Program Number B06-136R04

SERIES 16

SYSTEM EXERCISER

Consists of:

Program Description	06-136M95R04A15
Assembly Listing	06-136R04A13
Bootstrap Object Tape	06-136M17R04
Series 16 System Exerciser	06-136F01M14
HSPTR Test Tape	
Series 32 System Exerciser	06-159M44R02
Card Reader Test Deck	

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SERIES 16 SYSTEM EXERCISER

1 GENERAL

Related Documents:

Program Listing	06-136M91R04
Program Paper Tape	06-136M17R04

Related Items Required for Use:

Series 16 System Exerciser HSPTR Test Tape	06-136F01M14
Series 32 System Exerciser Card Reader Test Deck	06-159M44R02

Related Processor Tests (as appropriate):

Processor Test	06-106
Model 8/16 Processor Test, Part 1	06-209
Model 8/16 Processor Test, Part 2	06-210
Model 8/16 E Processor Test, Part 1	06-211
Model 8/16 E Processor Test, Part 2	06-212
Model 5/15 Processor Test, Part 1	06-215
Model 5/16 Processor Test, Part 2	06-216

Other Applicable Tests:

Common Teletype Basic Confidence Test	06-004
Common Current Loop Interface Test	06-184
Common CRT Test	06-146
Common Carousel 300 Test	06-183
Model 1100 Terminal Test Program	06-217
Model 1200 Terminal Test Program	06-218

2 PURPOSE OF TEST

The Series 16 System Exerciser tests a complete 16 bit system with CPU, memory, I/O devices, selector channels, and other options running simultaneously. The exerciser is not designed to detect specific failures in any device; but, it detects failures caused by the interactions between elements of the system.

3 MINIMUM HARDWARE REQUIRED

The following lists the minimum hardware required to run this test:

- 16-bit Processor
- Minimum 32kb memory
- A console Teletype type device, GDT, CRT, PET 1100, or Carousel 15, 30, or 35 on a current loop interface; or a GDT, CRT, PET 1100, PET 1200, or Carousel 15, 30, 35, or 300 on a PASLA or PALM interface.

Optional multiplexor bus devices:

- display panel - M71-101 or M71-102
- universal clock module - M48-000
- paper-tape reader or reader/punch - M46-205 interface
- card reader - M46-235 interface
- two line printers - M46-202 or M46-206 interface
- intertape cassette system - M46-400 (four drives may be tested simultaneously)
- floppy media disc system (four drives may be tested simultaneously)
- model 5/16 external clock
- universal logic interface - M48-013 - requires 17-200 test cable
- digital multiplexor - requires one or more input modules, one or more output modules,and the SK-523 test fixture
- eight-line interrupt module - M48-001 - requires removal of the 17-170 cable on the front of the board
- memory protect controller

Optional selector channel devices configured in any combination on a maximum of four M73-105 or M81-115 selector channels:

- 9 track, 800 or 1600 bpi magnetic tape transports M46-470 or M46-475 controller.(Four drives on any combination of controllers can be tested simultaneously.)

- 2.5 or 10 Mb removable cartridge disc system, M46-420 or M46-421 controller.(Four drives on any combination of controllers can be tested simultaneously.)

- 40 Mb removable cartridge disc system, M46-433 controller (Four drives can be tested simultaneously.)

- 67 or 256 Mb MSM disc system.(Four drives can be tested simultaneously.)

- SELCH tester

4 REQUIREMENTS OF MACHINE UNDER TEST

This program assumes that the CPU, memory, and each peripheral device were individually checked using the appropriate test program.

If the system has more than 64kb of memory, the 8/16E memory bank scheme with a maximum address range of 256kb is assumed.

A card reader test deck must be used to check the card reader (06-159M44R02). See Appendix E for a description of the test deck.

If no high-speed, paper-tape punch is present on the system, a test paper tape (06-136F01M14) must be provided if the HSPTR is to be tested.

5 LOADING PROCEDURE

Tape Format:

The 06-136M17 tape is an absolute, nonzoned memory image tape with a front-end bootloader.

Normal Loading Procedure:

1. Manually enter the X'50' sequence shown below into memory:

LOCATION	CONTENTS	
X'30'	X'0000'	
X'32'	X'0000'	
X'34'	X'0000'	
X'36'	X'0050'	
X'50'	X'D500'	
X'52'	X'00CF'	
X'54'	X'4300'	
X'56'	X'0080'	
X'78'	X'0294'	For TTY or Carousel 35
X'78'	X'C092'	For micro I/O bus
X'78'	X'0399'	For HSPTR
X'78'	X'1399'	For HSPTR/P

2. Place the program tape in the tape reader.

3. Execute at address X'30'.

4. When the processor halts, observe the CHKSUM byte displayed on processor display indicator D1. If it is zero, loading is complete; if it is not zero, repeat the loading procedure.

Multimedia Diagnostic Loading Procedure:

To load this program from the Interdata Multimedia Diagnostic System, refer to Publication Number 06-176A15.

Program Execution:

After successfully loading the program, if the console device is a TTY, GDT, CRT, PET 1100, or Carousel 15, 30, or 35 on a current loop interface with device number X'02', press RUN (EXEcute) to begin execution.

If the console device is different, refer to Appendix A and set up the parameters for the console I/O device. Address location X'2D0' and start program execution. The following title is output to the console device:

```
SERIES 16 SYSTEM EXERCISER 06-136R04

*
```

The exerciser can be restarted at address X'2D4'. This bypasses some initialization and preserves the device control blocks (DCBs) of previously selected devices. The following message is output:

```
RESTART
*
```

6 OPERATING PROCEDURES

The Series 16 System Exerciser consists of two major tasks: the command processor and the device dispatcher. The command processor communicates with the operator to build the tables and data structures used by the device dispatcher.

The command processor is entered when the program is initially started at X'2D0' or restarted at X'2D4'. The command processor is also entered whenever the device dispatcher terminates. An asterisk character (*) is output to the console device to indicate that commands can be entered. See Appendix B for the command syntax. The RUN command causes the command processor to pass control to the device dispatcher.

The device dispatcher repeatedly polls the device service table in an attempt to keep all selected devices busy. The dispatcher terminates for any of the following reasons:

- The operator depresses the break key on the console device.
- Machine malfunction interrupt.
- An error is detected and the HLT option is selected.
- The error queue overflows.
- An unrecoverable error occurs. (See Appendix F.)

Normal Testing:

1. All devices to be tested are placed on the device service table (DST) using the device selection commands listed in Appendix C.

2. When you select a device for testing that uses a selector channel, you can also choose to let that device use the movable buffer. To make that assignment, the command immediately following the device selection command must be:

   *MOVE (CR)

   A maximum of 12 devices can be assigned to use the movable buffer. Attempting to assign more than 12 devices results in an error message. Each device, in the order that the assignments were made, are given access to use the movable buffer instead of its normal input buffer. The movable buffer starts at the first 1kb boundary above the exerciser. After each use, it moves up 1kb. When the top of memory is reached, the device loses control of the movable buffer and resorts back to its own input buffer. The movable buffer is then given to the next device chosen.

   When the movable buffer is active, the memory test driver automatically skips the 1kb segment where the movable buffer currently is.

3. Program options and feature tests (e.g., halt on error, single-precision floating-point) are selected using the program control commands listed in Appendix D.

