1116 F7834 7382      GOSUB  OUTBYT      Output the Comma token
1117 F7838 7422      GOSUB  Exppar      Check if expression
1118 F783C 870       ?ST=1  InvalE      Is it invalid?
1119 F783F E0        GOYES  ST!NO2      Invalid...restore
1120 F7841 873       ?ST=1  NumExp      Is it valid numeric?
1121 F7844 70        GOYES  ST!NO1      Yes...accept it!
1122      *
1123      * String...check if StrOK...if OK, accept; if not, restore
1124      *
1125 F7846 86A       ?ST=0  =StrOK
1126 F7849 40        GOYES  ST!NO2      Not OK...restore
1127 F784B          ST!NO1
1128      *
1129      * Accept it all now (The ntoken is in A[B])
1130      *
1131 F784B 03        RTNCC      Carry clear=accepted
1132      *
1133      *
1134 F784D          ST!NO2
1135      *
1136      * Not accepted...restore and return with next char in A[B]
1137      *
1138 F784D 7952      GOSUB  RSDOD1      Restore DO, D1
1139 F7851 75D2      GOSUB  BLANK      Skip blanks, read next character
```

```
1140 F7855 02          RTNSC          Return, carry SET
1141 *****
1142 *****
1143 **
1144 ** Name:          FILSPp - Parse an HPIL file specifier
1145 ** Name:          FILSp - Parse an HPIL file specifier (string OK)
1146 ** Name:          DEVSPp - Parse an HPIL device specifier (got :)
1147 ** Name:          DVSPp - Parse an HPIL device specifier (* OK)
1148 **
1149 ** Category:     PARUTL
1150 **
1151 ** Purpose:
1152 **     Routine to parse a file and/or device specifier
1153 **
1154 ** Entry:
1155 **     D1 points to the ASCII character string
1156 **     D0 points to the location where the tokens go
1157 **     D[A] is the end of available memory
1158 **     P=0
1159 **
1160 ** Exit:
1161 **     D0 positioned past last token output by this routine
1162 **     D1 positioned past last character accepted
1163 **     P=0
1164 **     Carry set if error (C[3:0] is error #)
1165 **             (D1 points at the erroneous item)
1166 **     Carry clear if OK (D1 points past file spec, A is next
1167 **             token, D0 is set properly, A[S]#0 if filename found)
1168 **
1169 ** Calls:         CKSTR, OUTBYT, NAMEpb, OUT2TC, NAMEp, NTOKEN, OUT1TK,
1170 **             CKNUM+, CKNUM-, RESPTR, SVDOD1, CATCH+, RSDOD1
1171 **
1172 ** Uses.....
1173 ** Inclusive:    A, B, C, D[15:5], R0-R4, D0, D1, P, ST[11, 10, 7, 3:0],
1174 **             FUNCDO, PRMCNT[0]
1175 **
1176 ** Stk lvls:     FILSPp: 5 (CKNUM)
1177 ** Stk lvls:     FILSp: 5 (CKSTR)(CKNUM)
1178 ** Stk lvls:     DEVSPp: 4 (CKNUM+)(NAMEp)
1179 ** Stk lvls:     DVSPp: 4 (CKNUM+)(NAMEp)
1180 **
1181 ** History:
1182 **
1183 **     Date      Programmer      Modification
1184 **     -----      -
1185 **     11/28/83    NZ              Updated documentation
1186 **
1187 *****
1188 *****
1189 *
1190 * File specifier syntax:
1191 *   Input stream:
1192 *     <string expression>
1193 *   or [ <file name> ] : <device specifier>
1194 *   or [ <file name> ] . <volume label>
```

```

1195      *   Token output:
1196      *       <string expression>
1197      *   or <tLITRL> [ <file name> ] <tCOLON> <device specifier>
1198      *   or <tLITRL> [ <file name> ] <tSEMIC> <volume label>
1199      *
1200      * Device specifier syntax:
1201      *   Input stream:
1202      * 1)   <string expression>           (DEVSPp only)
1203      * 2) or : <address>                   (DEVSPp only)
1204      * 3) or : <device word> [ (<seq num> ) ] (DEVSPp only)
1205      * 4) or : % <device type> [ (<seq num> ) ] (DEVSPp only)
1206      * 5) or : <assign word>               (DEVSPp only)
1207      * 6) or : <device ID> [ (<seq num> ) ] (DEVSPp only)
1208      * 7) or [ : ] *                       (DEVSPp only)
1209      * 2) or <address>
1210      * 3) or <device word> [ (<seq num> ) ]
1211      * 4) or % <device type> [ (<seq num> ) ]
1212      * 5) or <assign word>
1213      * 6) or <device ID> [ (<seq num> ) ]
1214      *
1215      *   Token output:
1216      * 1)   <string expression>
1217      * 2) or <tCOLON> <num expr>
1218      * 3) or <tCOLON> <tLITRL> <device word> [ <tCOLON> <num expr> ]
1219      * 4) or <tCOLON> <t%> <num expr> [ <tCOLON> <num expr> ]
1220      * 5) or <tCOLON> <tLITRL> <assign word>
1221      * 6) or <tCOLON> <tLITRL> <device ID> [ <tCOLON> <num expr> ]
1222      * 7) or <tCOLON> <t*>
1223      *
1224      * *****
1225      *
1226      * Check for string expression first (Save state for restore)
1227      *
1228 F7857 7922 =FILSp  GOSUB  CKSTR           Check if string (Carry = NO)
1229 F785B 460   GOC    FILSPp          Not string...try literal
1230 F785E 6541 GOTO    FILSp8
1231      * _
1232      * _
1233 F7862      =FILSPp
1234 F7862 20      P=      0
1235 F7864 3100    LC(2) =tLITRL      Literal token (File specifier)
1236 F7868 7F42    GOSUB  OUTBYT      Output it!
1237      *
1238      * Now D1 points to the first char of the file spec (or blanks)
1239      *
1240 F786C 2F      P=      15
1241 F786E 30A    LC(1)  10          10 characters max!
1242 F7871 74B1    GOSUB  NAMEpb      Parse the name (If carry, error)
1243      *
1244      * If carry is set, A[B] is the next char: could be bad first
1245      * char (digit) OR too long. I can't do either one...RTNSXM!
1246      *
1247 F7875 453    GOC    FILSpn          Not anything I understand
1248      *
1249      * Have parsed the name...check next character

```

```
1250      *
1251 F7878 104      R4=A          Save A[S] in R4[S]
1252 F787B 31A3     LCASC  \:\
1253 F787F 962      ?A=C   B          Is it a colon?
1254 F7882 D2       GOYES  FILSp0    Yes...continue
1255 F7884 31E2     LCASC  \.\
1256 F7888 966      ?A#C   B          Is it a "."?
1257 F788B 02       GOYES  FILSpn    No...return, set XM, clear carry
1258      *
1259      * Have a volume label...same rules as NAMES (alpha, alpha-digit)
1260      *
1261 F788D 171      =DVLBp  D1=D1+ 2      Skip the "."
1262      ****
1263      *
1264      *          LC(4)  (=tSEMIC)^(=tCOLON)
1265 F7890 33       NIBHEX 33
1266 F7892 00       CON(2) =tCOLON
1267 F7894 00       CON(2) =tSEMIC
1268      *
1269      ****
1270 F7896 7B22     GOSUB  oUT2TC
1271 F789A 2F       P=      15
1272 F789C 306      LC(1)  6          Max of 6 characters in volume lbl
1273 F789F 7A81     GOSUB  NAMEp
1274 F78A3 470     GOC    FILSpn    Bad first char OR too long..exit
1275      *
1276      * Check that at LEAST one char accepted
1277      *
1278 F78A6 94C      ?A#0   S          Any characters accepted?
1279 F78A9 F6       GOYES  FILSp!    Yes...check for loop #
1280      *
1281      * If here, had either a first char that was not a letter or
1282      * a colon OR had a name too long...either one is not HPIL.
1283      *
1284 F78AB 62F0     FILSpn  GOTO   FILSpX    Return, set XM, clear carry
1285      *
1286      *
1287 F78AF 171     FILSp0  D1=D1+ 2      Skip the colon
1288      *
1289      * Entry for Device parse (AFTER the colon)
1290      *
1291 F78B2 84A      =DEVSpP  ST=0   =StarOK    FILE:* is NOT OK for this entry
1292 F78B5 7B03     =DVSpP   GOSUB  OUT:      Output the colon token
1293 F78B9 7382     GOSUB  Ntoken    Get next token...
1294 F78BD 3100     LC(2)  =t*
1295 F78C1 966      ?A#C   B          Is this a "*"?
1296 F78C4 71       GOYES  FILSp1    No...continue checking
1297      *
1298      * Found a "*"...is it permitted here?
1299      *
1300 F78C6 20       P=      =eILPAr    Illegal parameter
1301 F78C8 86A      ?ST=0   =StarOK
1302 F78CB C0       GOYES  FILSpX    Error if StarOK=0
1303      *
1304      * OK...output the token
```

```

1305          *
1306 F78CD 20          P=      0
1307 F78CF 78E1       GOSUB  OUTBYT      Output the t* token
1308 F78D3 64D0       GOTO   FILSp9      Done...exit
1309          *-
1310          *-
1311 F78D7 66C0 FILSpX GOTO   FILSpX
1312          *-
1313          *-
1314 F78DB          FILSp1
1315          *
1316          * Not "*"...check if device type ("%")
1317          *
1318 F78DB 3100          LC(2) =t%
1319 F78DF 966         ?A#C  B          Is it device type?
1320 F78E2 R5          GOYES  FILSp4      No...continue checking
1321          *
1322          * Device type (Syntax %<num expr> [ (<num expr> ) ] )
1323          *
1324 F78E4 76D1          GOSUB  oUT1TK      Output one token (t%)
1325          *
1326          * Following two lines are for stack levels (ENTERp,...)
1327          *
1328 F78E8 7B61          GOSUB  CKNUM+      Save info, call EXPPAR
1329 F78EC 7B71          GOSUB  CKNUM-      Check results of EXPPAR
1330 F78F0 46E          GOC    FILSpX      Error if carry (string/no expr)
1331 F78F3 3182 FILSp2 LCASC  \(\
1332 F78F7 966         ?A#C  B          Is there a sequence #?
1333 F78FA 22          GOYES  FILSp3      No...check for loop #
1334          *
1335          * Sequence # found
1336          *
1337 F78FC 74C2          GOSUB  OUT:        Output the "(" (kludge)
1338 F7900 7351          GOSUB  CKNUM+      Call EXPPAR (for stack levels)
1339 F7904 7361          GOSUB  CKNUM-      Check numeric expression
1340 F7908 4EC          GOC    FILSpX      Error if carry
1341          *
1342          * Check for closing paren now
1343          *
1344 F790B 3192          LCASC  \)\
1345 F790F 20          P=      =eMSPAR      Missing parameter
1346 F7911 966         ?A#C  B
1347 F7914 3C          GOYES  FILSpX      Error...no closing ")"
1348 F7916 20          P=      0
1349 F7918 7422 FILSp! GOSUB  Ntoken      Get next token first
1350          *
1351          * Now check for loop #
1352          *
1353 F791C 31A3 FILSp3 LC(2) \:\
1354 F7920 966         ?A#C  B          Is there a loop #?
1355 F7923 51          GOYES  FILSp8      No...exit after restoring D1
1356          *
1357          * Loop # found
1358          *
1359 F7925 3100          LC(2) =tSEMIC      Internal representation

```



```

1360 F7929 7E81      GOSUB  OUTBYT      Output the semicolon token...
1361 F792D 7621      GOSUB  CKNUM+      Call EXPPAR (for stack levels)
1362 F7931 7631      GOSUB  CKNUM-      Check numeric expression
1363 F7935 486       GOC    FILSpX      Error if carry
1364 F7938 6B60     FILSp8  GOTO    FILSp8      Exit after restore
1365                *-
1366                *-
1367 F793C          FILSp4
1368                *
1369                * Not a device type...check further (Device word or address)
1370                *
1371                * First try address (if parses, then check for chars following)
1372                *
1373 F793C 7B01      GOSUB  RESPTR      Restore pointer back to start
1374 F7940 7F41      GOSUB  SVDD0D1     Save D0, D1
1375 F7944 7F01      GOSUB  CKNUM+      Call EXPPAR (for stack levels)
1376 F7948 7F11      GOSUB  CKNUM-      Check if numeric expression
1377 F794C 4A2       GOC    FILSp6      Not numeric...try device word
1378                *
1379                * If it is clearly a value expression (1,A+2,etc), then XM=1
1380                * (This means that any device ID's which begin with a numeric
1381                * function may need to be quoted)
1382                *
1383 F794F 831       ?XM=0
1384 F7952 50        GOYES  FILSp5      Not value expression...check more
1385 F7954 57C       GONC   FILSp3      Go always...this is an address
1386                *-
1387                *-
1388                *
1389                * If the next token is in [A-Z][0-9] and the previous char is
1390                * not a blank, then this must be a device ID
1391                *
1392 F7957 70C1     FILSp5  GOSUB  RESPTR      Back up to last token start
1393 F795B 14B      A=DAT1 B          Read the ASCII of the token
1394 F795E 72B1     GOSUB  cATCH+     Check if letter or digit next
1395 F7962 55B      GONC   FILSp!     No...this is address (check loop)
1396 F7965 1C1     D1=D1- 2
1397 F7968 14B      A=DAT1 B
1398 F796B 171     D1=D1+ 2
1399 F796E 3102     LC(2)  \ \        Check for a preceding blank
1400 F7972 962     ?A=C   B
1401 F7975 3A      GOYES  FILSp!     Blank...this is an address
1402                *
1403                * This is not an address...check if this is device word
1404                *
1405 F7977 7F21     FILSp6  GOSUB  RSD0D1     Restore D0, D1
1406 F797B 20      P=      0
1407 F797D 3100     LC(2)  =tLITRL
1408 F7981 7631     GOSUB  OUTBYT      Output the literal token first
1409 F7985 2F      P=      15
1410 F7987 308     LC(1)   8          Max of eight chars in device word
1411 F798A 7F90     GOSUB  NAMEp       Parse it
1412 F798E 4F0     GOC    FILSpX      Excess characters...error
1413                *
1414                * Check that at LEAST one character accepted

```