4. Verify the proper device selection and parameter values using the DST list command.

5. Verify the proper options and feature selections using the OPT list command.

6. Use the RUN command to begin testing. All testing is done under interrupt control. If background testing is selected, the following tests are executed one time for each pass through the device service table:

   - illegal instruction interrupt test
   - simulate interrupt test
   - SVC interrupt test
   - fixed-point arithmetic test
   - single-precision, floating-point test (if option FLT is selected)
   - double-precision, floating-point test (if option DFLT is selected)
   - load multiple, store multiple test

7. The display panel is used to indicate testing on those devices or features that cannot be visually observed. See Appendix G for the meaning of each bit. A count is displayed in the display's top half. The count increments by one each pass through the device service table.

8. Press the break key on the console device to terminate testing.

9. Devices can be added or deleted from the device service table at this time. Return to Step 1.

Optional Testing:

Polling all devices while awaiting their interrupts is accomplished with the PSW enabling the following interrupts:

- immediate interrupt (PSW bits 1 and 4 set)
- machine malfunction (PSW bit 2 set)
- fixed-point arithmetic fault (PSW bit 3 set)
- floating-point fault (PSW bit 5 set)

The user can change this PSW by changing location DSPCHER. Machine malfunction, fixed-point arithmetic, and floating point interrupts can be disabled through this means. If fixed point arithmetic fault is disabled, errors are generated unless floating point testing is disabled or background testing is disabled. The immediate interrupt cannot be disabled.

During testing, whenever error messages are not being printed, an echo test is running on the console. Pressing any key other than break should cause the corresponding character to be typed.

Error Procedures:

When the program detects an error during testing:

1. The error counter in the offending device's DCB is incremented.

2. If the LOG option is set and the bad status bit in the device's DCB equals zero, an error message is placed on the error queue.

3. The bad status bit and the not counting bit in the device's DCB are set.

4. If the HLT option is set or if the error queue is full, testing is aborted.

5. If testing is not aborted, testing continues from where the error occurred. If the error is considered unrecoverable, testing is aborted.

6. If testing is aborted, the error queue is printed, and control is given to the command processor.

If a machine malfunction interrupt is detected, an error message is placed in the error queue and the processor is halted. When the RUN switch on the display panel is depressed, the error message is output, and control is given to the command processor.

An unexpected illegal instruction interrupt causes an error message to be placed on the error queue. The message is output, and control is given to the command processor.

An unformatted cartridge causes SELCH write address failure (error 41) on the disc. The status given for a SELCH read or write address failure (errors 40 and 41) is the SELCH status, not the device status.

7 PROGRAMMING NOTES

All testing is done under interrupt control. The exerciser is based on the Series 32 System Exerciser. Its logic flow is simple so hardware debugging is as easy as possible. The operator can select up to 32 devices for testing at a given time. The selected devices are continuously tested until operator intervention. Tests can then be added or deleted to enable the operator to narrow interaction problems. The exerciser is designed to create a maximum amount of processor and I/O interrupt activity within a given time period with the hope that any potential interaction problems, not discovered by the processor test or individual peripheral tests, are found.

7.1 PERIPHERAL DRIVERS

Each peripheral driver is designed to meaningfully test the device's data transfer function under interrupt control. Thorough device testing is left to the individual device test program.

Each peripheral driver in the system exerciser consists of a number of phases. Each phase is an independent software routine representing a logical operation between the processor and the device under test. Separate phases check the status of the device, start an I/O operation, and handle interrupts. Special phases check selector channel data transfer termination addresses and make transferred data validity checks.

When an error is encountered, subroutines ERRORLOG and QUEUECHK enter the error message on the error queue, and the next logical phase is not entered. With the disc, magnetic tape, and cassette drivers, an attempt is made to restart the entire driver. In any case, the driver cannot continue until the trouble is cleared. The bad status bit is set in the device control block to discontinue reporting the same error over and over. When the trouble is cleared, the bad status bit resets and the driver continues.

7.2 DEVICE CONTROL BLOCK

When a device is selected through the command processor, the address of a device control block (DCB) is placed on the device service table. Each device has its own DCB and input buffer. The DCB contains all information needed to service a device. All device drives are reentrant and use the DCB for any necessary working storage. To add support for an additional device of any type, only provide a DCB and an input buffer. The address of the DCB should be placed in the DEV2DCB table.

To simplify this task, one special entry has already been placed in the DEV2DCB table. The mnemonic for this entry is SPCL, meaning special device, and it references a partially filled in DCB at the top of the exerciser. See the listing for details.

All references to the DCB are symbolic offsets from the start of the DCB. EQUate statements at the beginning of the program define these offsets. Not all of the fields are appropriate to all devices. Figure 1 shows the DCB format.

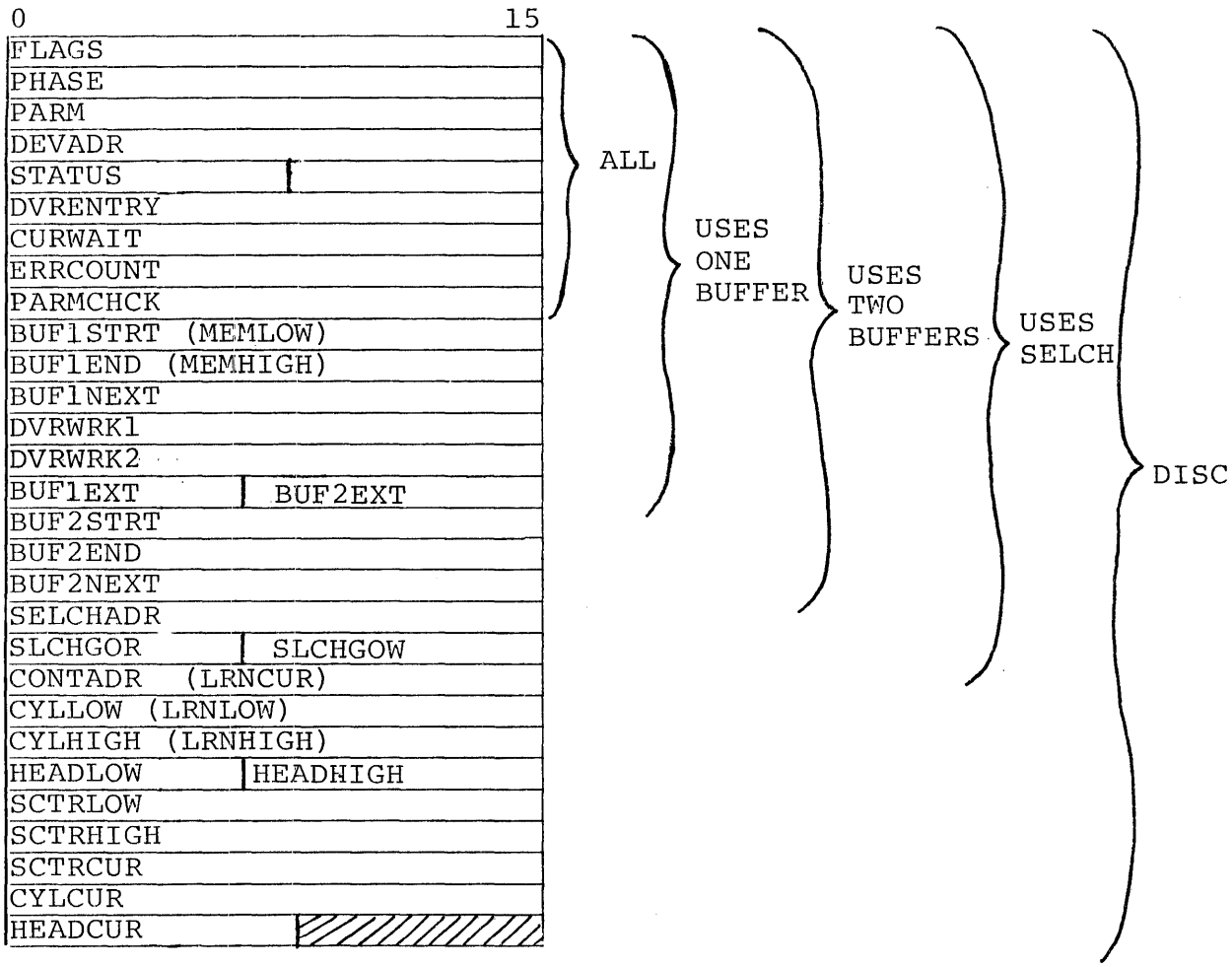


Figure 1 Device Control Block Format

The DCB FLAG halfword contains single bit flags defined as:

BIT	NAME	DESCRIPTION
0	IGNORE	0 Performs action indicated by other flags. 1 Dispatcher should bypass this device.
1	BUSY	0 Available for dispatching 1 If IGNORE = 0, interrupt is pending.
2	NOTCOUNT	0 Enables counting of dispatcher or wait passes. 1 Disable counting. Should be used with caution for long operations such as magnetic tape rewind.
3	BADSTAT	0 Sense status returned good status. 1 Error condition. Bit is set and tested by error routines. Bit is cleared by the driver. Transition from 0 to 1 causes error message print.
4	DEVCNTL1	Only significant to the driver. It is manipulated by the driver and the parameter check routine.
5	DEVCNTL2	Only significant to the driver. It is manipulated by the driver and the parameter check subroutine.
6	Reserved	
7	Reserved	
8	SELCH	0 This device is not a SELCH. 1 This device is a SELCH.
9	MEMORY	0 This is not the memory test DCB. 1 This is the memory test DCB.
10	USESELCH	0 Device is not accessed through a SELCH. 1 Device uses a SELCH.
11	DISC	0 Device is not a disc. 1 Device is a disc.
12	Reserved	0 Device is not a floppy. 1 Device is a floppy.
13	Reserved	
14,15	BUFFERS	00 Device has no buffers. 01 Device uses one buffer. 10 Device uses two buffers. 11 Illegal combination.

Table 1 shows the initial FLAG settings for the various DCB's.

TABLE 1 DEVICE/FLAG CROSS REFERENCE

DEVICE	MNEMONIC	FLAG
Console	-	0000
Paper Tape Reader	PTR	0802
Paper Tape Punch	PTP	0402
Paper Tape Reader/Punch	PTRP	0C02
Cassette Tape	CAS	0002
Floppy Disc	FMD	000A
Card Reader	CRD	0001
Line Printer	LNP	0001
A.C. Line Clock	ACL	0000
Precision Interval Clock	PIC	0001
5/16 External Clock	CLK	0000
Eight Line Interrupt Module	INT8	0000
Universal Logic Interface	ULI	0000
Digital Multiplexor	DMUX	0000
Selector Channel	SELCH	0080
SELCH Tester	SLCH	0022
Magnetic Tape	MAG	0022
Disc	DSC	0032
67 or 256 Mb Disc	MSM	0C32
Memory Testing	MEM	0040
Memory Protect	MMP	0000
Special Device	SPCL	0000

The PHASE halfword indentifies the currently active driver routine or the routine to be next activated. It is used as an index into the driver phase table whenever the driver is activated.

The command processor uses the parameter selection flag halfword (PARM) to fill in the DCB. The PARM bits are defined as:

BIT	PARAMETER THAT CAN BE ENTERED
0	Device Address
1	Disc Controller Address
2	SELCH Address
3	Not Used
4	Not Used
5	Cylinder Address Limits
6	Head Address Limits
7	Sector Address Limits
8	Memory Limits
9	May Use Movable Buffer
10-15	Not Used

APPENDIX A
CONSOLE DEVICE DEFINITION

1. The halfword labeled CONTYP (see Program Listing) has the default value for a Teletype type device, GDT, CRT, or Carousel 15, 30, or 35 on a current loop interface. If the console device is different, CONTYP must be changed as:

CONTYP	MEANING
X'0001'	GDT or CRT on a PASLA/PALM interface, strapped for FDX operation at the highest baud rate.
X'0002'	TTY, GDT, CRT, or Carousel 15, 30, or 35 on a TTY current loop interface.
X'0003'	Reserved, interpret as X'02'.
X'0004'	Carousel 300 on PASLA/PALM interface, strapped for FDX operation at the highest baud rate.
X'0005'	TTY, GDT, CRT, or Carousel 15, 30, or 35 on a micro I/O bus current loop interface.
X'0000' and X'0006' through X'00FF'	Reserved, interpret as X'02'.

2. The GDT or CRT, if used on a PASLA/PALM interface, should be strapped for device addresses X'10' and X'11' for the receive and transmit sides respectively. If the base address (X'10') is different, then the halfword labeled PASLADR (see the Program Listing) must be changed.

3. The Teletype type device or current loop interface, if used, should be strapped for device address X'02'. If the address is different, the halfword labeled CLIFADR (see the Program Listing) must be changed.

4. If used on a PASLA/PALM interface, the Carousel 300 should be strapped for device addresses X'10' and X'11' for the receive and transmit sides respectively. If the base address (X'10') is different, then the halfword labeled 'C300ADR' (see the Program Listing) must be changed.

5. If used, the micro I/O bus should be strapped for device address X'C0'. If it is different, then the halfword labeled MICROIO (see the Program Listing) must be changed.

APPENDIX B
CONSOLE COMMAND SYNTAX

When the command processor types an asterisk on the console, a command can be entered. All commands are terminated by a carriage return except for the open next cell command, which is a line feed by itself. A hash or sharp symbol (#) deletes the current command line, allowing the command to be reentered.

1. To select a device or enable a program option, type the command mnemonic, followed by a single space character if parameters follow. If there are no parameters to enter, type a carriage return instead of a space. The optional parameter values are separated by commas and terminated by a carriage return.

   All parameters are positional, separated by commas, with no embedded blanks. All parameter values are given in hexadecimal. To skip a parameter and let it have the default value, type a comma instead of a value. The parameter input can be terminated at any time by entering a carriage return. The default values will be used for any parameters not entered.

   EXAMPLES

   Enable single-precision floating-point testing:

   *FLT (CR)

   Enable double-precision floating-point testing:

   *DFLT (CR)

   Test the paper-tape reader using all default values:

   *PTR (CR)

   Test magnetic tape unit one. Use default device address and SELCH address X'F1'.

   *MAG1 ,F1 (CR)

   For parameters that require two values, the values are separated by a hyphen.