```

1415      *
1416 F7991 948      ?A=0  S      Any valid characters?
1417 F7994 R0      GOYES  FILSpX  No valid characters...error
1418 F7996 76A1    GOSUB  Ntoken  Get next token
1419 F799A 685F    GOTO   FILSp2  OK...check if sequence #
1420      *-
1421      *-
1422 F799E 21      FILSpX  P=      1
1423 F79A0 0D      P=P-1
1424 F79A2 00      RTNSXM      Clear carry
1425      *-
1426      *-
1427 F79A4 7371    FILSp8  GOSUB  RESPTR  Restore pointer
1428 F79A8 821    FILSp9  XM=0      Clear XM...
1429 F79AB 114      A=R4      Restore A[S] from R4[S]
1430      *
1431      * Entry for XWORD parse
1432      *
1433 F79AE      =XWORDp
1434 F79AE 03      =RTNCC  RTNCC      Return with carry clear
1435      *****
1436      *****
1437      **
1438      ** Name:          DVCSPP - Parse a device specifier (: optional)
1439      **
1440      ** Category:     STPARS
1441      **
1442      ** Purpose:
1443      **   Device spec parse...string expr, *, and [:] OK
1444      **
1445      ** Entry:
1446      **   D1 points to the ASCII character string
1447      **   D0 points to the location where the tokens go
1448      **   D[A] is the end of available memory
1449      **   P=0
1450      **
1451      ** Exit:
1452      **   D0 positioned past last token output by this routine
1453      **   D1 positioned past last character accepted
1454      **   Carry clear
1455      **   P=0
1456      **   Exits through ERRORP if error
1457      **
1458      ** Calls:         EOLCK,RESPTR,OUTBYT,CKSTR,BLANK,DVSPp,DVLBp
1459      **
1460      ** Uses.....
1461      ** Inclusive:    A,B,C,D[15:5],R0-R3,D0,D1,P,ST[11,10,8,7,3:0],
1462      **               FUNCDO,PRMCNT[0]
1463      **
1464      ** Stk lvls:     5 (CKSTR)(DVSPp)
1465      **
1466      ** History:
1467      **
1468      **   Date      Programmer      Modification
1469      **   -----

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1470      ** 11/28/83      NZ      Updated documentation
1471      **
1472      ****
1473      ****
1474      *
1475      * Syntax:
1476      *   Input stream: <string expression> or
1477      *   [ : ] <device specifier> or
1478      *   [ : ] {*} or
1479      *   . <volume label>
1480      *   Token output: <string expression> or
1481      *   <tCOLON> <device specifier> or
1482      *   <tCOLON> <t*> or
1483      *   <tCOLON> <tSEMIC> <volume label>
1484      *
1485 F79B0  =PACKp
1486 F79B0 84A =DVCPn* ST=0 =StarOK
1487 F79B3 6600 GOTO DVCSpp
1488      *-
1489      *-
1490 F79B7 85A =DVCPy* ST=1 =StarOK      "*" OK
1491 F79BA 848 =DVCSpp ST=0 =OptDev      Device specifier required
1492      *
1493 F79BD 8F00 DVCSpc GOSBVL =EOLCK      Check if is EOL, @, !, ELSE
      000
1494 F79C4 5B1 GONC DVCP05      If not, restore ptr and cont.
1495 F79C7 878 ?ST=1 =OptDev      Is device spec. optional ?
1496 F79CA 60 GOYES DVCSpr      If so, we are done
1497 F79CC 6DCB GOTO MSGPAR      Otherwise say, Missing Parm.
1498      *-
1499      *-
1500 F79D0 7741 DVCSpr GOSUB RESPTR      Restore pointer for device parse
1501 F79D4 20 P= 0      Load dummy comma token into C
1502 F79D6 3100 LC(2) =tCOMMA
1503 F79DA 7DD0 GOSUB OUTBYT      Output the comma token
1504 F79DE 03 RTNCC      Already restored input pointer
1505      *-
1506      *-
1507 F79E0 7731 DVCP05 GOSUB RESPTR      Restore pointer
1508 F79E4 7C90 GOSUB CKSTR      Check if string (Carry=NO)
1509 F79E8 460 GOC DVCP10      No...try literal
1510 F79EB 6F21 GOTO RESPTR      Yes...restore pointer, return
1511      *-
1512      *-
1513 F79EF 7731 DVCP10 GOSUB BLANK      Read in the character
1514 F79F3 31E2 LCASC \. \      Check first for volume label
1515 F79F7 962 ?A=C B      Is this a volume label?
1516 F79FA 22 GOYES DVCP40      Yes...volume label
1517 F79FC 31A3 LCASC \: \
1518 F7A00 966 ?A#C B      Is there a colon?
1519 F7A03 50 GOYES DVCP30      No...continue
1520      *
1521      * Colon is present...skip it
1522      *
1523 F7A05 171 D1=D1+ 2      Skip to next item

```

```
1524 F7A08 79AE DVCP30 GOSUB DVSPp      Device spec parse
1525 F7A0C 4B0  DVCP35 GOC   DVCP65     If carry, error (can't happen)
1526 F7A0F 831          ?XM=0         OK?  Processed as is?
1527 F7A12 21          GOYES DVCP70     Yes...return with carry clear
1528 F7A14 62BB       GOTO  INITp1     If not, say "Syntax"
1529          *_
1530          *_
1531 F7A18 667B DVCP65 GOTO  Error!      Parse error, already set up
1532          *_
1533          *_
1534 F7A1C          DVCP40
1535          *
1536          * Volume label
1537          *
1538 F7A1C 7D6E          GOSUB DVLBp      Device volume label parse
1539 F7A20 6BEF       GOTO  DVCP35     Go check for error
1540          *_
1541          *_
1542 F7A24 84A DVCP70 ST=0  10          ST(10) MUST be zero (Implied LET)
1543 F7A27 03          RTNCC
1544          *****
1545          *****
1546          **
1547          ** Name:      NAMEpb - Skip leading blanks, parse device word
1548          ** Name:      NAMEp - Parse a device word (C[S] is # chars)
1549          **
1550          ** Category:   PARUTL
1551          **
1552          ** Purpose:
1553          **   Parse a device word: <letter > {<letter> | <digit >} *n
1554          **
1555          ** Entry:
1556          **   C[S] is max number of characters to accept
1557          **   D1 points to the ASCII character string
1558          **   D0 points to the location where the tokens go
1559          **   D[A] is the end of available memory
1560          **
1561          ** Exit:
1562          **   First character not used in A[B] (char @ D1)
1563          **   Carry set if length exceeded or first char is a digit
1564          **   A[S]=0 if no chars, #F if characters
1565          **   D0 positioned past last character output by this routine
1566          **   D1 positioned past last character accepted
1567          **   P=0
1568          **
1569          ** Calls:      BLANK,CATC++,OUT1TK
1570          **
1571          ** Uses.....
1572          ** Inclusive: A[S,B],C[S,B],P,D0,D1,ST[2:1]
1573          **
1574          ** Stk lvls:   3 (CATC++)
1575          **
1576          ** History:
1577          **
1578          **   Date      Programmer      Modification
```

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1579      ** -----
1580      ** 11/28/83      NZ      Updated documentation
1581      **
1582      ****
1583      ****
1584      *
1585      * Syntax:
1586      *   Input stream: [ <letter> [ <letter> | <digit> ] *n ]
1587      *   Token output: Same as input (with all letters converted to
1588      *                   upper case)
1589      *
1590 F7A29 7DFO =NAMEpb GOSUB BLANK      Skip any leading blanks!
1591 F7A2D 20  =NAMEp  P=      0
1592 F7A2F AC0      A=0      S      Clear "char" flag
1593 F7A32 7BDO      GOSUB CATC++   Read first char, set statuses
1594 F7A36 500      RTNNC          Not letter or digit...return, CC
1595 F7A39 871      ?ST=1 Digit    Is this a digit?
1596 F7A3C 00      RTNYES         Yes...not permitted here-Set Carry
1597 F7A3E A4C      A=A-1  S      Set A[S]="F"
1598 F7A41 A4E NAMEp1 C=C-1  S      Decrement count
1599 F7A44 400      RTNC          Error...too long! (Set Carry)
1600 F7A47 7370     GOSUB  OUT1TK   Output the token
1601 F7A4B 171      D1=D1+ 2      Increment to next token
1602 F7A4E 7FBO     GOSUB  CATC++   Read it, check it out
1603 F7A52 4EE      GOC      NAMEp1 Letter or digit...OK!
1604 F7A55 03      RTNCC          Carry clear = OK!
1605      ****
1606      ****
1607      **
1608      ** Name:      CKNUM - Check for a numeric expr (output it)
1609      ** Name:      CKNUM+ - Save D1 in R3, goto EXPPAR
1610      ** Name:      CKNUM- - Check EXPPAR exit conditions for number
1611      **
1612      ** Category:  LOCAL
1613      **
1614      ** Purpose:
1615      **   Check for a numeric expression and output the tokens
1616      **   for that expression
1617      **
1618      ** Entry:
1619      **   D1 points to the ASCII character string
1620      **   D0 points to the location where the tokens go
1621      **   D[A] is the end of available memory
1622      **   P=0
1623      **
1624      ** Exit:
1625      **   Carry set if not numeric (P is error number for parse,
1626      **   D1 points to the error)
1627      **   Carry clear if OK (tokens output, D0,D1 set to next
1628      **   items, P=0)
1629      **   D0 positioned past last token output by this routine
1630      **   D1 positioned past last character accepted
1631      **
1632      ** Calls:      EXPPAR
1633      **

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1634      ** Uses.....
1635      ** Inclusive: A,B,C,D[15:5],R0,R1,R3,D0,D1,P,ST[11,7,3:0],
1636      **             FUNCDO,PRMCNT[0]
1637      **
1638      ** Stk lvls:  CKNUM:  4 (CKNUM+)
1639      ** Stk lvls:  CKNUM+: 3 (<EXPPAR>)
1640      ** Stk lvls:  CKNUM-: 0
1641      **
1642      ** History:
1643      **
1644      **      Date      Programmer      Modification
1645      **      -----      -
1646      **      11/28/83      NZ              Updated documentation
1647      **
1648      ****
1649      ****
1650 F7A57 137 CKNUM+  CD1EX
1651 F7A5A 10B          R3=C          Save input pointer for case of
1652 F7A5D 135          D1=C          string (to set error pointer)
1653 F7A60 8D00 Exppar  GOVLNG =EXPPAR
1654           000
1655      *_-
1656 F7A67 7CEF CKNUM  GOSUB  CKNUM+  Call EXPPAR after save
1657      *
1658 F7A6B 873 CKNUM-  ?ST=1 NumExp  Is it numeric?
1659 F7A6E 80          GOYES  CKNUM1  Yes...OK
1660 F7A70 11B          C=R3
1661 F7A73 135          D1=C          Restore input pointer
1662 F7A76 590          GONC   CKNUM2  Go always
1663      *_-
1664      *_-
1665 F7A79 870 CKNUM1  ?ST=1 InvalE  Invalid?
1666 F7A7C 40          GOYES  CKNUM2  Yes...error
1667 F7A7E 03          RTNCC          No...all OK
1668      *_-
1669      *_-
1670 F7A80 20  CKNUM2  P=      =eIExp  Illegal expression
1671 F7A82 02          RTNSC
1672      ****
1673      ****
1674      **
1675      ** Name:      CKSTR - Parse a string expression
1676      **
1677      ** Category:  LOCAL
1678      **
1679      ** Purpose:
1680      **      CKSTR tries to parse a string expression non-destructivel
1681      **
1682      ** Entry:
1683      **      D1 points to the ASCII character string
1684      **      D0 points to the location where the tokens go
1685      **      D[A] is the end of available memory
1686      **      P=0
1687      **

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```
1688      ** Exit:
1689      **      Carry set if not string (D0, D1 restored)
1690      **      Carry clear if string (tokens output)
1691      **      D0 positioned past last token output by this routine
1692      **      D1 positioned past last character accepted
1693      **      P=0
1694      **      Exits through ERRORP if error
1695      **
1696      ** Calls:      SVDOD1,EXPPAR,<RSDOD1>
1697      **
1698      ** Uses.....
1699      ** Inclusive: A,B,C,D[15:5],R0-R2,D0,D1,P,ST[11,7,3:0],FUNCD0,
1700      **             PRMCNT[0]
1701      **
1702      ** Stk lvls:  4 (EXPPAR)
1703      **
1704      ** History:
1705      **
1706      **      Date      Programmer      Modification
1707      **      -----      -
1708      **      11/28/83      NZ              Updated documentation
1709      **
1710      ****
1711      ****
1712 F7A84 7B00 =CKSTR GOSUB SVDOD1      Save D0 and D1 in R2
1713 F7A88 74DF      GOSUB Exppar
1714 F7A8C 873      ?ST=1 NumExp      Valid numeric? (set unless string)
1715 F7A8F B1      GOYES RSDOD1      Yes...not string
1716 F7A91 03      RTNCC      Return (valid string)
1717      ****
1718      ****
1719      **
1720      ** Name:      SVDOD1 - Save D0 and D1 in R2
1721      ** Name:      RSDOD1 - Restore D0 and D1 from R2
1722      **
1723      ** Category:  STPARS
1724      **
1725      ** Purpose:
1726      **      Save/restore D0 and D1 in/from R2
1727      **
1728      ** Entry:
1729      **      SVDOD1: none
1730      **      RSDOD1: R2 contains D0 and D1 (from SVDOD1)
1731      **
1732      ** Exit:
1733      **      SVDOD1: R2 contains D0 and D1 values
1734      **      RSDOD1: D0 and D1 are restored from R2
1735      **      P,Carry unchanged from input
1736      **
1737      ** Calls:      CSLC5,CSRC5
1738      **
1739      ** Uses.....
1740      ** Inclusive: C[W],R2
1741      **
1742      ** Stk lvls:  1 (CSLC5)(CSRC5)
```