   Test 2.5Mb disc unit one. Use device address X'D6'. Use default values for the controller address, SELCH address. Use the values 0 and X'CA' (decimal 202) for low and high cylinder limits. Use the default values for head and sector limits:

   *DSC1 ,,D6,0-CA (CR)

If only one value is specified without the hyphen, that value is used for both fields (except for memory test limits, which default separately).

2. To remove a device from testing, or to turn off a program option, type the command mnemonic followed by the percent character (%) and a carriage return.

   EXAMPLES

   Delete error message printout:

   *LOG% (CR)

   Stop testing the paper-tape reader:

   *PTR% (CR)

3. If an error is detected when selecting a device, an error message is printed, and the device is not placed on the device service table. Selecting a device that has been previously selected, generates a warning message. The new set of parameters then overrides the previous parameters.

   If an invalid parameter is detected, an error message is printed and the device is removed from the device service table.

APPENDIX C
DEVICE SELECTION COMMAND SUMMARY

Abbreviations:

ADR	Device address
CONTADR	Controller address
SELCH	SELCH address
CYLL	Cylinder low limit
CYLH	Cylinder high limit

NOTE

All cylinders in this range (inclusive) are tested.

HEADL	Head (Track) low limit
HEADH	Head (Track) high limit

NOTE

All heads in this range (inclusive) are tested on each selected cylinder.

SCTRL	Sector low limit
SCTRH	Sector high limit

NOTE

All sectors in this range (inclusive) are tested on each selected head for each cylinder. A seek is performed before each read or write.

LRNL	Logical record number low limit
LRNH	Logical record number high limit

Each device is listed, followed by an example giving all the default parameters.

1. Paper-Tape Reader

```
     ADR
PTR  003      (reader only)
PTP  003      (punch only)
PTRP 013      (reader/punch combination)
```

NOTE

When deleting reader or punch testing, any of the three commands deletes all paper tape testing. To change the type of testing, simply override the old type with the new.

2. Card Reader

```
    ADR
CRD 004
```

3. AC Line Clock

```
    ADR
ACL 06D
```

4. Precision Interval Clock

```
    ADR
PIC 06C
```

5. Line Printer One

```
     ADR
LNP1 062
```

6. Line Printer Two

```
     ADR
LNP2 062
```

7. Cassette Tape One

```
     ADR
CAS1 045
```

8. Cassette Tape Two

```
     ADR
CAS2 045
```

9. Cassette Tape Three

```
     ADR
CAS3 045
```

10. Cassette Tape Four

```
     ADR
CAS4 045
```

11. Magnetic Tape One

```
     ADR,SELCH
MAG1 085,0F0
```

12. Magnetic Tape Two

```
     ADR,SELCH
MAG2 085,0F0
```

13. Magnetic Tape Three

```
     ADR,SELCH
MAG3 085,0F0
```

14. Magnetic Tape Four

```
     ADR,SELCH
MAG4 085,0F0
```

15. Series 30 or 40 Disc One

```
     ADR,CONTADR,SELCH,CYLL-CYLH,HEADL-HEADH,SCTRL-SCTRH
DSC1 0C6, 0B6,0F0,0-0,0-0,0-0
```

16. Series 30 or 40 Disc Two

DSC2 (Same as disc one)

17. Series 30 or 40 Disc Three

DSC3 (Same as disc one)

18. Series 30 or 40 Disc Four

DSC4 (Same as disc one)

NOTE

For Series 40 Discs, Heads 0 and 1 test the removable cartridge and Heads 2 and 3 test the fixed disc. Any range of heads is valid. Always specify the removable disc address.

19. 40 Mb Disc One

```
     ADR,CONTADR,SELCH,CYLL-CYLH, HEADL-HEADH, SCTRL-SCTRH
DSCA 0FC,0FB,0F0,0-0,0-0,0-0
```

20. 40 Mb Disc Two

DSCB (Same as DSCA)

21. 40 Mb Disc Three

DSCC (Same as DSCA)

22. 40 Mb Disc Four

DSCD (Same as DSCA)

23. MSM Disc One

MSM1 (Same as DSCA)

24. MSM Disc Two

MSM2 (Same as DSCA)

25. MSM Disc Three

MSM3 (Same as DSCA)

26. MSM Disc Four

MSM4 (Same as DSCA)

27. Floppy Disc One

```
     ADR,LRNL-LRNH
FMD1 0C1,1-1
```

28. Floppy Disc Two

    FMD2 (Same as FMD1)

29. Floppy Disc Three

    FMD3 (Same as FMD1)

30. Floppy Disc Four

    FMD4 (Same as FMD1)

31. Digital Multiplexor

```
     ADR
DMUX 04B
```

32. Model 5/16 External Clock

```
    ADR
CLK 007
```

33. Universal Logic Interface

```
    ADR
ULI 08B
```

34. Selector Channel Tester

```
     ADR,SELCH
SLCH D0,F0
```

35. Eight Line Interrupt Module

```
     ADR
INT8 020
```

36. Memory

```
    MEML - MEMH
MEM End of Exerciser - Top of memory
```

37. Memory Protect Module

```
    ADR
MPT 0AE
```

APPENDIX D
COMMAND SUMMARY

Program Control Commands

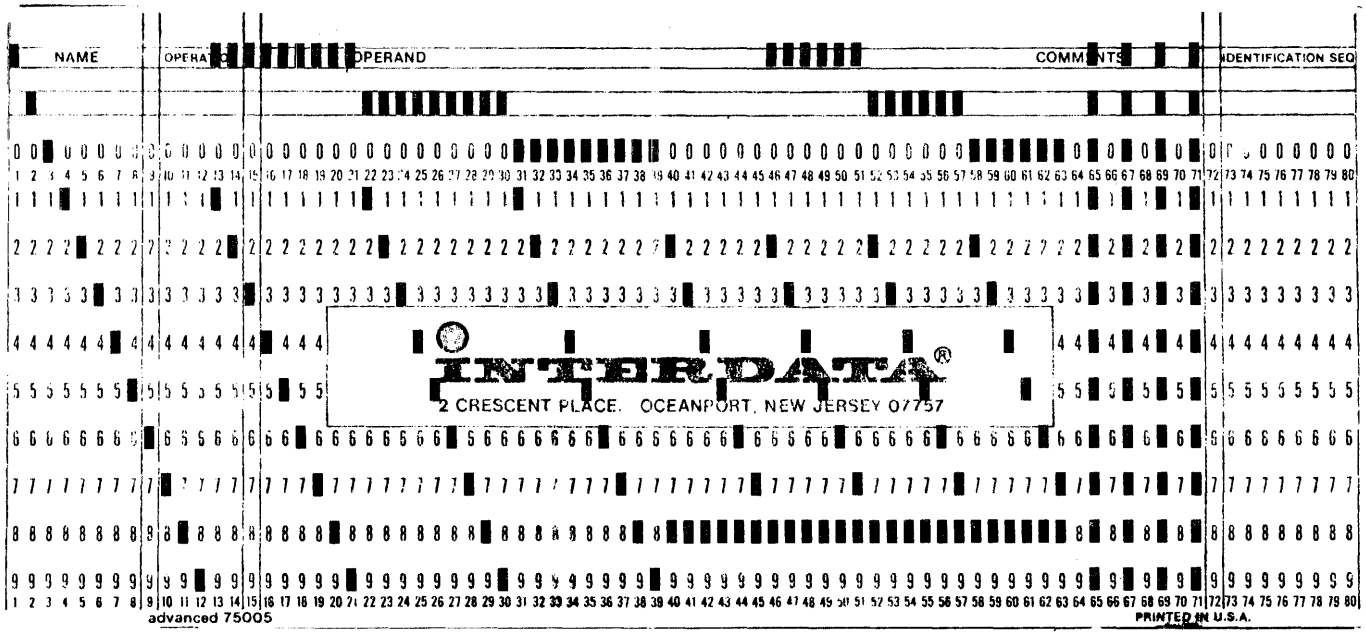
COMMAND	DESCRIPTION
HLT%	Continue testing after error (default)
HLT	Halt on error
LOG%	Disable error printout
LOG	Print error messages (default)
FLT%	Disable single-precision floating-point test (default)
FLT	Enable single-precision floating-point test (default)
DFLT%	Disable double-precision floating-point test (default)
DFLT	Enable double-precision floating-point test
BCK%	Disable background testing. Overrides FLT and DFLT.
BCK	Enable background testing (default)
MOVE	Assign the device just selected to the movable buffer. If the device just selected does not allow use of the movable buffer, an error message is output. If the previous command did not select a device, an error message is output. If the movable buffer assign table is full, an error message is output.
MOVE%	Cancel use of the movable buffer. All devices on the movable buffer assign table are removed.

Other Commands

COMMAND	DESCRIPTION
OPN NNNNN	Print the address and halfword contents of memory location NNNNN.
LF	Typing the line feed key causes the address and halfword contents of the next sequential location to be printed.
REP NNNN	Replace the contents of the open location with NNNN. The address and new contents of the location are printed.
ERR	Prints error summary for those devices currently on the device service table.
DST	Prints the device mnemonics and parameters for those devices currently on the device service table.
OPT	Prints the current switch options. See Program Control Commands.
RUN	Transfers control from the command processor to the device dispatcher. Testing of the selected devices begins.

APPENDIX E
TEST DATA

1. Sample Card Reader Test Card



2. High-Speed Paper-Tape Reader Test Tape 06-136F01M14

This tape, included in this system exerciser package should be made a continuous loop by the user for testing reader-only systems.

3. Example of line printer output:

```
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
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[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
[ "#%&  '()*+,-.10123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ(/)^<
```

APPENDIX F
ERROR MESSAGE SUMMARY

*	01				OPSW	OLOC	NPSW	NLOC	Machine malfunction interrupt
*	04				OPSW	OLOC			Unexpected illegal
	05				OPSW	OLOC			Expected illegal did not occur
*	06				OPSW	OLOC			Unexpected SVC
	07				OPSW	OLOC			Expected SVC did not occur
*	12				OPSW	OLOC			Unexpected arithmetic fault
	13				OPSW	OLOC			Expected AFAULT did not occur
	14				OPSW	OLOC			Expected SPFP fault did not occur
	15				EXPECTED		ACTUAL		SPFP data error
	20	DEV	SS						Bad device status
*	21	DEV	SS						Break key on console device
*	32	DEV	SS		OPSW	OLOC			Unexpected I/O interrupt
	33	DEV	SS						Expected I/O interrupt didn't occur
	34	DEV	SS		OPSW	OLOC			SINT failure
	40	DEV	SS	SEL	EXP	ACT			SELCH read address failure
	41	DEV	SS	SEL	EXP	ACT			SELCH write address failure
	44				OPSW	OLOC			Expected DPFP fault did not occur
	45				RESULT				DPFP data error
	50	DEV	SS		EXP	ACT			Data transfer error
	60				EXP	ACT			Load/store multiple error
	61				EXP	ACT	ADDRESS		Memory test error

*Indicates unrecoverable error

DEV	Device Address	3 digits
SS	Status	2 digits
SEL	SELCH Address	3 digits
OPSW	Old PSW (status)	4 digits
OLOC	Old PSW (location count)	4 digits
NPSW	New PSW (status)	4 digits
NLOC	New PSW (location count)	4 digits
EXP	Expected value	4 digits
ACT	Actual value	4 digits
EXPECTED	Expected value	8 digits
ACTUAL	Actual value	8 digits
RESULT	Actual result	16 digits
ADDRESS	Memory address	8 digits

ERROR MESSAGE INTERNAL FORMAT

0	Flags	Error Number
2	Device Number	
4	Status or New PSW or Actual Value 0:15	
6	SELCH Address or New LOC or Actual Value 16:31	
8	Old PSW or Expected Value bit 0:15	
10	Old LOC or Expected Value bit 16:31	

FLAGS - Select which fields are applicable to this error

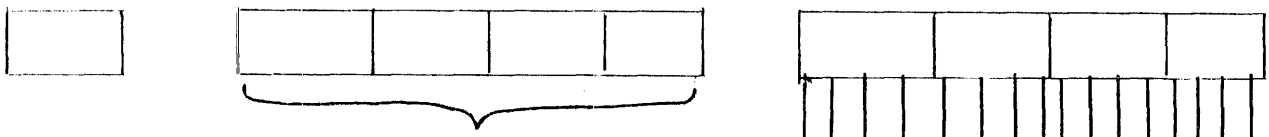
BIT	FIELDS SELECTED
0	Device number, status
1	SELCH address
2	Old PSW or expected value bits 0:15
3	Old LOC or expected value bits 16:31
4	New PSW or actual value bits 0:15
5	New LOC or actual value bits 16:31
6	Reserved
7	Reserved

OTHER ERROR MESSAGES

FORMAT ERROR	Missing space, comma, or hyphen in a command; or MOVE command follows selection of a device not allowed to use the movable buffer.
SEQUENCE ERROR	MOVE command did not follow a device selection.
DATA ERROR	Nonhexadecimal character received.

SYNTAX ERROR	Illegal device or command mnemonic.
NOT ON TABLE	Attempted deletion of a device that had not been placed on the device service table.
DST OVERFLOW	Device service table overflow. More than 32 devices.
MOVE TABLE OVERFLOW	More than 12 assignments.
NOT ENOUGH SELCH BCBS	All selector channels assigned; no default assignment can be made.
ERROR QUEUE FULL	More than 11 errors to be printed.
PROGRAM ERROR, ERRORLOG	Error queue full detection has failed.
PROGRAM ERROR, ABORT HANDLER	Testing was aborted, but the error queue is empty.
DUPLICATE DEVICE	Device number conflict.
FALSE SYNC	Device timeout.
PROGRAM ERROR, NO MNEMONIC FOR DCB	The error list or DST list command has come up with an invalid DCB address.