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1743      **
1744      ** History:
1745      **
1746      **      Date      Programmer      Modification
1747      **      -----      -
1748      **      11/28/83      NZ      Added documentation
1749      **
1750      ****
1751      ****
1752 F7A93 137 =SVD0D1 CD1EX
1753 F7A96 135      D1=C
1754 F7A99 8E00      GOSUBL =CSLC5      Save D1 in R2[9:5]
1755      00
1755 F7A9F 136      CDOEX
1756 F7AA2 134      DO=C      Save D0 in R2[A]
1757 F7AA5 10A      R2=C
1758 F7AA8 01      RTN
1759      *-
1760      *-
1761 F7AAA 11A =RSD0D1 C=R2
1762 F7AAD 134      DO=C      Restore D0
1763 F7AB0 8E00      GOSUBL =CSRC5
1764      00
1764 F7AB6 135      D1=C      Restore D1
1765 F7AB9 01      RTN
1766      ****
1767      *
1768      * These routines are identical to the mainframe routines by the
1769      * same names
1770      *
1771      ****
1772 F7ABB AEE =OUTBYT ACEX B
1773 F7ABE 8D00 =oUT1TK GOVLNG =OUT1TK
1774      000
1774      *-
1775      *-
1776 F7AC5 8D00 =oUT2TC GOVLNG =OUT2TC
1777      000
1777      *-
1778      *-
1779 F7ACC AFA =OUT3TC A=C W
1780 F7ACF 8D00 =oUT3TK GOVLNG =OUT3TK
1781      000
1781      *-
1782      *-
1783 F7AD6 AFA =OUTNBC A=C W
1784 F7AD9 8D00 =oUTNBS GOVLNG =OUTNBS
1785      000
1785      *-
1786      *-
1787      ****
1788      ****
1789      **
1790      ** Name:      NUMCK+ - Restore input pointer, check num expr
1791      ** Name:      NUMCK - Check for a valid numeric expression
```



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1792      **
1793      ** Purpose:
1794      **      Check for a valid numeric expression. If not found,
1795      **      then exit to ERRORR
1796      **
1797      ** Entry:
1798      **      D1 points to the ASCII character string
1799      **      D0 points to the location where the tokens go
1800      **      D[A] is the end of available memory
1801      **      P=0
1802      **
1803      ** Exit:
1804      **      D0 positioned past last token output by this routine
1805      **      D1 positioned past last character accepted
1806      **      P=0
1807      **      Carry clear
1808      **      Exits through ERRORR if error
1809      **
1810      ** Calls:      RESPTR,EXPPAR
1811      **
1812      ** Uses.....
1813      ** Inclusive: A,B,C,D[15:5],R0,R1,R3,D0,D1,P,ST[11,7,3:0],
1814      **             FUNCDO,PRMCNT[0]
1815      **
1816      ****
1817      ****
1818 F7AE0 7730 =NUMCK+ GOSUB  RESPTR
1819 F7AE4 11B  =NUMCK  C=R3           Preserve upper part of R3
1820 F7AE7 137           CD1EX
1821 F7AEA 135           D1=C           Save for case of string expression
1822 F7AED 10B           R3=C
1823 F7AF0 7C6F         GOSUB  Exppar   Mainframe jump to EXPPAR
1824 F7AF4 873           ?ST=1  NumExp   Numeric?
1825 F7AF7 B0           GOYES  NUMCK1   Yes...check if valid
1826 F7AF9 11B           C=R3           No...restore D1 (string expr)
1827 F7AFC 135           D1=C
1828 F7AFF 590          GONC   NUMCK2   Go always
1829      *_-
1830      *_-
1831 F7B02 870  NUMCK1  ?ST=1  InvalE   Invalid expression?
1832 F7B05 40           GOYES  NUMCK2   Yes...error
1833 F7B07 03           RTNCC           No...valid numeric expression
1834      *_-
1835      *_-
1836 F7B09 20  NUMCK2  P=      =eILExp   Illegal expression
1837 F7B0B 8C00        GOLONG =ERRORR   Don't restore D1 (already set)
1838      *
1839      * More duplicates of mainframe routines
1840      *
1841 F7B11 14B  =CATC++ A=DAT1 B
1842 F7B14 8D00 =cATCH+ GOVLNG =CATCH+
1843      000
1844      ****
1845      ****

```

```
1845      **
1846      ** Name:          RESPTR - Restore D1 from LEXPTR
1847      **
1848      ** Category:     LOCAL
1849      **
1850      ** Purpose:
1851      **           Restore the input pointer from LEXPTR
1852      **
1853      ** Entry:
1854      **           None
1855      **
1856      ** Exit:
1857      **           D1 restored from LEXPTR
1858      **           Carry clear
1859      **
1860      ** Calls:         None
1861      **
1862      ** Uses.....
1863      ** Inclusive:    R[A],D1
1864      **
1865      ** Stk lvls:     0
1866      **
1867      ** History:
1868      **
1869      **      Date      Programmer      Modification
1870      **      -----      -
1871      **      11/28/83      NZ          Added documentation
1872      **
1873      ****
1874      ****
1875 F7B1B 1F00 =RESPTR D1=(5) =LEXPTR
           000
1876 F7B22 143      A=DAT1 A
1877 F7B25 131      D1=A
1878 F7B28 03      RTNCC
1879      ****
1880      ****
1881      **
1882      ** Name:          BLANK - Skip blanks, return first non-blank char
1883      **
1884      ** Category:     PARUTL
1885      **
1886      ** Purpose:
1887      **           Skip blanks in the input stream
1888      **
1889      ** Entry:
1890      **           D1 points to the input stream
1891      **
1892      ** Exit:
1893      **           A[B] contains the next character
1894      **           D1 points to the character in A[B]
1895      **
1896      ** Calls:         None
1897      **
1898      ** Uses.....
```

```
1899      ** Inclusive: A[B],C[B],P,D1 (D1 only if leading blanks)
1900      **
1901      ** Stk lvls:  0
1902      **
1903      ** History:
1904      **
1905      **      Date      Programmer      Modification
1906      **      -----      -
1907      **      11/28/83      NZ          Updated documentation
1908      **
1909      ****
1910      ****
1911 F782A 20  =BLANK  P=      0
1912 F782C 3102      LCASC  \ \
1913 F7830 1C1      D1=D1- 2
1914 F7833 171  Skip    D1=D1+ 2
1915 F7836 14B  =SKIP   A=DAT1 B
1916 F7839 962      ?A=C   B
1917 F783C 7F      GOYES  Skip
1918 F783E 01      RTN
1919      *_-
1920      *_-
1921 F7840 8D00 Ntoken GOVLNG =NTOKEN
      000
1922      ****
1923      ****
1924      **
1925      ** Name:      ENABLp - Parse the ENABLE INTR statement
1926      **
1927      ** Category:  STPARS
1928      **
1929      ** Purpose:
1930      **      Parse the ENABLE INTR statement
1931      **
1932      ** Entry:
1933      **      D1 points to the ASCII character string
1934      **      D0 points to the location where the tokens go
1935      **      D[A] is the end of available memory
1936      **      P=0
1937      **
1938      ** Exit:
1939      **      D0 positioned past last token output by this routine
1940      **      D1 positioned past last character accepted
1941      **      P=0
1942      **      Exits through ERRORP if error
1943      **
1944      ** Calls:      WRDSCN,<REQSTp>
1945      **
1946      ** Uses.....
1947      ** Inclusive: A,B,C,D[15:5],R0,R1,R2,D0,D1,P,ST[11,7,3:0],
1948      **      FUNCDO,PRMCNT[0]
1949      **
1950      ** Stk lvls:  5 (<REQSTp>)
1951      **
1952      ** History:
```

```

1953      **
1954      **      Date      Programmer      Modification
1955      **      -----      -----      -----
1956      **      11/28/83      NZ      Added documentation
1957      **
1958      ****
1959      ****
1960 F7B47 7840 =ENBLp GOSUB wrdscn
1961 F7B4B 00      CON(2) =tXWORD
1962 F7B4D 00      CON(2) =LEXPIL
1963 F7B4F 00      CON(2) =tINTRR
1964 F7B51 900     REL(3) ENBLp1
1965 F7B54 00      CON(2) 00
1966 F7B56 607A    GOTO  INITp1      Syntax error
1967      * _
1968      * _
1969 F7B5A 185    ENBLp1  D0=D0- 6      Don't output the INTR token
1970      *
1971      * Fall into REQUEST parse (ENABLE and REQUEST match after INTR)
1972      *
1973      ****
1974      ****
1975      **
1976      ** Name:      REQSp - Parse the REQUEST statement
1977      **
1978      ** Category:  STPARS
1979      **
1980      ** Purpose:
1981      **      Parse the REQUEST statement
1982      **
1983      ** Entry:
1984      **      D1 points to the ASCII character string
1985      **      D0 points to the location where the tokens go
1986      **      D[A] is the end of available memory
1987      **      P=0
1988      **
1989      ** Exit:
1990      **      D0 positioned past last token output by this routine
1991      **      D1 positioned past last character accepted
1992      **      P=0
1993      **      Exits through ERRORP if error
1994      **
1995      ** Calls:      LOOPWp, ST!NOp, <RESPTR>
1996      **
1997      ** Uses.....
1998      ** Inclusive:  A,B,C, D[15:5], R0, R1, R2, D0, D1, P, ST[11,7,3:0],
1999      **             FUNCDO, PRMCNT[0]
2000      **
2001      ** Stk lvls:  6 (LOOPWp)
2002      **
2003      ** History:
2004      **
2005      **      Date      Programmer      Modification
2006      **      -----      -----      -----
2007      **      11/28/83      NZ      Added documentation

```

```
2008      **
2009      ****
2010      ****
2011      *
2012      *  ENABLE parse falls into REQUEST parse
2013      *
2014 F7B5D 7BDB =REQSTp GOSUB LOOP#p
2015 F7B61 84A          ST=0   =StrOK
2016 F7B64 74CC          GOSUB ST!NOp      Check for a string or number
2017 F7B68 460          GOC   REQp10      Error if carry
2018 F7B6B 6FAF          GOTO  RESPTR     Restore pointer if OK
2019      *
2020      *
2021 F7B6F 699F REQp10 GOTO  NUMCK2
2022      ****
2023      ****
2024      **
2025      ** Name:          PASSp - Parse the PASS CONTROL statement
2026      **
2027      ** Category:     STPARS
2028      **
2029      ** Purpose:
2030      **      Parse the PASS CONTROL statement
2031      **
2032      ** Entry:
2033      **      D1 points to the ASCII character string
2034      **      D0 points to the location where the tokens go
2035      **      D[A] is the end of available memory
2036      **      P=0
2037      **
2038      ** Exit:
2039      **      D0 positioned past last token output by this routine
2040      **      D1 positioned past last character accepted
2041      **      P=0
2042      **      Exits through ERRORP if error
2043      **
2044      ** Calls:          WRDSCN,<DVCSPc>
2045      **
2046      ** Uses.....
2047      ** Inclusive:     A,B,C,D[15:5],R0-R4,D0,D1,P,ST[11:7,3:0],
2048      **                  FUNCDO,PRMCNT[0]
2049      **
2050      ** Stk lvls:      5 (<DVCSPc>)
2051      **
2052      ** History:
2053      **
2054      **      Date          Programmer          Modification
2055      **      -----          -
2056      **      11/28/83      NZ              Added documentation
2057      **
2058      ****
2059      ****
2060 F7B73 7C10 =PASSp GOSUB wrdscn
2061 F7B77 00          CON(2) =tXWORD
2062 F7B79 00          CON(2) =LEXPIL
```

```
2063 F7B7B 00          CON(2) =tCNTRL
2064 F7B7D 900        REL(3) PASp10      ADDRESS FOR MATCHING
2065 F7B80 00          CON(2) 00
2066 F7B82 671A PASpER GOTO  MSGPAR      Missing parameter
2067                *_
2068                *_
2069 F7B86 185 PASp10 DO=DO- 6          Don't need the tCNTRL
2070 F7B89 84A                ST=0  =StarOK      "*" is not OK here
2071 F7B8C 858                ST=1  =OptDev      Device spec is optional
2072 F7B8F 6D2E                GOTO  DVCSPc
2073                *_
2074                *_
2075 F7B93 8D00 wrdscn GOVLNG =WRDSCN
      000
```

```
2076                *****
2077                *****
2078                **
2079                ** Name:      CNTRLp - Parse the CONTROL ON/OFF statement
2080                ** Name:      RESTp - Parse the RESTORE IO statement
2081                **
2082                ** Category:   STPARS
2083                **
2084                ** Purpose:
2085                **      Parse the CONTROL ON/OFF or RESTORE IO statement
2086                **
2087                ** Entry:
2088                **      D0 points to the ASCII character string
2089                **      D0 points to the location where the tokens go
2090                **      D[A] is the end of available memory
2091                **      P=0
2092                **
2093                ** Exit:
2094                **      D0 positioned past last token output by this routine
2095                **      D1 positioned past last character accepted
2096                **      P=0
2097                **      If no error, carry clear
2098                **      Exits through ERRORP if error
2099                **
2100                ** Calls:      WRDSCN,EOLCK,NUMCK+,<RESPTR>
2101                **
2102                ** Uses.....
2103                ** Inclusive:  A,B,C,D[15:5],R0-R2,R3[A],D0,D1,P,ST[11,7,3:0],
2104                **      FUNCDO,PRMCNT[0]
2105                **
2106                ** Stk lvls:   5 (NUMCK+)
2107                **
2108                ** History:
2109                **
2110                **      Date      Programmer      Modification
2111                **      -----      -
2112                **      11/28/83      NZ          Added documentation
2113                **
2114                *****
2115                *****
2116 F7B9A 75FF =CNTRLp GOSUB wrdscn
```

```

2117 F7B9E 00          CON(2) =tON
2118 F7BA0 210        REL(3) CNTRL          CONTROL ON
2119 F7BA3 00          CON(2) =tOFF
2120 F7BA5 D00        REL(3) CNTRL          CONTROL OFF
2121 F7BA8 00          CON(2) 00
2122 F7BAA 67DF       GOTO  PASpER          "Missing Parameter"
2123                  * _
2124                  * _
2125 F7BAE 79AA =REStp GOSUB  IOp          First parse "IO"
2126                  *
2127                  * Check for optional numeric expression
2128                  *
2129 F7BB2 8F00 CNTRL  GOSBVL =EOLCK        See if reached end-of-statement
                                000
2130 F7BB9 460        GOC   RespTr          Yes...done
2131 F7BBC 702F       GOSUB  NUMCK+         Must be a numeric expr
2132 F7BC0 6A5F RespTr GOTO   RESPTR
2133                  * _
2134                  * _
2135 F7BC4 3100 OUT:   LC(2) =tCOLON
2136 F7BC8 62FE       GOTO   OUTBYT
2137                  *****
2138                  *****
2139                  **
2140                  ** Name:          CONWUC - Convert A[W] to upper case
2141                  **
2142                  ** Category:     PILUTL
2143                  **
2144                  ** Purpose:
2145                  **   Convert A[W] to upper case
2146                  **
2147                  ** Entry:
2148                  **   P=0
2149                  **   D1 points at the letters and digits to convert
2150                  **
2151                  ** Exit:
2152                  **   A[W] in upper case
2153                  **   P=0
2154                  **   Carry clear
2155                  **
2156                  ** Calls:        <CNVWUC>
2157                  **
2158                  ** Uses.....
2159                  **   Inclusive: A[W],C[W]
2160                  **
2161                  ** Stk lvls:     1 <CNVWUC>
2162                  **
2163                  ** History:
2164                  **
2165                  **   Date          Programmer          Modification
2166                  **   -----          -
2167                  **   09/07/83        NZ                Changed entry to read data at D1
2168                  **                   first, then convert to upper case
2169                  **   09/06/83        NZ                Changed to goto mainframe routine
2170                  **   01/03/83        NZ                Updated documentation

```

```
2171          **
2172          ****
2173          ****
2174 F7BCC 8D00 =CONWUC GOVLNG =CNVWUC      Convert to upper case (mainframe)
           000
2175 F7BD3          END
```


?A=CM+	Ext		-	223	802						
=ASGNp	Abs	1013404	#F769C	-	655						
ASGNp1	Abs	1013436	#F76BC	-	669	664					
ASGNp2	Abs	1013444	#F76C4	-	673	660					
=BLANK	Abs	1014570	#F7B2A	-	1911	453	822	838	926	1053	1139 1513
					1590						
=CATC++	Abs	1014545	#F7B11	-	1841	1593	1602				
CATCH+	Ext			-	1842						
CKNUM	Abs	1014375	#F7A67	-	1656	230	239	351	904		
CKNUM+	Abs	1014359	#F7A57	-	1650	1328	1338	1361	1375	1656	
CKNUM-	Abs	1014379	#F7A6B	-	1658	1329	1339	1362	1376		
CKNUM1	Abs	1014393	#F7A79	-	1665	1659					
CKNUM2	Abs	1014400	#F7A80	-	1670	1662	1666				
=CKSTR	Abs	1014404	#F7A84	-	1712	659	1228	1508			
=CLEARp	Abs	1013278	#F761E	-	409						
=CNTRLp	Abs	1014682	#F7B9A	-	2116						
CNTRDL	Abs	1014706	#F7BB2	-	2129	2118	2120				
CNVWUC	Ext			-	2174						
=CONWUC	Abs	1014732	#F7BCC	-	2174	201	454	828			
CSLC5	Ext			-	1754						
CSRC5	Ext			-	1763						
=DEVSPp	Abs	1013938	#F78B2	-	1291						
DISPP	Ext			-	118						
DVCP05	Abs	1014240	#F79E0	-	1507	1494					
DVCP10	Abs	1014255	#F79EF	-	1513	1509					
DVCP30	Abs	1014280	#F7A08	-	1524	1519					
DVCP35	Abs	1014284	#F7A0C	-	1525	1539					
DVCP40	Abs	1014300	#F7A1C	-	1534	1516					
DVCP65	Abs	1014296	#F7A18	-	1531	1525					
DVCP70	Abs	1014308	#F7A24	-	1542	1527					
=DVCPn*	Abs	1014192	#F79B0	-	1486	116	124				
=DVCPy*	Abs	1014199	#F79B7	-	1490	73					
DVCSPc	Abs	1014205	#F79BD	-	1493	414	2072				
=DVCSPp	Abs	1014202	#F79BA	-	1491	1487					
DVCSPr	Abs	1014224	#F79D0	-	1500	1496					
=DVLBP	Abs	1013901	#F788D	-	1261	1538					
=DVSPp	Abs	1013941	#F78B5	-	1292	1524					
=Digit	Abs	1	#00001	-	18	1595					
=ENABLp	Abs	1014599	#F7B47	-	1960						
ENBLp1	Abs	1014618	#F7B5A	-	1969	1964					
=ENTERp	Abs	1013021	#F751D	-	124						
ENTR10	Abs	1013042	#F7532	-	129	127					
EOLCK	Ext			-	1493	2129					
ERROR!	Ext			-	212						
ERRORP	Ext			-	670						
ERRORR	Ext			-	1837						
EXPPAR	Ext			-	1653						
=EoIOK	Abs	9	#00009	-	29	823	1031	1048			
Error!	Abs	1013135	#F758F	-	212	1531					
Errorp	Abs	1013438	#F76BE	-	670	161	218	241	245		
Errorx	Abs	1013354	#F766A	-	561	458	610				
Exppar	Abs	1014368	#F7A60	-	1653	1117	1713	1823			
=ExprOK	Abs	8	#00008	-	28	785	1032	1035			
=FILSPp	Abs	1013858	#F7862	-	1233	1229					
=FILSp	Abs	1013847	#F7857	-	1228	210					

FILSp1	Abs	1014040	#F7918	-	1349	1279	1395	1401				
FILSp0	Abs	1013935	#F78AF	-	1287	1254						
FILSp1	Abs	1013979	#F78DB	-	1314	1296						
FILSp2	Abs	1014003	#F78F3	-	1331	1419						
FILSp3	Abs	1014044	#F791C	-	1353	1333	1385					
FILSp4	Abs	1014076	#F793C	-	1367	1320						
FILSp5	Abs	1014103	#F7957	-	1392	1384						
FILSp6	Abs	1014135	#F7977	-	1405	1377						
FILSp8	Abs	1014180	#F79A4	-	1427	1230	1364					
FILSp9	Abs	1014184	#F79A8	-	1428	1308						
FILSpX	Abs	1014174	#F799E	-	1422	1284	1311	1363	1412	1417		
FILSpn	Abs	1013931	#F78AB	-	1284	1247	1257	1274				
FILSpX	Abs	1013975	#F78D7	-	1311	1302	1330	1340	1347			
FILSp8	Abs	1014072	#F7938	-	1364	1355						
FRAMEE	Ext			-	1012							
FRASP1	Abs	1013635	#F7783	-	987	993						
FRASP2	Abs	1013663	#F779F	-	999	1002						
FRASP3	Abs	1013793	#F7821	-	1056	1013						
FRASPn	Abs	1013778	#F7812	-	1050	1047						
=FRASPP	Abs	1013609	#F7769	-	975	777	842					
FRASPx	Abs	1013740	#F77EC	-	1036	1034						
FRASPy	Abs	1013775	#F780F	-	1049	1039						
INITP.	Abs	1013141	#F7595	-	215	211						
INITP0	Abs	1013152	#F75A0	-	221	216						
INITP2	Abs	1013156	#F75A4	-	222	240						
INITPE	Abs	1013187	#F75C3	-	241	231						
=INITPR	Abs	1013176	#F75B8	-	232	224	353					
=INITp	Abs	1013105	#F7571	-	201							
INITp1	Abs	1013191	#F75C7	-	244	205	1528	1966				
=IOp	Abs	1013339	#F765B	-	555	655	2125					
IOp10	Abs	1013363	#F7673	-	565	559						
IOp20	Abs	1013366	#F7676	-	566	505						
=InvalE	Abs	0	#00000	-	17	1118	1665	1831				
LEXPIL	Ext			-	340	503	557	606	1962	2062		
LEXPTR	Ext			-	1875							
=LOCALp	Abs	1013225	#F75E9	-	332							
LOCLp1	Abs	1013274	#F761A	-	362	345						
LOOP#1	Abs	1013601	#F7761	-	921	905	913					
LOOP#2	Abs	1013605	#F7765	-	926	918						
=LOOP#p	Abs	1013564	#F773C	-	900	284	767	2014				
Loopp	Abs	1013249	#F7601	-	350	463						
MSGPAR	Abs	1013146	#F759A	-	217	1497	2066					
=NAMEp	Abs	1014317	#F7A2D	-	1591	1273	1411					
NAMEp1	Abs	1014337	#F7A41	-	1598	1603						
=NAMEpb	Abs	1014313	#F7A29	-	1590	1242						
NTOKEN	Ext			-	1921							
=NUMCK	Abs	1014500	#F7AE4	-	1819							
=NUMCK+	Abs	1014496	#F7AE0	-	1818	2131						
NUMCK1	Abs	1014530	#F7B02	-	1831	1825						
NUMCK2	Abs	1014537	#F7B09	-	1836	1828	1832	2021				
Ntoken	Abs	1014592	#F7B40	-	1921	69	143	221	333	614	661	1293
				-	1349	1418						
=NumExp	Abs	3	#00003	-	20	1120	1658	1714	1824			
=OFFIOp	Abs	1013320	#F7648	-	501							
=ONINTp	Abs	1013368	#F7678	-	604							

=XWORDp	Abs	1014190	#F79AE	-	1433														
=XWRD1p	Abs	1013169	#F75B1	-	229														
=cATCH+	Abs	1014548	#F7B14	-	1842	1394													
chkOK	Abs	1013087	#F755F	-	155	146	149												
eILEXp	Ext			-	1670	1836													
eILPAr	Ext			-	669	1300													
eMSPAr	Ext			-	217	1345													
eSYNTx	Ext			-	160	244													
=oUT1TK	Abs	1014462	#F7ABE	-	1773	225	917	1324	1600										
=oUT2TC	Abs	1014469	#F7AC5	-	1776	1270													
=oUT3TK	Abs	1014479	#F7ACF	-	1780	349													
=oUTNBS	Abs	1014489	#F7AD9	-	1784	837	1052												
tX	Ext			-	1318														
t*	Ext			-	662	1294													
t@	Ext			-	155														
tCNTRL	Ext			-	2063														
tCOLON	Ext			-	1266	2135													
tCOMMA	Ext			-	358	1115	1502												
tINTRR	Ext			-	504	607	1963												
tIO	Ext			-	558														
tIS	Ext			-	70														
tLITRL	Ext			-	1235	1407													
tLOCKO	Ext			-	341														
tOFF	Ext			-	288	2119													
tON	Ext			-	286	2117													
tSEMIC	Ext			-	129	147	902	911	1267	1359									
tUSING	Ext			-	144														
tXWORD	Ext			-	339	502	556	605	1961	2061									
wrdscn	Abs	1014675	#F7B93	-	2075	285	501	555	604	1960	2060	2116							

Input Parameters

Source file name is NZ&PAR::MS

Listing file name is NZ/PAR:TI:ML::-1

Object file name is NZ%PAR:TI:MS::-1

Initial flag settings are 111111
 0123456789012345

Errors

None

Saturn Assembler News

```

1      *
2      *      N  N  ZZZZ  &      DDDD  EEEEE  CCC
3      *      N  N      Z  & &  D  D  E      C  C
4      *      NN N      Z  & &  D  D  E      C
5      *      N N N      Z      &      D  D  EEEE  C
6      *      N NN  Z      & & &  D  D  E      C
7      *      N  N  Z      & &  D  D  E      C  C
8      *      N  N  ZZZZ  && &  DDDD  EEEEE  CCC
9      *
10     *
11     *      TITLE  PIL DECOMPILE ROUTINES<831027.1220>
12 F7BD3  *      ABS   #F7BD3      TIXHP6 address (fixed)
13     *      *****
14     *      *****
15     *      **
16     *      ** Name:      PRNTSD - PRINTER IS decompile routine
17     *      ** Name:      PACKd - PACK decompile (device spec,OUTELA)
18     *      **
19     *      ** Category:  STDCMP
20     *      **
21     *      ** Purpose:
22     *      **      Decompile the PRINTER IS/PACK statements
23     *      **
24     *      ** Entry:
25     *      **      D1 points to tokenized device spec
26     *      **      D0 points to output buffer
27     *      **      D[A] is end of available memory, P=0
28     *      **
29     *      ** Exit:
30     *      **      Exits through OUTELA
31     *      **      Carry clear, P=0
32     *      **
33     *      ** Calls:      OUT3TC, ?A=CLN, PILDC, ?A=CMA, OUTCMA, EXPRDC
34     *      **
35     *      ** Uses.....
36     *      **      Exclusive: A, C
37     *      **      Inclusive: A,B,C,R0,R1,R2,D0,D1,P,ST[0,3,8,10,11]
38     *      **
39     *      ** Stk lvls:  6 (PILDC)
40     *      **
41     *      ** Detail:
42     *      **      Decompile 1 or more device specs (separated by
43     *      **      commas)
44     *      **
45     *      ** History:
46     *      **
47     *      **      Date      Programmer      Modification
48     *      **      -----      -
49     *      **      12/22/82      NZ      Updated documentation
50     *      **
51     *      *****
52     *      *****
53 F7BD3  *      =PRNTSD
54 F7BD3 3594  *      LCASC  \ SI\      "IS "
          3502

```

```

55 F7BDB 7000      GOSUB  =OUT3TC      Output 3 tokens!
56                *
57                * Device decompile
58                *
59 F7BDF 14B      =PACKd A=DAT1 B      Read in the token (OUT3TC kills)
60 F7BE2 7003      GOSUB  ?A=CLN      Is this a colon?
61 F7BE6 571      GONC   PACKD6      No...string expression
62                *
63                * D1 points to tCOLON of a device specifier
64                *
65 F7BE9 7BB1      GOSUB  PILDC        Decompile the device specifier
66 F7BED 77E2      GOSUB  ?A=CMA      Is there a comma?
67 F7BF1 501      GONC   PACKD9      No...exit
68 F7BF4 171      D1=D1+ 2      Yes...skip it,
69 F7BF7 7ED1      GOSUB  Outcma      output it, continue
70 F7BFB 53E      GONC   PACKd      Go always!
71                *
72                *
73 F7BFE 7F62      PACKD6 GOSUB Exprdc      String expression specifier
74 F7C02 6850      PACKD9 GOTO  Outela      Output End-Of-Line
75                *****
76                *****
77                **
78                ** Name:      OUTPd - OUTPUT decompile routine
79                **
80                ** Category:  STDCMP
81                **
82                ** Purpose:
83                **      Decompile the OUTPUT statement
84                **
85                ** Entry:
86                **      D0 points to the output buffer
87                **      D1 points to the input buffer (tokens)
88                **      D[A] is the end of available memory
89                **      P=0
90                **
91                ** Exit:
92                **      D0 at next position in output buffer
93                **      D1 at next character in input buffer
94                **      P=0
95                **
96                ** Calls:      ?A=CLN,PILDC,?A=CMA,OUTCMA,OUTBLK,EXPRDC
97                **
98                ** Uses.....
99                ** Exclusive: A, C,          D1
100               ** Inclusive: A,B,C,R0,R1,R2,D0,D1,P,ST[0,3,8,10,11]
101               **
102               ** Stk lvls:  6 (PILDC)
103               **
104               ** History:
105               **
106               **      Date      Programmer      Modification
107               **      -----      -
108               **      12/22/82      NZ          Updated documentation
109               **

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```

110 *****
111 *****
112 F7C06 =OUTPd
113 F7C06 7CD2 GOSUB ?A=CLN
114 F7C0A 572 GONC OUTPd4 Not COLON: must be string expr
115 F7C0D 7791 OUTPd1 GOSUB PILDC Decompile the device spec
116 F7C11 OUTPd2
117 F7C11 73C2 GOSUB ?A=CMA A=DAT1 B; LC(2) =tCOMMA
118 F7C15 171 D1=D1+ 2 Skip this token (tCOMMA or t@)
119 F7C18 966 ?A#C B Match?
120 F7C1B 90 GOYES OUTPd3 No...go to DISPDC
121 F7C1D 78B1 GOSUB Outcma Yes...output the comma, loop back
122 F7C21 5BE GONC OUTPd1 Go always
123 *-
124 *-
125 *
126 * Now have a non-comma token...must be the t@ I added
127 *
128 F7C24 79A1 OUTPd3 GOSUB Outblk Output a trailing blank
129 F7C28 14B A=DAT1 B Read the next char for DISPDC
130 F7C2B 8D00 GOVLNG =DISPDC Continue at DISP decompile
    000
131 *-
132 *-
133 F7C32 7B32 OUTPd4 GOSUB Exprdc Output the expression
134 F7C36 6ADF GOTO OUTPd2 (Token is t@...never comma)
135 *****
136 *****
137 **
138 ** Name: INITd - Decompile INITIALIZE statement
139 **
140 ** Category: STDCMP
141 **
142 ** Purpose:
143 ** Decompile the INITIALIZE statement
144 **
145 ** Entry:
146 ** D0 points to the output buffer
147 ** D1 points to the input buffer
148 ** D[A] is the end of available memory
149 ** P=0
150 ** A[B]=data pointed to by D1
151 **
152 ** Exit:
153 ** D0,D1 positioned after the INITIALIZE statement
154 ** P=0
155 **
156 ** Calls: OUTNBC,FILDC*,?A=CMA,OUTCMA,EXPRDC
157 **
158 ** Uses.....
159 ** Exclusive: A, C, D1,P
160 ** Inclusive: A,B,C,R0,R1,R2,D0,D1,P,ST[0,3,8,10,11]
161 **
162 ** Stk lvls: 6 (FILDC*)
163 **