APPENDIX G
FLASHING INDICATORS ON THE DISPLAY PANEL



BIT	TEST
0	DSC1 or FMD1
1	DSC2 FMD2
2	DSC3 FMD3
3	DSC4 FMD4
4	DSCA MSM1
5	DSCB MSM2
6	DSCC MSM3
7	DSCD MSM4
8	BACKGROUND
9	MEMORY
10	Single Precision FLPT
11	Double Precision FLPT
12	Precision Interval Clock
13	AC Line Clock
14	5/16 External Clock or Memory Protect
15	SELCH Tester or Digital MUX

```
 1  S16EXR   PROG  SERIES 16 SYSTEM EXERCISER  06-136R04M96A13              EXR00010
 2           SCRAT                                                         EXR00020
 3           TARGT 16                                                      EXR00030
 4           CROSS                                                         EXR00040
 5           SQCHK                                                         EXR00050
 6  *                                                                      EXR00060
 7  * COPYRIGHT (C) 1977 BY PERKIN-ELMER CORPORATION JUNE 1978             EXR00070
 8  *                                                                      EXR00080
 9  * PROGRAM IS DESIGNED TO TEST THE SIMULTANEOUS OPERATION OF            EXR00090
10  * 1) MULTIPLEXOR CHANNEL DEVICES                                       EXR00100
11  * 2) SELECTOR CHANNEL AND SELECTOR CHANNEL DEVICES                     EXR00110
12  * 3) MEMORY OPERATIONS                                                 EXR00120
13  * 4) PROCESSOR OPERATIONS                                              EXR00130
14  * 5) PROCESSOR INTERRUPT FEATURES                                      EXR00140
15  *                                                                      EXR00150
16  * ASSUMPTIONS:                                                         EXR00160
17  * 1) ALL PROCESSOR TESTS HAVE BEEN SUCCESSFULLY RUN                    EXR00170
18  * 2) ALL PERTINANT PERIPHERAL TESTS HAVE BEEN SUCCESSFULLY RUN         EXR00180
19  *                                                                      EXR00190
20  * LOADING THE PROGRAM:                                                 EXR00200
21  * 1. PROGRAM CONTAINS A FRONT END BOOT LOADER AND IS LOADED            EXR00210
22  *    USING THE STANDARD 50 SEQUENCE.                                   EXR00220
23  *                                                                      EXR00230
24  * 2. IF THE CONSOLE DEVICE IS NOT A TTY,GDT,CRT OR CAROUSEL            EXR00240
25  *    15,30 OR 35 ON A CURRENT LOOP INTERFACE, THE HALFWORD             EXR00250
26  *    LABELED "CONTYP" AT X'02D8' MUST BE MODIFIED.                     EXR00260
27  *                                                                      EXR00270
28  *        CONSOLE DEVICE IDENTIFIER:                                    EXR00280
29  *                                                                      EXR00290
30  *        01    = GDT OR CRT ON PASLAPALM (FDX,HIGHEST BAUD RATE)       EXR00300
31  *        02    = TTY,GDT,CRT OR CAROUSEL 15,30,35 ON CURRENT LOOP INF  EXR00310
32  *        03    = RESERVED, INTERPRETED AS '02'                         EXR00320
33  *        04    = CAROUSEL 300 ON PASLA/PALM (FDX,HIGHEST BAUD RATE)    EXR00330
34  *        05    = TTY,GDT,CRT OR CAROUSEL 15,30,35 ON MICRO I/O CL INF  EXR00340
35  *        00 AND 06:FF = RESERVED, INTERPRETED AS '02'                  EXR00350
36  *                                                                      EXR00360
37  *                                                                      EXR00370
38  * 3. PROGRAM IS STARTED AT X'2D0' TO PERFORM COMPLETE INITIALIZATION    EXR00380
39  * 4. PROGRAM CAN BE RESTARTED AT X'2D4' TO PRESERVE THE DEVICE         EXR00390
40  *    SERVICE TABLE AND DCB'S                                           EXR00400
41  *                                                                      EXR00410
42  *                                                                      EXR00420
43  * NORMAL OPERATION:                                                    EXR00430
44  *                                                                      EXR00440
45  * DEVICES ARE SELECTED AND PLACED ON THE DEVICE SERVICE TABLE BY       EXR00450
46  * OPERATOR COMMANDS.  THE RUN COMMAND IS USED TO START TESTING.        EXR00460
47  * EACH DEVICE ON THE SERVICE TABLE IS REPEATEDLY POLLED BY THE         EXR00470
48  * DISPATCHER IN AN ATTEMPT TO KEEP ALL DEVICES BUSY.  ERRORS ARE       EXR00480
49  * REPORTED ON THE CONSOLE DEVICE.  IF THE CONSOLE DEVICE FALLS         EXR00490
50  * BEHIND IN PRINTING ERROR MESSAGES, THE ERROR QUEUE WILL FILL UP      EXR00500
51  * AND TESTING WILL BE ABORTED.  CONTROL RETURNS TO THE COMMAND         EXR00510
52  * PROCESSOR AFTER THE ERRORS ARE PRINTED.  DEPRESSING THE BREAK        EXR00520
53  * KEY ON THE CONSOLE DEVICE WILL ALSO ABORT TESTING.                   EXR00530
```

```
                                    56  *                                                                                   EXR00560
                                    57  * SYSTEM GENERATION PARAMETERS                                                     EXR00570
                                    58  *                                                                                   EXR00580
                                    59  * THE FOLLOWING EQUATES MAY BE ADJUSTED TO TAILOR THE                            EXR00590
                                    60  * DEVICE DRIVER AND DCB COMPLEMENT TO FIT THE SYSTEM.                            EXR00600
                                    61  *                                                                                   EXR00610
                                    62  * EQUATE AN ITEM TO ZERO TO DELETE THE DRIVER AND DCB                           EXR00620
                                    63  *                                                                                   EXR00630
0000 0001                           64  PAPRTAPE EQU   1              HSPTR,HSPTP,HSPTRP   MAX 1                        EXR00640
0000 0001                           65  CARDRDR  EQU   1              CARD READER          MAX 1                        EXR00650
0000 0002                           66  PRINTERS EQU   2              LINE PRINTERS        MAX 2                        EXR00660
0000 0001                           67  CLOCK    EQU   1              ACL AND PIC          MAX 1                        EXR00670
0000 0004                           68  CASSETTE EQU   4              CASSETTE DRIVES      MAX 4                        EXR00680
0000 0004                           69  FLOPPY   EQU   4              FLOPPY MEDIA DISC    MAX 4                        EXR00690
0000 0001                           70  SLCHTSTR EQU   1                                                                 EXR00700
0000 0004                           71  SELCHS   EQU   4              SELECTOR CHANNELS    MAX 4                        EXR00710
0000 0004                           72  MAGTAPE  EQU   4              MAG TAPE TRANSPORTS  MAX 4                        EXR00720
0000 0004                           73  DISCS    EQU   4              2.5 & 10MB DISCS     MAX 4                        EXR00730
0000 0004                           74  DSK40MB  EQU   4              40MB DISC DRIVES     MAX 4                        EXR00740
0000 0004                           75  MSMDISC  EQU   4              80 & 300 MB DISCS    MAX 4                        EXR00750
0000 0001                           76  DIGTLMPX EQU   1              DIGITAL MULTIPLEXOR  MAX 1                        EXR00760
0000 0000                           77  DIGTLIO  EQU   0              DIGITAL I/O          MAX 1                        EXR00770
0000 0001                           78  EIGHTINT EQU   1              8-LINE INTERRUPT     MAX 1                        EXR00780
0000 0000                           79  PASLA    EQU   0              PASLA/PALM                                        EXR00790
0000 0001                           80  ULI      EQU   1              UNIVERSAL LOGIC INF  MAX 1                        EXR00800
0000 0084                           81  QUEUESIZ EQU   132            MAX SIZE OF ERROR QUEUE                           EXR00810
0000 7FF8                           82  MAXWAIT  EQU   X'7FF8'        MAX IMUM TIME-OUT VALUE                           EXR00820
```