```



```

164      ** History:
165      **
166      **   Date      Programmer      Modification
167      **   -----      -
168      **  12/22/82      NZ          Updated documentation
169      **
170      ****
171      ****
172 F7C3A      =INITd
173 F7C3A 3794      LCASC \ EZI\      "IZE " OF INITIAL IZE
      A554
      02

174      *
175      * Back up the output pointer ("INITIAL " is out already)
176      *
177 F7C44 27      P= 7      Output 8 nibbles (IZE )
178 F7C46 181      DO=DO- 2      Back up over the blank...
179 F7C49 7000      GOSUB =OUTNBC      Output P+1 nibbles
180 F7C4D 8F00      GOSBVL =FILDC*      Output the file specifier
      000

181 F7C54      INITD0
182 F7C54 7082      GOSUB ?A=CMA      Is there a tCOMMA?
183 F7C58 4C0      GOC      INITD3      Yes...decompile the expression
184 F7C5B      Outela
185 F7C5B 14B      =XWORDd A=DAT1 B      (Could change to GOVLNG =OUTEL1)
186 F7C5E 8D00      GOVLNG =OUTELA      Output end of line
      000

187      *-
188      *-
189      *
190      * Found an optional parameter expression
191      *
192 F7C65 171      INITD3 D1=D1+ 2      Skip the comma token
193 F7C68 7D61      GOSUB Outcma      OUTPUT COMMA
194      *
195      * Entry for <XWORD> <Expression> [, <Expression> ]*
196      *
197 F7C6C      =STAND+
198 F7C6C 7102      =INITD2 GOSUB Exprdc      Decompile the expression
199 F7C70 63EF      GOTO      INITD0      Check if more follows
200      ****
201      ****
202      **
203      ** Name:      STANDd - STANDBY decompile
204      **
205      ** Category:      STDCMP
206      **
207      ** Purpose:
208      **      Decompile the STANDBY statement
209      **
210      ** Entry:
211      **      D1 points to the tokenized statement
212      **      D0 points to the output buffer
213      **      D[A] is the end of available memory
214      **      P=0

```

```
215      **
216      ** Exit:
217      **      DO, D1 updated past statement contents
218      **      P=0
219      **
220      ** Calls:      LOOP#d,<INITD2>
221      **
222      ** Uses.....
223      ** Inclusive: A,B,C,RO,R1,R2,DO,D1,P,ST[0,3,8,10,11]
224      **
225      ** Stk lvls:  5 (EXPRDC)
226      **
227      ** History:
228      **
229      **      Date      Programmer      Modification
230      **      -----      -
231      **      02/25/83      NZ      Added documentation
232      **
233      *****
234      *****
235 F7C74 77C0 =STANDd GOSUB LOOP#d      Decompile optional loop #
236 F7C78 3100      LC(2) =tON
237 F7C7C 962      ?A=C B      Is this STANDBY ON?
238 F7C7F 80      GOYES STANDj      Yes...output text
239 F7C81 3100      LC(2) =tOFF
240 F7C85 966      ?A#C B      Is this STANDBY OFF?
241 F7C88 4E      GOYES STAND+      No...must be expression
242 F7C8A 6712 STANDj GOTO CNTRLd      Decompile shared with CONTROL
243      *****
244      *****
245      **
246      ** Name:      LOCALd - Decompile LOCAL statement
247      **
248      ** Category:  STDCMP
249      **
250      ** Purpose:
251      **      Decompile LOCAL [ LOCKOUT ] statement
252      **
253      ** Entry:
254      **      DO points to the output buffer
255      **      D1 points to the input buffer
256      **      D[A] is the end of available memory
257      **      P=0
258      **
259      ** Exit:
260      **      DO,D1 positioned after the LOCAL statement
261      **      P=0
262      **
263      ** Calls:      GTEXT+ ,?A=CMA,OUTBLK,EXPRDC
264      **
265      ** Uses.....
266      ** Inclusive: A,B,C,RO,R1,R2,DO,D1,P,ST[0,3,8,9,10,11]
267      **
268      ** Stk lvls:  5 (EXPRDC)
269      **
```

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270      ** History:
271      **
272      **      Date      Programmer      Modification
273      **      -----      -
274      **      10/26/83      NZ          Updated documentation
275      **      02/01/83      JH          Added Routine
276      **
277      ****
278      ****
279 F7C8E 15B5 =LOCALd A=DAT1 6
280 F7C92 AF6      C=A      W          Set high nibs for compare
281      *
282      * Following lines are REALLY...
283      *      LC(6) (=tLOCKO)~(=LEXPIL)~(tXWORD)
284      ****
285 F7C95 35      NIBHEX 35      LC(6)...
286 F7C97 00      CON(2) =tXWORD      tXWORD~...
287 F7C99 00      CON(2) =LEXPIL      LEXPIL~.
288 F7C9B 00      CON(2) =tLOCKO      tLOCKO.
289      ****
290 F7C9D 976      ?A#C      W          Is this LOCAL LOCKOUT?
291 F7CA0 72      GOYES CLEARd      No...just a device specifier
292      *
293      * LOCAL LOCKOUT...
294      *
295 F7CA2 849      ST=0      9          No trailing blank
296 F7CA5 8F00      GOSBVL =GTEXT+
          000
297 F7CAC 7822 Loopd GOSUB ?A=CMA      A=DAT1 B;LC(2) =tCOMMA
298 F7CB0 171      D1=D1+ 2
299 F7CB3 962      ?A=C      B          Loop specifier?
300 F7CB6 D0      GOYES LOCLd1      No...done
301 F7CB8 1C1      D1=D1- 2      Yes...skip the tCOMMA
302 F7CBB 7211      GOSUB Outblk      Output the blank
303 F7CBF 7EA1      GOSUB Exprdc      Decompile the loop expression
304 F7CC3 679F LOCLd1 GOTO Outela      Output end of line
305      ****
306      ****
307      **
308      ** Name:      CLEARd, TRIGd, REMOTd - Device spec decompile
309      **
310      ** Category:  STDCMP
311      **
312      ** Purpose:
313      **      Decompile CLEAR, TRIGGER and REMOTE statements
314      **
315      ** Entry:
316      **      D0 points to the output buffer
317      **      D1 points to the input buffer
318      **      D[A] is the end of available memory
319      **      P=0
320      **
321      ** Exit:
322      **      D0, D1 positioned after the CLEAR, LOCAL or REMOTE stnt
323      **      P=0

```

```
324      **
325      ** Calls:      ?A=CMA,<PACKd>
326      **
327      ** Uses.....
328      ** Inclusive: A,B,C,R0,R1,R2,D0,D1,P,ST[0,3,8,10,11]
329      **
330      ** Stk lvls:   6 (PILDC)
331      **
332      ** History:
333      **
334      **      Date      Programmer      Modification
335      **      -----      -
336      **      10/26/83      NZ          Updated documentation
337      **      02/01/83      JH          Added optional device capability
338      **
339      ****
340      ****
341 F7CC7      =REMOTd
342 F7CC7      =TRIGd
343 F7CC7      =CLEARd
344 F7CC7 7D02      GOSUB ?A=CMA      Check for tCOMMA
345 F7CCB 590      GONC CLRd10      Not found...decompile device spec
346 F7CCE 171      D1=D1+ 2          Found tCOMMA...skip it (EOL)
347 F7CD1 698F      GOTO  Outela      Output end of line
348      *-
349      *-
350 F7CD5      CLRd10
351      *
352      * Now have a <Device spec>
353      *
354 F7CD5 690F      GOTO  PACKd
355      ****
356      ****
357      **
358      ** Name:      OFFIOd - OFF IO and OFF INTR decompile
359      ** Name:      RESTd - RESTORE IO decompile
360      **
361      ** Category:  STDCMP
362      **
363      ** Purpose:
364      **      Decompile the "IO" part of OFF IO and RESTORE IO
365      **      Decompile the "INTR" part of OFF INTR
366      **      Decompile the "IO " <expr> of RESTORE IO [<num expr>]
367      **
368      ** Entry:
369      **      D0 points to the output buffer
370      **      D1 points to the input buffer (tokenized line)
371      **      A[B]=next input token
372      **      D[A] is then end of available memory
373      **      P=0
374      **
375      ** Exit:
376      **      Exits through OUTELA
377      **      D0 points to the output buffer
378      **      D1 points to the input buffer
```

```
379      **
380      ** Calls:      0tINTR,I0d,I0dspc
381      **
382      ** Uses.....
383      ** Exclusive:  C
384      ** Inclusive: A,C,D0,D1,P
385      **
386      ** Stk lvls:  3 (I0dspc)
387      **
388      ** History:
389      **
390      **      Date      Programmer      Modification
391      **      -----      -
392      **      12/22/82      NZ      Updated documentation
393      **
394      ****
395      ****
396 F7CD9 3100 =OFFI0d LC(2) =tXWORD
397 F7CDD 966      ?A#C      B
398 F7CE0 C0      GOYES      OFI0d1
399      *
400      * This is OFF INTR
401      *
402 F7CE2 175      D1=D1+ 6      Step over the tINTR
403 F7CE5 7DD1      GOSUB 0tINTR      Output the INTR
404 F7CE9 560      GONC  OFI0d2      Go always
405      *
406      *
407 F7CEC      OFI0d1
408 F7CEC 7400      GOSUB I0d      Decompile "IO"
409 F7CF0 6A6F OFI0d2 GOTO  Outela      Exit
410      *
411      *
412 F7CF4 3394 I0d      LCASC \OI\
413      F4
413 F7CFA 6000 Out2tc GOTO  =oUT2TC      Output 2 tokens from C
414      *
415      * Output "IO ", decompile an expression
416      *
417 F7CFE 7BC0 =RESTd GOSUB I0dspc      Decompile "IO "
418 F7D02 66A1      GOTO  CNTRL9      Finish up with expression
419      ****
420      ****
421      **
422      ** Name:      ASGNd - ASSIGN IO decompile
423      **
424      ** Category:  STDCMP
425      **
426      ** Purpose:
427      **      Decompile the ASSIGN IO statement
428      **
429      ** Entry:
430      **      D0 points to the output buffer
431      **      D1 points to the input buffer (tokenized statement)
432      **      D[A] is the end of available memory
```

```

433      **      P=0
434      **
435      ** Exit:
436      **      Exits through PACKd
437      **
438      ** Calls:      IOdspc,<PACKd>
439      **
440      ** Uses.....
441      ** Inclusive: A,B,C,R0,R1,R2,D0,D1,P,ST[0,3,8,10,11]
442      **
443      ** Stk lvls:   5 <PACKd>
444      **
445      ** History:
446      **
447      **      Date      Programmer      Modification
448      **      -----      -
449      **      12/22/82      NZ          Updated documentation
450      **
451      *****
452      *****
453 F7D06      =ASGNd
454 F7D06 73C0      GOSUB IOdspc      Decompile "IO "
455 F7D0A 64DE      GOTO  PACKd      Device Decompile!
456      *****
457      *****
458      **
459      ** Name:      RESETd - RESET HPIL decompile
460      **
461      ** Category:  STDCMP
462      **
463      ** Purpose:
464      **      Decompile the RESET HPIL statement
465      **
466      ** Entry:
467      **      D1 points past the RESET token
468      **      D0 points to the output buffer
469      **      D[A] is the end of available memory
470      **      P=0
471      **
472      ** Exit:
473      **      Output buffer has "RESET HPIL"
474      **      D0, D1 past the statement
475      **
476      ** Calls:      OUTNBC,<Loopd>
477      **
478      ** Uses.....
479      ** Inclusive: A,B,C,D0,D1,R0,R1,R2,P,ST[0,3,8,10,11]
480      **
481      ** Stk lvls:   5 (Loopd)
482      **
483      ** History:
484      **
485      **      Date      Programmer      Modification
486      **      -----      -
487      **      02/18/83      NZ          Added loop number decompile

```

```
488      ** 12/22/82      NZ      Updated documentation
489      **
490      ****
491      ****
492 F7D0E 3784 =RESETd LCASC \LIPH\
          0594
          C4
493 F7D18 27      P=      7
494 F7D1A 7000      GOSUB =OUTNBC      Output "HPIL"
495 F7D1E 6D8F      GOTO  Loopd
496      ****
497      ****
498      **
499      ** Name:      SENDd - Decompile the SEND statement
500      **
501      ** Category:  STDCMP
502      **
503      ** Purpose:
504      **      Decompile the SEND statement (also works for ENABLE
505      **      INTR and REQUEST)
506      **
507      ** Entry:
508      **      D1 points to the first item following the SEND token
509      **      DO points to the output buffer
510      **      D[A] is the end of available memory
511      **      A[B] is the next token (at D1)
512      **      P=0
513      **
514      ** Exit:
515      **      DO,D1 after SEND command, P=0
516      **      Exits through OUTELA
517      **
518      ** Calls:      LOOP#d,FRASPd,ST!N0d,<OUTELA>
519      **
520      ** Uses.....
521      ** Inclusive: A,B,C,RO,R1,R2,DO,D1,P,ST[0,3,8,10,11]
522      **
523      ** Stk lvls:  6 (LOOP#d)(ST!N0d)
524      **
525      ** History:
526      **
527      **      Date      Programmer      Modification
528      **      -----      -
529      **      12/22/82      NZ      Updated documentation
530      **
531      ****
532      ****
533      *
534      * SEND decompile will also work for REQUEST and ENABLE INTR
535      *
536 F7D22 70A1 =ENABLd GOSUB 0tINTR      Decompile "INTR "
537 F7D26 14B      A=DAT1 B      Read in the next token
538 F7D29      =REQSTd
539 F7D29 7210 =SENDd GOSUB LOOP#d
540      *
```

```

541      * LOOP#d decompiles the loop number, if any, and returns with
542      * A[B] containing the next token
543      *
544      * FRASPD decompiles a frame spec, if any. If not a frame spec,
545      * it returns with carry set. In either case, A[B] is the next
546      * token.
547      *
548 F7D2D 7D2D SENDD1  GOSUB  FRASPD
549 F7D31 5BF          GONC   SENDD1          Loop until frame spec not found
550      *
551      * If here, either EOL or expression
552      *
553      * ST!Nod Decompiles the string or numeric expression(s), if
554      * any. If none are found, it returns with carry set.
555      *
556 F7D34 7B40          GOSUB  ST!Nod
557 F7D38 54F          GONC   SENDD1          Continue with next frame spec
558      *
559      * If here, have reached end-of-line
560      *
561 F7D3B 6F1F          GOTO   Outela          Output end of line
562      *****
563      *****
564      **
565      ** Name:          LOOP#d - Decompile an optional loop #
566      **
567      ** Category:     DCMUTL
568      **
569      ** Purpose:
570      **   Decompile a loop number, if any. If none present, exit
571      **   with carry set (Leaves next token in A[B])
572      **
573      ** Entry:
574      **   D1 points to the (optional) loop #
575      **   D0 points to the output buffer
576      **   D[A] is the end of available memory
577      **   A[B] is the next token (at D1)
578      **
579      ** Exit:
580      **   D0,D1 positioned after the loop #, if found
581      **   A[B] is the next token
582      **   Carry set if no loop #, clear if loop # found
583      **
584      ** Calls:        EXPDC+,OUT2TC
585      **
586      ** Uses.....
587      ** Exclusive: A, C,          D1
588      ** Inclusive: A,B,C,R0,R1,R2,D0,D1,P,ST[0,3,8,10,11]
589      **
590      ** Stk lvls:    5 (EXPDC+)
591      **
592      ** History:
593      **
594      **   Date      Programmer      Modification
595      **   -----
  
```



```
596      ** 03/01/83      NZ      Updated to read token after expr
597      ** 12/22/82      NZ      Updated documentation
598      **
599      *****
600      *****
601 F7D3F      =LOOP#d
602 F7D3F 3100      LC(2) =tSEMIC
603 F7D43 966      ?#C      B
604 F7D46 00      RTNYES      Not a loop #...return, carry set
605 F7D48 7221      GOSUB Expdc+      Expression decompile
606 F7D4C 33B3      LCASC \ ;\
        02
607 F7D52 74AF      GOSUB Out2tc      Output terminating <semic><blank>
608 F7D56 171      D1=D1+ 2      Skip tSEMIC following the expr
609 F7D59 14B      A=DAT1 B      Read next token
610 F7D5C 03      RTNCC      Return, carry clear (LOOP #)
611      *****
612      *****
613      **
614      ** Name:      FRASPd - Decompile a frame spec
615      **
616      ** Category:  DCMUTL
617      **
618      ** Purpose:
619      **      Frame spec decompile routine
620      **
621      ** Entry:
622      **      D0 points to the output buffer
623      **      D1 points to the input buffer (tokens)
624      **      D[A] is the end of available memory
625      **      A[B] is the next token (at D1)
626      **      P=0
627      **
628      ** Exit:
629      **      A[B] is next token
630      **      Carry clear if frame spec found, set if not found
631      **      D0,D1 updated to current position
632      **
633      ** Calls:      ?A=CLN,OUT1TK,RANGEA,Outblk
634      **
635      ** Uses.....
636      ** Exclusive:  A,C, D1
637      ** Inclusive:  A,C,D0,D1
638      **
639      ** Stk lvls:  2 (OUT1TK)(Outblk)
640      **
641      ** History:
642      **
643      **      Date      Programmer      Modification
644      **      -----      -
645      **      12/22/82      NZ      Updated documentation
646      **
647      *****
648      *****
649 F7D5E      =FRASPd
```

```
650 F7D5E 7481      GOSUB  ?A=CLN
651 F7D62 480      GOC   FRASd2      This is a frame spec (Skip COLON)
652 F7D65 02      RTNSC      Not a frame (return, carry set)
653              *-
654              *-
655 F7D67 7000 FRASd1 GOSUB  =oUT1TK      Output the character
656 F7D6B 171 FRASd2 D1=D1+ 2      Skip the current token/character
657 F7D6E 14B      A=DAT1 B      Read next character
658 F7D71 8E00      GOSUBL =RANGEA      Check if in [A-Z]
        00
659 F7D77 5FE      GONC   FRASd1      Yes...continue
660              *
661              * Output a trailing blank after mnemonic
662              *
663 F7D7A 7350      GOSUB  Outblk
664 F7D7E AEE      ACEX   B          Restore item (OUTBYT does ACEX)
665 F7D81 03      RTNCC      End of frame (return, carry clear)
666              *****
667              *****
668              **
669              ** Name:      ST!N0d - Decompile a string or numeric expr
670              **
671              ** Category:  DCMUTL
672              **
673              ** Purpose:
674              **      Decompile string or numeric expr (Preceded by tCOMMA)
675              **
676              ** Entry:
677              **      D0 points to the output buffer
678              **      D1 points to the input buffer (tokens)
679              **      D[A] is the end of available memory
680              **      A[B] is the next token (at D1)
681              **      P=0
682              **
683              ** Exit:
684              **      A[B] is next token, D1 points to next token
685              **      D0, D1 updated to current position, P=0
686              **      Carry set if not a string or a numeric expression
687              **
688              ** Calls:      EXPDC+, ?A=CM+, Outcma, Outblk
689              **
690              ** Uses.....
691              ** Exclusive: A, C,          D1
692              ** Inclusive: A,B,C,RO,R1,R2,D0,D1,P,ST[0,3,8,10,11]
693              **
694              ** Stk lvls:  5 (EXPDC+)
695              **
696              ** History:
697              **
698              **      Date      Programmer      .      Modification
699              **      -----      -----      .      -----
700              **      12/22/82      NZ          Updated documentation
701              **
702              *****
703              *****
```

```
704 F7D83 3100 =ST!Nd LC(2) =tCOMMA
705 F7D87 966      ?ANC B
706 F7D8A 00      RTNYES      Not an expression (RTNSC)
707 F7D8C 7ED0 ST!Nd1 GOSUB Expdc+ D1=D1+2;EXPRDC
708              *
709              * A[B] is next item
710              *
711 F7D90 7741      GOSUB ?A=CM+
712 F7D94 5A0      GONC ST!Nd2      Done with expression list...exit
713              *
714              * Another expression follows
715              *
716 F7D97 7E30      GOSUB Outcma      Output a comma between items
717 F7D9B 60FF      GOTO ST!Nd1      Loop back and continue
718              *_
719              *_
720 F7D9F 7E20 ST!Nd2 GOSUB Outblk      (Saves A[B] in C[B])
721 F7DA3 AEE      ACEX B      Restore item from C[B]
722 F7DA6 03      RTNCC      Exit, carry clear
723              *****
724              *****
725              **
726              ** Name:      PILDC - Decompile an HPIL device specifier
727              **
728              ** Category:  DCMUTL
729              **
730              ** Purpose:
731              **      Decompile an HP-IL device spec stored as a literal:
732              **      case:
733              **      <t*>
734              **      or <t%><numeric expression>[( <numeric expression> )]
735              **      or <numeric expression>
736              **      or <tLITRL> <literal> [( <numeric expression> )]
737              **      or <tSEMIC> <volume label>
738              **
739              ** Entry:
740              **      D0 points to the tCOLON in the input buffer
741              **      D1 points to the output buffer
742              **      D[A] is the end of available memory
743              **      P=0
744              **
745              ** Exit:
746              **      D0 points after the last character of the output line
747              **      D1 points to the first token following the input tokens
748              **      P=0
749              **
750              ** Calls:      OUTBYT,EXPDC+,?A=CLN,OUT1TK,EXPRDC
751              **
752              ** Uses.....
753              **      Exclusive: A, C,      D0,D1
754              **      Inclusive: A,B,C,R0,R1,R2,D0,D1,P,ST[0,3,8,10,11]
755              **
756              ** Stk lvls:  5 (EXPRDC)(EXPDC+)
757              **
758              ** History:
```

```

759          **
760          **   Date       Programmer       Modification
761          **   -----       -
762          **  12/22/82       NZ           Updated documentation
763          **
764          ****
765          ****
766          *
767          * Syntax:
768          *   Input stream:
769          *     <t* >
770          *   or <t% > <num expr> [ <tCOLON> <num expr> ]
771          *   or <num expr>
772          *   or <tLITRL> <literal data> [ <tCOLON> <num expr> ]
773          *   or <tSEMIC> <literal volume label>
774          *
775          *   Output text:
776          *     *
777          *   or :%<num expr> [ (<num expr>) ]
778          *   or :<num expr>
779          *   or :<literal data> [ (<num expr>) ]
780          *   or .<volume label>
781          *
782 F7DA8 31A3 =PILDC  LCASC  \:\
783 F7DAC 7910      GOSUB  Outbyt      Output the colon
784 F7DB0 171      D1=D1+ 2
785 F7DB3 14B      A=DAT1  B           Read the next token
786          *
787          * Check for "*" token
788          *
789 F7DB6 3100      LC(2)  =t*
790 F7DBA 966      ?A#C   B           Is it t*?
791 F7DBD 42       GOYES  PILDC2      No...check further
792 F7DBF 181      DO=DO- 2          Yes...undo the ":"
793 F7DC2 171      D1=D1+ 2          Skip the "*" token
794 F7DC5 31A2      LCASC  \*\
795 F7DC9 6000     Outbyt  GOTO   =OUTBYT      Done with this device spec
796          *
797          *
798 F7DCD 732F     IOdspc  GOSUB  IOd       Output "IO "
799 F7DD1 3102     Outblk  LCASC  \ \
800 F7DD5 63FF      GOTO   Outbyt
801          *
802          *
803 F7DD9 31C2     Outcma  LCASC  \,\
804 F7DDD 6BEF      GOTO   Outbyt
805          *
806          *
807 F7DE1 3100     PILDC2  LC(2)  =t%
808 F7DE5 966      ?A#C   B           Is it Accessory ID?
809 F7DE8 F2       GOYES  PILDC5      No...check further
810 F7DEA 3152      LCASC  \% \          Yes...output %
811          *
812          * Accessory ID
813          *

```

```

814 F7DEE 77DF PILDC3 GOSUB Outbyt
815 F7DF2 7870 GOSUB Expdc+ Step over t% first
816 F7DF6 7CE0 GOSUB ?A=CLN "(" token kludge
817 F7DFA 506 GONC PILDC9 Not "(" token...check loop #
818 F7DFD 3182 PILDC4 LCASC \\
819 F7E01 74CF GOSUB Outbyt
820 F7E05 7560 GOSUB Expdc+ (Step over tCOLON first)
821 F7E09 3192 LCASC \\
822 F7E0D 78BF GOSUB Outbyt Send the closing ")"
823 F7E11 AEE ACEX B Get token back to A[B]
824 F7E14 564 GONC PILDC9 Go always to check for loop #
825 * _
826 * _
827 *
828 * Not Accessory ID - perhaps a device word
829 *
830 F7E17 3100 PILDC5 LC(2) =tLITRL
831 F7E1B 966 ?A#C B Is this a literal?
832 F7E1E 42 GOYES PILDC8 No...must be an address expression
833 F7E20 171 D1=D1+ 2 Skip =tLITRL
834 *
835 * If here, this is a literal (device word or Device ID)
836 *
837 F7E23 14B PILDC6 A=DAT1 B Read next character
838 F7E26 D6 C=A A Copy A[B] to C[B]
839 F7E28 A66 C=C+C B If carry, end of literal
840 F7E2B 4C0 GOC PILDC7 Carry...end of literal
841 F7E2E 171 PILDC6 D1=D1+ 2 Still part of literal...skip input
842 *
843 * Output the character and loop back for next character
844 *
845 F7E31 7000 GOSUB =oUT1TK Output from A[B]
846 F7E35 5DE GONC PILDC6 Go always - loop back again
847 * _
848 * _
849 *
850 * High bit set...end of literal characters
851 *
852 F7E38 PILDC7
853 F7E38 7AA0 GOSUB ?A=CLN Is there a tCOLON "(")?
854 F7E3C 40C GOC PILDC4 Yes...process the expression
855 F7E3F 5B1 GONC PILDC9 Go always to check loop #
856 * _
857 * _
858 F7E42 3100 PILDC8 LC(2) =tSEMIC
859 F7E46 966 ?A#C B Is this a volume label?
860 F7E49 E0 GOYES PILDC8 No...must be address expression
861 *
862 * Literal volume label
863 *
864 F7E4B 181 DO=DO- 2 Back over the \:
865 F7E4E 31E2 LCASC \. Write out the \., then vol label
866 F7E52 DA A=C A
867 F7E54 59D GONC PILDC6 Go always
868 * _

```

```

869      * _
870      *
871      * If here, this must be an address expression
872      *
873 F7E57 7610 PILDc8  GOSUB  Exprdc
874 F7E5B 3100 PILDC9  LC(2)  =tSEMIC      Check if there is a loop spec
875 F7E5F 962        ?A=C   B          Loop specifier?
876 F7E62 40        GOYES  PILDC!   Yes...process it
877 F7E64 03        RTNCC                    No...return with carry clear
878      * _
879      * _
880 F7E66 31A3 PILDC!  LCASC  \:\          Loop specifier...
881 F7E6A 7B5F        GOSUB  Outbyt      output the colon,
882 F7E6E 171  Expdc+ D1=D1+ 2      then the expression
883 F7E71 8D00 Exprdc GOVLNG =EXPRDC

```

000

```

884      *****
885      *****
886      **
887      ** Name:          PASSd - PASS CONTROL decompile
888      **
889      ** Category:     STDCMP
890      **
891      ** Purpose:
892      **       Decompile the PASS CONTROL statement
893      **
894      ** Entry:
895      **       D1 points to the input buffer (tokens)
896      **       D0 points to the output buffer
897      **       D[A] is the end of available memory
898      **       A[B] is the next token (at D1)
899      **       P=0
900      **
901      ** Exit:
902      **       D0, D1 are positioned after the output/input tokens
903      **       Exits through OUTELA
904      **
905      ** Calls:        OUTNBC, ?A=CMA, <PACKd>
906      **
907      ** Uses.....
908      ** Inclusive:  A,B,C,R0,R1,R2,D0,D1,P,ST[0,3,8,10,11]
909      **
910      ** Stk lvls:    6 (PACKd)
911      **
912      ** History:
913      **
914      **      Date      Programmer      Modification
915      **      -----      -
916      **      10/27/83      NZ          Added documentation
917      **
918      *****
919      *****

```

```

920 F7E78 3F34 =PASSd  LCASC  \ LORTNOC\
      F4E4
      4525

```

```

          F4C4
          02
921 F7E8A 2F          P=      15
922 F7E8C 7000       GOSUB  =OUTNBC
923 F7E90 7440       GOSUB  ?A=CMA
924 F7E94 590        GONC   PASd10
925 F7E97 171        D1=D1+ 2
926 F7E9A 60CD      OUtela GOTO   Outela
927                *-
928                *-
929 F7E9E 604D      PASd10 GOTO   PACKd
930                *****
931                *****
932                **
933                ** Name:      CNTRLd - CONTROL ON/OFF decompile
934                **
935                ** Category:  STDCMP
936                **
937                ** Purpose:
938                **      Decompile the CONTROL ON/OFF statements
939                **
940                ** Entry:
941                **      DO is points to the input buffer (tokens)
942                **      D1 points to the output buffer
943                **      D[A] is the end of available memory
944                **      A[B] is the next token (at D1)
945                **      P=0
946                **
947                ** Exit:
948                **      DO, D1 positioned after the statement
949                **      Exits through PACKD6/OUTELA
950                **
951                ** Calls:      GTXT++,<OUTELA>,<PACKD6>
952                **
953                ** Uses.....
954                ** Inclusive:  A,B,C,RO,R1,R2,DO,D1,P,ST[0,3,8,10,11]
955                **
956                ** Stk lvls:  5 (PACKD6)
957                **
958                ** History:
959                **
960                **      Date      Programmer      Modification
961                **      -----      -
962                **      10/27/83      NZ          Added documentation
963                **
964                *****
965                *****
966 F7EA2 8F00      =CNTRLd GOSBVL =GTXT++      Output ON/OFF (blanks)
          000
967 F7EA9 14F      CNTRL9 C=DAT1 B      Check if at end of line
968 F7EAC 80D1          P=C      1
969 F7EB0 0C          P=P+1
          If carry, at end of line now
970 F7EB2 20          P=      0
          Reset P=0 regardless
971 F7EB4 45E          GOC   OUtela
          End of line if carry
972 F7EB7 664D      GOTO   PACKD6

```