REGISTER ASSIGNMENTS

```
0000 0000            84  R0       EQU   0                                  EXR00840
0000 0000            85  ZERO     EQU   0          CONSTANT ZERO           EXR00850
0000 0001            86  R1       EQU   1          INTERUPT ADDRESS        EXR00860
0000 0002            87  R2       EQU   2          GENERAL ACCUMULATOR     EXR00870
0000 0003            88  R3       EQU   3                                  EXR00880
0000 0003            89  RET1     EQU   3          FIRST LEVEL LINK REGISTER EXR00890
0000 0004            90  R4       EQU   4                                  EXR00900
0000 0004            91  DEV      EQU   4          CURRENT DEVICE NUMBER   EXR00910
0000 0005            92  R5       EQU   5                                  EXR00920
0000 0005            93  STAT     EQU   5          DEVICE STATUS           EXR00930
0000 0006            94  R6       EQU   6                                  EXR00940
0000 0006            95  DCBADR   EQU   6          CURRENT DEVICE CONTROL BLOCK ADRS EXR00950
0000 0007            96  R7       EQU   7                                  EXR00960
0000 0007            97  CHAR     EQU   7          GENERAL PURPOSE BYTE ACCUMULATOR EXR00970
0000 0008            98  R8       EQU   8                                  EXR00980
0000 0008            99  TEMP     EQU   8          GENERAL PURPOSE HALFWORD ACCUMULATOR EXR00990
0000 0009           100  DAT      EQU   9          GENERAL PURPOSE HALFWORD ACCUMULATOR EXR01000
0000 000A           101  R10      EQU   10                                 EXR01010
0000 000A           102  STATE    EQU   10         EXERCISOR STATUS REGISTER EXR01020
0000 000B           103  R11      EQU   11                                 EXR01030
0000 000B           104  RET2     EQU   11         SECOND LEVEL LINK REGISTER EXR01040
0000 000C           105  R12      EQU   12                                 EXR01050
0000 000C           106  RET3     EQU   12         THIRD LEVEL LINK REGISTER EXR01060
0000 000D           107  R13      EQU   13                                 EXR01070
0000 000E           108  R14      EQU   14         DCB FLAGS               EXR01080
0000 000F           109  R15      EQU   15         DRIVER PHASE            EXR01090

                    111  * STATE REGISTER BIT DEFINITIONS                  EXR01110
                    112  *                                                 EXR01120
0000 8000           113  ENTRFLAG EQU   X'8000'     INDICATES PRIMARY ENTRY EXR01130
0000 4000           114  HLTSWTCH EQU   X'4000'     HALT ON ERROR           EXR01140
0000 2000           115  LOGSWTCH EQU   X'2000'                             EXR01150
0000 1000           116  FLTSWTCH EQU   X'1000'                             EXR01160
0000 0800           117  BCKSWTCH EQU   X'0800'                             EXR01170
0000 0400           118  UTILITY  EQU   X'0400'                             EXR01180
0000 0200           119  QFULL    EQU   X'0200'                             EXR01190
0000 0100           120  EXTMEM   EQU   X'0100'                             EXR01200
0000 0080           121  ERRBIT   EQU   X'0080'                             EXR01210
0000 0040           122  DFLTSWCH EQU   X'0040'                             EXR01220
0000 0020           123  PARITY   EQU   X'0020'     FIRST PARITY ERROR FLAG EXR01230
0000 0010           124  MICROBUS EQU   X'0010'     CONSOLE FLAGS, MICRO I/O BUS EXR01240
0000 0008           125  CARSL300 EQU   X'0008'     CONSOLE FLAGS, CAROUSEL 300 EXR01250
0000 0004           126  PASLAFLG EQU   X'0004'     CONSOLE FLAGS, PASLA/PALM EXR01260
0000 0002           127  MOVING   EQU   X'0002'     MOVABLE BUFFER ACTIVE   EXR01270
0000 0001           128  MOVEBUSY EQU   X'0001'     MOVABLE BUFFER IN USE   EXR01280
```

DEVICE CONTROL BLOCK ASSIGNMENTS

```
0000 0000            130  FLAGS     EQU   0          DISPATCH & DEVICE TYPE FLAGS          EXR01300
0000 0002            131  PHASE     EQU   2          DRIVER PHASE COUNT                    EXR01310
0000 0004            132  PARM      EQU   4          PARAMETER FLAGS                       EXR01320
0000 0006            133  DEVADR    EQU   6          DEVICE ADDRESS                        EXR01330
0000 0008            134  STATUS    EQU   8          DEVICE STATUS                         EXR01340
0000 000A            135  DVRENTRY  EQU   10         DRIVER ENTRY ADDRESS                  EXR01350
0000 000C            136  CURWAIT   EQU   12         CURRENT TIMER VALUE                   EXR01360
0000 000E            137  ERRCOUNT  EQU   14         ERROR COUNT                           EXR01370
0000 0010            138  PARMCHCK  EQU   16         PARAMETER CHECK ROUTINE ADDRESS       EXR01380
0000 0012            139  BUF1STRT  EQU   18         BUFFER 1 START ADDRESS                EXR01390
0000 0012            140  MEMLOW    EQU   18         MEMORY TEST LOW LIMIT (BUF1STRT)      EXR01400
0000 0014            141  BUF1END   EQU   20         BUFFER 1 END ADDRESS                  EXR01410
0000 0014            142  MEMHIGH   EQU   20         MEMORY TEST HIGH LIMIT (BUF1END)      EXR01420
0000 0016            143  BUF1NEXT  EQU   22         CURRENT BUFFER 1 ADDRESS              EXR01430
0000 0018            144  DVRWRK1   EQU   24         WORK REGISTER 1                       EXR01440
0000 001A            145  DVRWRK2   EQU   26         WORK REGISTER 2                       EXR01450
0000 001C            146  BUF1EXT   EQU   28         BUFFER 1 EXTENDED ADRS BITS           EXR01460
0000 001D            147  BUF2EXT   EQU   29         BUFFER 2 EXTENDED ADRS BITS           EXR01470
0000 001E            148  BUF2STRT  EQU   30         BUFFER 2 START ADDRESS                EXR01480
0000 0020            149  BUF2END   EQU   32         BUFFER 2 END ADDRESS                  EXR01490
0000 0022            150  BUF2NEXT  EQU   34         CURRENT BUFFER 2 ADDRESS              EXR01500
0000 0024            151  SELCHADR  EQU   36         SELCH ADDRESS                         EXR01510
0000 0026            152  SLCHGOR   EQU   38         SELCH READ COMMAND                    EXR01520
0000 0027            153  SLCHGOW   EQU   39         SELCH WRITE COMMAND                   EXR01530
0000 0028            154  LRNCUR    EQU   40         CURRENT FLOPPY LRN                    EXR01540
0000 0028            155  CONTADR   EQU   40         DISC CONTROLLER ADDRESS               EXR01550
0000 002A            156  LRNLOW    EQU   42         FLOPPY LOW LRN                        EXR01560
0000 002A            157  CYLLOW    EQU   42         CYLINDER LOW LIMIT                    EXR01570
0000 002C            158  LRNHIGH   EQU   44         FLOPPY HIGH LRN LIMIT                 EXR01580
0000 002C            159  CYLHIGH   EQU   44         CYLINDER HIGH LIMIT                   EXR01590
0000 002E            160  HEADLOW   EQU   46         HEAD LOW LIMIT                        EXR01600
0000 002F            161  HEADHIGH  EQU   47         HEAD HIGH LIMIT                       EXR01610
0000 0030            162  SCTRLOW   EQU   48         SECTOR LOW LIMIT                      EXR01620
0000 0032            163  SCTRHIGH  EQU   50         SECTOR HIGH LIMIT                     EXR01630
0000 0034            164  SCTRCUR   EQU   52         CURRENT SECTOR NUMBER                 EXR01640
0000 0036            165  CYLCUR    EQU   54         CURRENT CYLINDER NUMBER               EXR01650
0000 0038            166  HEADCUR   EQU   56         CURRENT HEAD NUMBER                   EXR01660
                     167  *                                                                EXR01670
                     168  * DCB DISPATCH FLAG BITS                                        EXR01680
                     169  *                                                                EXR01690
0000 8000            170  IGNORE    EQU   X'8000'                                        EXR01700
0000 4000            171  BUSY      EQU   X'4000'                                        EXR01710
0000 2000            172  NOTCOUNT  EQU   X'2000'                                        EXR01720
0000 1000            173  BADSTAT   EQU   X'1000'                                        EXR01730
0000 0800            174  DEVCNTL1  EQU   X'0800'                                        EXR01740
0000 0400            175  DEVCNTL2  EQU   X'0400'                                        EXR01750
0000 0080            176  SELCH     EQU   X'0080'                                        EXR01760
0000 0040            177  MEMORY    EQU   X'0040'                                        EXR01770
0000 0020            178  USESELCH  EQU   X'0020'   DEVICE USES A SELCH                  EXR01780
0000 0010            179  DISC      EQU   X'0010'   DEVICE IS A DISC                     EXR01790
0000 0008            180  FMD       EQU   X'0008'   DEVICE IS A FLOPPY                   EXR01800
```