```

973 *****
974 *****
975 **
976 ** Name:      ONINTd - ON INTR decompile
977 **
978 ** Category:  STDCMP
979 **
980 ** Purpose:
981 **   Decompile the ON INTR statement
982 **
983 ** Entry:
984 **   D0 points to the input buffer (tokens)
985 **   D1 points to the output buffer
986 **   D[A] is the end of available memory
987 **   A[B] is the next token (at D1)
988 **   P=0
989 **
990 ** Exit:
991 **   D0, D1 positioned after the statement
992 **   Exits through ONDC20 (mainframe)
993 **
994 ** Calls:     OtINTR,<ONDC20>
995 **
996 ** Uses.....
997 ** Inclusive: Same as ONDC20
998 **
999 ** Stk lvls:  Same as ONDC20
1000 **
1001 ** History:
1002 **
1003 **   Date      Programmer      Modification
1004 **   -----      -
1005 **   10/27/83      NZ              Added documentation
1006 **
1007 *****
1008 *****
1009 F7EBB 7700 =ONINTd GOSUB  OtINTR
1010 F7EBF 8D00      GOVLNG =ONDC20      Continue with ON ... GOTO/GOSUB
      000
1011 *
1012 *
1013 *
1014 * Output \INTR\
1015 *
1016 F7EC6 3994 OtINTR  LCASC  \ RTNI\
      E445
      2502
1017 F7ED2 29      P=      9
1018 F7ED4 6000      GOTO  =OUTNBC      (Returns with P=0)
1019 *
1020 *
1021 *
1022 * Check if A[B] is a tCOMMA (Carry set if so)
1023 *
1024 F7ED8 14B      =?A=CMA A=DAT1 B

```



```
1025 F7EDB 3100 =?A=CM+ LC(2) =tCOMMA
1026 F7EDF 962      ?A=C   B
1027 F7EE2 00      RTNYES
1028 F7EE4 01      RTN
1029              *-
1030              *-
1031              *
1032              * Check if A[B] is tCOLON (Carry set if so)
1033              *
1034 F7EE6 3100 =?A=CLN LC(2) =tCOLON
1035 F7EEA 962      ?A=C   B
1036 F7EED 00      RTNYES
1037 F7EEF 01      RTN
1038 F7EF1          END
```


PASd10	Abs	1015454	#F7E9E	-	929	924		
=PILDC	Abs	1015208	#F7DA8	-	782	65	115	
PILDC1	Abs	1015398	#F7E66	-	880	876		
PILDC2	Abs	1015265	#F7DE1	-	807	791		
PILDC3	Abs	1015278	#F7DEE	-	814			
PILDC4	Abs	1015293	#F7DFD	-	818	854		
PILDC5	Abs	1015319	#F7E17	-	830	809		
PILDC6	Abs	1015331	#F7E23	-	837	846		
PILDC7	Abs	1015352	#F7E38	-	852	840		
PILDC8	Abs	1015362	#F7E42	-	858	832		
PILDC9	Abs	1015387	#F7E5B	-	874	817	824	855
PILDc6	Abs	1015342	#F7E2E	-	841	867		
PILDc8	Abs	1015383	#F7E57	-	873	860		
=PRNTSd	Abs	1014739	#F7BD3	-	53			
RANGER	Ext			-	658			
=REMOtd	Abs	1014983	#F7CC7	-	341			
=REQSTd	Abs	1015081	#F7D29	-	538			
=RESETd	Abs	1015054	#F7DOE	-	492			
=RESTd	Abs	1015038	#F7CFE	-	417			
SENDd1	Abs	1015085	#F7D2D	-	548	549	557	
=SENDd	Abs	1015081	#F7D29	-	539			
=ST!NOd	Abs	1015171	#F7D83	-	704	556		
ST!Nd1	Abs	1015180	#F7D8C	-	707	717		
ST!Nd2	Abs	1015199	#F7D9F	-	720	712		
=STANDd	Abs	1014900	#F7C74	-	235			
=STAND+	Abs	1014892	#F7C6C	-	197	241		
STANDj	Abs	1014922	#F7C8A	-	242	238		
=TRIGd	Abs	1014983	#F7CC7	-	342			
=XWORDd	Abs	1014875	#F7C5B	-	185			
oUT1TK	Ext			-	655	845		
oUT2TC	Ext			-	413			
tX	Ext			-	807			
t*	Ext			-	789			
tCOLON	Ext			-	1034			
tCOMMA	Ext			-	704	1025		
tLITRL	Ext			-	830			
tLOCKO	Ext			-	288			
tOFF	Ext			-	239			
tON	Ext			-	236			
tSEMIC	Ext			-	602	858	874	
tXWORD	Ext			-	286	396		

Input Parameters

Source file name is NZ&DEC::MS

Listing file name is NZ/DEC:TI:ML::-1

Object file name is NZXDEC:TI:MS::-1

Initial flag settings are
111111
0123456789012345

Errors

None

Saturn Assembler News

```

1      *
2      *
3      *      N  N  ZZZZZ  &      SSS  Y  Y  M  M
4      *      N  N      Z  & &  S  S  Y  Y  MM MM
5      *      NN  N      Z  & &  S      Y  Y  M  M  M
6      *      N  N  N      Z      &      SSS      Y  M  M  M
7      *      N  NN  Z      & & &  S      Y  M  M
8      *      N  N  Z      & &  S  S  Y  M  M
9      *      N  N  ZZZZZ  && &  SSS      Y  M  M
10     *
11     TITLE Symbolic Assignments <840301.1402>
12     *
13     * Status bit for ATTN key pressed (or other exception cause)
14     *
15     =Attn EQU 12
16     *
17     * Other status bits
18     *
19     =sPRIVT EQU 11      Status for PRIVATE/SECURE stmt
20     =sUNSEC EQU 10      Status for [UN]Secure statement
21     =sOVERW EQU 8       Status for overwrite existing file
22     =sDevOK EQU 8       Status for device spec exec OK
23     =sSTK EQU 7        Status for reading from stack
24     =CkTape EQU 5      Status to check for tape device
25     =sLoop? EQU 5      Status for allowing LOOP spec
26     =sReadd EQU 4      Status to force readdress the loop
27     =sFirst EQU 0      Status for first char in filespec
28     *
29     * Status bit corresponding to the bit I/O CPU sets if SREQ?
30     *
31     =sMBXsr EQU 1
32     *
33     * See NZ&PAR for parse status bits
34     *
35     *-----
36     *
37     * Equates for P=, DDL/DDT
38     *
39     * DDL's
40     *
41     =Write0 EQU 0      Write to buffer 0
42     =Write1 EQU 1      Write to buffer 1
43     =Write EQU 2      Write to tape
44     =SetBP EQU 3      Set byte pointer
45     =Seek EQU 4      Seek a record
46     =Format EQU 5     Format the medium
47     =PWrite EQU 6     Partial write mode
48     =Rewind EQU 7     Rewind
49     =CloseR EQU 8     Close record
50     =Xfr01L EQU 9     Transfer buffer 0-->1 (Listener)
51     =XchgL EQU 10     Exchange buffers 0,1 (Listener)
52     =Verify EQU 11    Verify the medium
53     *
54     * DDT's
55     *

```

```
56      =Read0 EQU    0      Read from buffer 0
57      =Read1 EQU    1      Read from buffer 1
58      =Read  EQU    2      Read from tape
59      =Positn EQU    3      Read current position
60      =XchgT  EQU    4      Exchange buffers 0,1 (Talker)
61      =Xfr01T EQU    5      Transfer buffer 0-->1 (Talker)
62      =ImpByt EQU    6      Send implementation bytes
63      =MaxRec EQU    7      Send max addressable record
64      *
65      *-----
66      *
67      * Equates for device specifiers
68      *
69      =DevTyp EQU    #1F     Device type
70      =DevID  EQU    #3F     Device ID
71      =Vollbl EQU    #5F     Volume label
72      =Null   EQU    #7F     "NULL" device
73      =Loop   EQU    #9F     "LOOP" device
74      *
75      *-----
76      *
77      * Equates for D[S] values returning from START
78      *
79      =DsAddr EQU    0      Device address
80      =DsDevT EQU    1      Device type
81      =DsDevI EQU    2      Device ID
82      =DsVoll EQU    3      Volume label
83      =DsNull EQU    4      NULL
84      =DsLoop EQU    5      LOOP
85      *
86      *-----
87      *
88      * Equates for STANDBY defaults
89      *
90      =#Timeo EQU    30     Default # IDY timeouts
91      =Timeout EQU    2*1000 Default timeout between IDY (ms)
92      *
93      *-----
94      *
95      * PRINT class equate (for OUTPUT class)
96      *
97      =OUTPTt EQU    2      This is next after PRINTt
98      =PLOTt  EQU    (OUTPTt)+1 This is for the PLOT class
99      *
100     *-----
101     *
102     * I/O buffer numbers - See TI&EQU
103     *
104     *-----
105     *
106     * HPIL frame types (return from FRAME)
107     *
108     =pACK   EQU    00     Acknowledge frame
109     =pSTATE EQU    01     Current Diamond state
110     =pDIAGR EQU    02     Diagnostic test results
```

```

111      =pDIAGL EQU    03      Diagnostic data
112      =pADDR EQU    04      Address frame
113      =pIFC EQU    05      IFC received (not active controller)
114      =pEOT EQU    06      EOT received as controller
115      =pHALTD EQU   07      Conversation halted by Diamond
116      =pTERM EQU    08      Terminator match (Diamond)
117      =pETE EQU    09      ETE received
118      =pUTYPE EQU   10      Unrecognized mailbox message type
119      =pDATA EQU    11      DATA/END frame
120      =pCMD EQU    12      Command received
121      =pRDY EQU    13      Ready frame received
122      =pIDY EQU    14      IDY received
123      =p3DATA EQU   15      Triple byte data
124      *
125      *-----
126      *
127      * ERROR TYPES: (See NZ&ERR for most error numbers)
128      *
129      =ePARSE EQU    00      Parse error
130      =eTAPE EQU    01      Tape error (mass storage error)
131      =ePIL EQU    02      HPIL error (loop or Diamond)
132      *
133      *-----
134      *
135      * Parameters for File Information Buffers (FIB)
136      * See TI&EQU for values and names
137      *
138      *-----
139      *
140      * Status bits (for Diamond state)
141      *
142      =sLOCKD EQU    11      Locked out mode (remote)
143      =sRMOTE EQU    10      Remote mode
144      =sDATAO EQU    9      Data in output buffer
145      =sDATAV EQU    8      Data available
146      =sSTAND EQU    7      Controller standby mode
147      =sPOLLE EQU    6      Serial Poll Enabled
148      =sUNCNF EQU    5      Loop is not configured
149      =sINTR EQU    4      Interrupt pending
150      =sSCNTR EQU    3      System Controller
151      =sTALKR EQU    2      Talker active
152      =sLISTR EQU    1      Listener
153      =sCONTR EQU    0      Controller
154      *
155      *-----
156      *
157      * Handshake bits (Diamond to Saturn) (in ST[3:0])
158      *
159      =s3BYTE EQU    3      Triple data byte transfer
160      =sMANUL EQU    2      Diamond is in manual mode
161      =sSRQIN EQU    1      SRQ received on loop
162      =sERROR EQU    0      Error detected/occurred
163      *
164      *-----
165      *
  
```

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166      * Handshake bits (Diamond to Saturn) (in ST[7:0])
167      *
168      =hs3BYT EQU    7           Triple data xfer
169      =hsMANL EQU    6           Manual mode
170      =hsLPRQ EQU    5           SRQ received from loop
171      =hsERRO EQU    4           Error occured
172      =hsRQSR EQU    3           Diamond SRQ on Saturn Bus
173      =hsAWKE EQU    2           Saturn awake
174      =hsNRD EQU     1           Saturn NRD
175      =hsMGAV EQU    0           Diamond message available
176      *
177      *-----
178      *
179      * Mailbox opcodes (TO Diamond)
180      *
181      * Frame class
182      *
183      =mFRAME EQU    #1000        Any of the class "FRAME"
184      =mDATAf EQU    #1000        DATA frame
185      =mDATA2 EQU    (mDATAf)/#100
186      =mENDf EQU     #1200        END frame
187      =mCMDf EQU     #1400        CoMmanD frame
188      =mCMD3 EQU     (mCMDf)/#10
189      =mCMD2 EQU     (mCMDf)/#100
190      =mEAR EQU      (mCMDf)+#18  Enable AsynchRonous IDYs
191      =mUNL EQU      (mCMDf)+#3F  Unaddress listeners
192      =mUNT EQU      (mCMDf)+#5F  Unaddress talkers
193      =mIFC EQU      (mCMDf)+#90  InterFaCe clear!!!
194      =mRDYf EQU     #1500        ReaDY frame
195      =mIDYf EQU     #1600        IDY frame
196      =mETO EQU      (mRDYf)+#40  ETO
197      =mETE EQU      (mRDYf)+#41  ETE
198      *
199      * Single-nibble parameter class
200      *
201      =mADDRM EQU    #2000        ADDRess Me as...
202      =maddrT EQU    #4           ...Talker
203      =maddrL EQU    #2           ...Listener
204      =mUNADM EQU    (mADDRM)+#10 UNADDRess Me as...^
205      =mPDLOP EQU    #30          Power down the loop
206      *
207      * Address class
208      *
209      =mADDRT EQU    #4000        ADDRess ... as Talker
210      =mADDRL EQU    #5000        ADDRess ... as Listener
211      =mFINDD EQU    #6000        FIND Device, type n
212      =mFIND1 EQU    (mFINDD)/#1000 FIND Device, type n (1 nibble)
213      =mAUTOR EQU    #70         AUTO Address loop
214      =mAUTOS EQU    (mAUTOR)+1  AUTO Address (AES, AAD)
215      *
216      * Conversation descriptors
217      *
218      =mSDA EQU      #800000      Start DATA conversation
219      =mSDA#5 EQU    (mSDA)/#100000 Start DATA conversation (P=5)
220      =mSST EQU      #900000      Start SStatus "

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221      =mSDI EQU #A00000 Start Device Id
222      =mSAI EQU #B00000 Start Accessory Id
223      =mTCT EQU #C00000 Transfer Control
224      =mTCT@4 EQU (mTCT)/#10000 Transfer Control (P=4)
225      =mSETTO EQU #D00000 SET TimeOut
226      =mSTO@5 EQU (mSETTO)/#100000 Set TimeOut (P=5)
227      =mSETFC EQU #E00000 SET Frame Count
228      =mSFC@5 EQU (mSETFC)/#100000 Set Frame Count @ nibble 5
229      *
230      * One-byte parameter class
231      *
232      =mSETDR EQU #F30000 SET Device response
233      =mSETAI EQU #F30120 SET Accessory ID length (=1)
234      =mSETAI EQU #F30321 SET Accessory ID value (=3)
235      =mSETS1 EQU #F30140 SET Status length (=1)
236      =mSETST EQU #F30041 SET Status value
237      =mSTS@4 EQU #F3 SET Status value (at nibble 4)
238      =mSETDI EQU #F30610 SET Device ID length (=6)
239      =mSETDI EQU #F30011 SET Device ID value (first byte)
240      =vDEVID EQU \17PH\ Value of device ID (=MP71)
241      *
242      =mSETTM EQU #F400 SET Terminator Mode
243      =mSETTC EQU #F500 SET Terminator Character
244      =mSETIC EQU #F600 SET # of IDY Timeouts
245      =mSETIT EQU #F700 SET IDY Timeout (in mS)
246      =mCLRBF EQU #F8 Clear data buffers (input&output)
247      =mSPTO EQU #F900 Set Serial Poll TimeOut
248      =mSETIM EQU #FA00 Set interrupt mask
249      =mREADI EQU #FB Read interrupt cause
250      =mREADC EQU #FC Read last device dependent command
251      =CLRISR EQU #FD00 ...CLEAR terminate on SRQ mode
252      =SETISR EQU (CLRISR)+1 ...SET terminate on SRQ mode
253      =mPULOP EQU #FE Power up the loop
254      =mSPDIS EQU #FF00 Disable IDY serial poll
255      =mSPEN EQU (mSPDIS)+1 Enable IDY serial poll
256      *
257      * Non-parameter messages
258      *
259      =mNOP EQU #00 NO oPeration (check for HS)
260      =mRDADR EQU #01 ReaD ADdRes table
261      =mSTATS EQU #02 STATuS request to I/O CPU
262      =mSTSTC EQU #0201 Request status, clear service reques
263      =mENDM EQU #03 END of Message
264      =mCSRQ EQU #04 Clear SRQ on loop
265      =mSSRQ EQU #05 Set SRQ on loop
266      =mERSTS EQU #06 Request ERror STATuS
267      =mAUTOE EQU #07 Enter AUTO End node
268      =mMANUL EQU #08 Go to manual mode
269      =mSCOPE EQU #0801 Go into MANUAL mode, retransmit
270      =mAUTO EQU #09 Go to auto mode
271      =mUPDSC EQU #0A00 Update System Controller bit(8/0)
272      =mRSTCA EQU #0B Reset current address
273      =mGETCA EQU #0C Read current address
274      =mINCCA EQU #0D Increment current address
275      =mMADDR EQU #0E Return "MY" address

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```
276      =MCLRCA EQU    #0F00      Clear controller status
277      =MSETCA EQU    #0F01      (Set controller active)
278      =MTAKEC EQU    #0F03      Take control of the loop
279      *
280      =MTAKEI EQU    (MTAKEC)~#90 Take control and send IFC frame
281      =MTAKEO EQU    (MTAKEC)~#10 Take control and send NOP frame
282      *
283      * Diagnostic class
284      *
285      =MRdMem EQU    #F00000      Read memory (add addr, RAM page)
286      =MWrMem EQU    #F10000      Write memory (add value~address)
287      =MTEST EQU    #F2          I/O CPU self-test
288      *
289      *-----
290      *
291      * RAM usage...
292      *
293      =SngDev EQU    4            Single device I/O buffer
294      *
295      * IS-xxx:
296      *      nib:  usage:
297      *      ---  -----
298      *      2-0:  If device address known, address, loop # here
299      *             If not known/assigned/iobuffer, FFF
300      *             If assigned, not HPIL, Fxx, xx<>FF
301      *
302      *      3:   If unassigned/not HPIL, F
303      *             If IO buffer for device ID/volume label, 4
304      *             If type specified, loop # + 1 (nib 3: 1,2,3)
305      *             If address specified, 0
306      *             If this assignment has been "OFF"ed, bit 3 is 1
307      *
308      *      6-4: If type, nib 6: sequence #, nibs 5-4: Acc id
309      *             If address, 6-4: address, loop #
310      *             If IO buffer, 6-4: io buffer #
311      *             If unassigned (NOT "OFF"ed), FFF
312      *             If not HPIL and nib 3=F, not defined
313      *
314      *-----
315      *
316      * Nibble "DSPSET"
317      *
318      =DispOK EQU    11           Display device is set up
319      =H82163 EQU    10           Display device is an HP82163A
320      =Printr EQU    9            Display device is a printer
321      =LoopOK EQU    8            Loop has not died while in disp
322      *
323      *-----
324      *
325      * Nibble "LOOPST" (bits 8 and 9 are cleared when START is called)
326      *
327      =Offed EQU    11            If set, USER specified OFF IO
328      =Device EQU    10           Last START found device mode
329      *
330      *-----
```

```
331      *  
332      * MBOX^: (3 nibbles)  
333      * Middle 3 digits of address of last mailbox used (ie if  
334      * mailbox was at address #20010 then MBOX^ is #001)  
335      *  
336      *-----  
337 00000      END
```

=#Timeo	Abs	30	#0001E	-	90	
=Attn	Abs	12	#0000C	-	15	
=CLRTSR	Abs	64768	#0FD00	-	250	251
=CkTape	Abs	5	#00005	-	24	
=CloseR	Abs	8	#00008	-	49	
=DevID	Abs	63	#0003F	-	70	
=DevTyp	Abs	31	#0001F	-	69	
=Device	Abs	10	#0000A	-	327	
=DispOK	Abs	11	#0000B	-	317	
=DsAddr	Abs	0	#00000	-	79	
=DsDevI	Abs	2	#00002	-	81	
=DsDevT	Abs	1	#00001	-	80	
=DsLoop	Abs	5	#00005	-	84	
=DsNull	Abs	4	#00004	-	83	
=DsVolL	Abs	3	#00003	-	82	
=Format	Abs	5	#00005	-	46	
=ImpByt	Abs	6	#00006	-	62	
=Loop	Abs	159	#0009F	-	73	
=LoopOK	Abs	8	#00008	-	320	
=MaxRec	Abs	7	#00007	-	63	
=Null	Abs	127	#0007F	-	72	
=OUTPTt	Abs	2	#00002	-	97	98
=Offed	Abs	11	#0000B	-	326	
=PLOTt	Abs	3	#00003	-	98	
=PWrite	Abs	6	#00006	-	47	
=Positn	Abs	3	#00003	-	59	
=Printr	Abs	9	#00009	-	319	
=Read	Abs	2	#00002	-	58	
=Read0	Abs	0	#00000	-	56	
=Read1	Abs	1	#00001	-	57	
=Rewind	Abs	7	#00007	-	48	
=SETTSR	Abs	64769	#0FD01	-	251	
=Seek	Abs	4	#00004	-	45	
=SetBP	Abs	3	#00003	-	44	
=SngDev	Abs	4	#00004	-	292	
=Timeout	Abs	2000	#007D0	-	91	
=Verify	Abs	11	#0000B	-	52	
=VolLbl	Abs	95	#0005F	-	71	
=Wallby	Abs	10	#0000A	-	318	
=Write	Abs	2	#00002	-	43	
=Write0	Abs	0	#00000	-	41	
=Write1	Abs	1	#00001	-	42	
=XchgL	Abs	10	#0000A	-	51	
=XchgT	Abs	4	#00004	-	60	
=Xfr01L	Abs	9	#00009	-	50	
=Xfr01T	Abs	5	#00005	-	61	
=ePARSE	Abs	0	#00000	-	129	
=ePIL	Abs	2	#00002	-	131	
=eTAPE	Abs	1	#00001	-	130	
=hs3BYT	Abs	7	#00007	-	168	
=hsAWKE	Abs	2	#00002	-	173	
=hsERRO	Abs	4	#00004	-	171	
=hsLPRQ	Abs	5	#00005	-	170	
=hsMANL	Abs	6	#00006	-	169	
=hsMGAV	Abs	0	#00000	-	175	

=hsNRD	Abs	1	#00001	-	174						
=hsRQSR	Abs	3	#00003	-	172						
=mADDRl	Abs	20480	#05000	-	210						
=mADDRM	Abs	8192	#02000	-	201	204					
=mADDRT	Abs	16384	#04000	-	209						
=mAUTO	Abs	9	#00009	-	269						
=mAUTOA	Abs	112	#00070	-	213	214					
=mAUTOE	Abs	7	#00007	-	266						
=mAUTOS	Abs	113	#00071	-	214						
=mCLRBF	Abs	248	#000F8	-	245						
=mCLRCA	Abs	983040	#F0000	-	275						
=mCMD2	Abs	20	#00014	-	189						
=mCMD3	Abs	320	#00140	-	188						
=mCMDf	Abs	5120	#01400	-	187	188	189	190	191	192	193
=mCSRQ	Abs	4	#00004	-	263						
=mDATA2	Abs	16	#00010	-	185						
=mDATAf	Abs	4096	#01000	-	184	185					
=mEAR	Abs	5144	#01418	-	190						
=mENDM	Abs	3	#00003	-	262						
=mENDf	Abs	4608	#01200	-	186						
=mERSTS	Abs	6	#00006	-	265						
=mETE	Abs	5441	#01541	-	197						
=mETO	Abs	5440	#01540	-	196						
=mFIND1	Abs	6	#00006	-	212						
=mFINDD	Abs	24576	#06000	-	211	212					
=mFRAME	Abs	4096	#01000	-	183						
=mGETCA	Abs	12	#0000C	-	272						
=mIDYf	Abs	5632	#01600	-	195						
=mIFC	Abs	5264	#01490	-	193						
=mINCCA	Abs	13	#0000D	-	273						
=mMADDR	Abs	14	#0000E	-	274						
=mMANUL	Abs	8	#00008	-	267						
=mNOP	Abs	0	#00000	-	258						
=mPDLOP	Abs	48	#00030	-	205						
=mPULOP	Abs	254	#000FE	-	252						
=mRDADR	Abs	1	#00001	-	259						
=mRDYf	Abs	5376	#01500	-	194	196	197				
=mREADC	Abs	252	#000FC	-	249						
=mREADI	Abs	251	#000FB	-	248						
=mRSTCA	Abs	11	#0000B	-	271						
=mRdMem	Abs	15728640	#00000	-	284						
=mSAI	Abs	11534336	#00000	-	222						
=mSCOPE	Abs	2049	#00801	-	268						
=mSDA	Abs	8388608	#00000	-	218	219					
=mSDA05	Abs	8	#00008	-	219						
=mSDI	Abs	10485760	#00000	-	221						
=mSETAI	Abs	15926049	#30321	-	233						
=mSETA1	Abs	15925536	#30120	-	232						
=mSETCA	Abs	3841	#00F01	-	276						
=mSETDI	Abs	15925265	#30011	-	238						
=mSETDR	Abs	15925248	#30000	-	231						
=mSETD1	Abs	15926800	#30610	-	237						
=mSETFC	Abs	14680064	#00000	-	226	227					
=mSETIC	Abs	62976	#0F600	-	243						
=mSETIM	Abs	64000	#0FA00	-	247						

=nSEIIT	Abs	63232	#0F700	-	244		
=nSETST	Abs	15925313	#30041	-	235		
=nSETSL	Abs	15925568	#30140	-	234		
=nSEITC	Abs	62720	#0F500	-	242		
=nSETTM	Abs	62464	#0F400	-	241		
=nSETTO	Abs	13631488	#00000	-	224	225	
=nSFC@5	Abs	14	#0000E	-	227		
=nSPDIS	Abs	65280	#0FF00	-	253	254	
=nSPEN	Abs	65281	#0FF01	-	254		
=nSPTD	Abs	63744	#0F900	-	246		
=nSSRQ	Abs	5	#00005	-	264		
=nSST	Abs	9437184	#00000	-	220		
=nSTATS	Abs	2	#00002	-	260		
=nSTO@5	Abs	13	#0000D	-	225		
=nSTSO@4	Abs	243	#000F3	-	236		
=nSTSTC	Abs	513	#00201	-	261		
=nTAKEC	Abs	3843	#00F03	-	277	279	280
=nTAKEI	Abs	983952	#F0390	-	279		
=nTAKEO	Abs	983824	#F0310	-	280		
=nTCT	Abs	12582912	#00000	-	223		
=nTEST	Abs	242	#000F2	-	286		
=nUNADM	Abs	8208	#02010	-	204		
=nUNL	Abs	5183	#0143F	-	191		
=nUNT	Abs	5215	#0145F	-	192		
=nUPDSC	Abs	2560	#00A00	-	270		
=nWrMem	Abs	15794176	#10000	-	285		
=naddrL	Abs	2	#00002	-	203		
=naddrT	Abs	4	#00004	-	202		
=p3DATA	Abs	15	#0000F	-	123		
=pACK	Abs	0	#00000	-	108		
=pADDR	Abs	4	#00004	-	112		
=pCMD	Abs	12	#0000C	-	120		
=pDATA	Abs	11	#0000B	-	119		
=pDIAGL	Abs	3	#00003	-	111		
=pDIAGR	Abs	2	#00002	-	110		
=pEOT	Abs	6	#00006	-	114		
=pETE	Abs	9	#00009	-	117		
=pHALTD	Abs	7	#00007	-	115		
=pIDY	Abs	14	#0000E	-	122		
=pIFC	Abs	5	#00005	-	113		
=pRDY	Abs	13	#0000D	-	121		
=pSTATE	Abs	1	#00001	-	109		
=pTERM	Abs	8	#00008	-	116		
=pUTYPE	Abs	10	#0000A	-	118		
=s3BYTE	Abs	3	#00003	-	159		
=sCONTR	Abs	0	#00000	-	153		
=sDATAO	Abs	9	#00009	-	144		
=sDATAV	Abs	8	#00008	-	145		
=sDIAsr	Abs	1	#00001	-	31		
=sDevOK	Abs	8	#00008	-	22		
=sERROR	Abs	0	#00000	-	162		
=sFirst	Abs	0	#00000	-	27		
=sINTR	Abs	4	#00004	-	149		
=sLISTR	Abs	1	#00001	-	152		
=sLOCKD	Abs	11	#0000B	-	142		

=sLoop?	Abs	5	#00005	-	25
=sMANUL	Abs	2	#00002	-	160
=sOVERW	Abs	8	#00008	-	21
=sPOLLE	Abs	6	#00006	-	147
=sPRIVT	Abs	11	#0000B	-	19
=sRMOTE	Abs	10	#0000A	-	143
=sReadd	Abs	4	#00004	-	26
=sSCNTR	Abs	3	#00003	-	150
=sSRQIN	Abs	1	#00001	-	161
=sSTAND	Abs	7	#00007	-	146
=sSTK	Abs	7	#00007	-	23
=sTALKA	Abs	2	#00002	-	151
=sUNCNF	Abs	5	#00005	-	148
=sUNSEC	Abs	10	#0000A	-	20
=vDEVID	Abs	825708616	#75048	-	239