DEVICE CONTROL BLOCK ASSIGNMENTS

```
                              182  *                              PHASE VALUE EQUATES                 EXR01820
       0000 0002              183  ONE       EQU   2                                                  EXR01830
       0000 0004              184  TWO       EQU   4                                                  EXR01840
       0000 0006              185  THREE     EQU   6                                                  EXR01850
       0000 0008              186  FOUR      EQU   8                                                  EXR01860
       0000 000A              187  FIVE      EQU   10                                                 EXR01870
       0000 000C              188  SIX       EQU   12                                                 EXR01880
       0000 000E              189  SEVEN     EQU   14                                                 EXR01890
       0000 0010              190  EIGHT     EQU   16                                                 EXR01900
       0000 0012              191  NINE      EQU   18                                                 EXR01910
       0000 0014              192  TEN       EQU   20                                                 EXR01920
       0000 0016              193  ELEVEN    EQU   22                                                 EXR01930
       0000 0018              194  TWELVE    EQU   24                                                 EXR01940
       0000 001A              195  THIRTEEN  EQU   26                                                 EXR01950
       0000 001C              196  FOURTEEN  EQU   28                                                 EXR01960
       0000 001E              197  FIFTEEN   EQU   30                                                 EXR01970
       0000 0020              198  SIXTEEN   EQU   32                                                 EXR01980
       0000 0022              199  SEVENTEN  EQU   34                                                 EXR01990
       0000 0024              200  EIGHTEEN  EQU   36                                                 EXR02000
       0000 0026              201  NINETEEN  EQU   38                                                 EXR02010
       0000 0028              202  TWENTY    EQU   40                                                 EXR02020
       0000 002A              203  TWENTY1   EQU   42                                                 EXR02030
       0000 0030              204  SELCHGOR  EQU   X'30'                                              EXR02040
       0000 0010              205  SELCHGOW  EQU   X'10'                                              EXR02050
0000R                         206            ORG   X'0080'                                            EXR02060
0080   C810 02D0              207            LHI   R1,X'2D0'                                          EXR02070
0084   2421                   208            LIS   R2,1            INCREMENT VALUE                    EXR02080
0086   C830 3ED5              209            LHI   R3,LNZB         ADDRESS OF LAST NON-ZERO BYTE      EXR02090
008A   C860 00FF              210  MN        LHI   R6,X'FF'        CHECKSUM BYTE                      EXR02100
008E   D340 0078              211            LB    R4,X'78'        BINARY INPUT DEVICE                EXR02110
0092   DE40 0079              212            OC    R4,X'79'        OUTPUT COMMAND READ                EXR02120
0096   9D45                   213  LEADER    SSR   R4,R5                                              EXR02130
0098   2091                   214            BTBS  9,1                                                EXR02140
009A   9B45                   215            RDR   R4,R5                                              EXR02150
009C   0855                   216            LDAR  R5,R5           TEST THE INPUT CHARACTER           EXR02160
009E   2234                   217            BZS   LEADER          IGNORE LEADING ZERO BYTES          EXR02170
00A0   D251 0000              218  LOAD      STB   R5,0(R1)        STORE IN MEMORY                    EXR02180
00A4   0765                   219            XAR   R6,R5           GENERATE CHECKSUM                  EXR02190
00A6   9A26                   220            WDR   R2,R6           DISPLAY ACCUMULATED CHECKSUM       EXR02200
00A8   9D45                   221            SSR   R4,R5                                              EXR02210
00AA   2091                   222            BTBS  9,1                                                EXR02220
00AC   9B45                   223            RDR   R4,R5           NEXT BYTE                          EXR02230
00AE   C110 00A0              224            BXLE  R1,LOAD         LOOP                               EXR02240
00B2   9826                   225            WHR   R2,R6           DISPLAY FINAL CHECKSUM             EXR02250
00B4   C200 00B8              226  HALT3     LPSW  STARTX                                             EXR02260
00B8   8000                   227  STARTX    DC    X'8000',X'02D0'                                    EXR02270
00BA   02D0
```

```
00BC                        229          ORG   X'02D0'                                    EXR02290
02D0  4300 02E8             230          B     START          PRIMARY ENTRY FOR SET-UP    EXR02300
02D4  4300 04C0             231          B     RESTART        SECONDARY ENTRY FOR RESTART EXR02310
                            232  *                                                        EXR02320
                            233  *                                                        EXR02330
                            234  * CONSOLE DEVICE DEFINITION TABLE                       EXR02340
                            235  *                                                        EXR02350
02D8  0002                  236  CONTYP   DCX   0002           DEFAULT TO TTY,GDT,CRT OR CAROUSEL EXR02360
                            237  *                             15,30,35 ON CURRENT LOOP INTERFACE EXR02370
02DA  0002                  238  CONADR   DCX   0002           DEFAULT ADDRESS IS X'02'   EXR02380
02DC  0010                  239  PASLADR  DCX   0010           PASLA/PALM ADDRESS         EXR02390
02DE  0002                  240  CLIFADR  DCX   0002           CURRENT LOOP INTERFACE ADDRESS EXR02400
02E0  0002                  241          DCX   0002                                      EXR02410
02E2  0010                  242  C300ADR  DCX   0010           CAROUSEL 300 PASLA ADDRESS EXR02420
02E4  00C0                  243  MICROIO  DCX   00C0           ASCII PROGRAMMER CONSOLE ADRS EXR02430
02E6  0001                  244  TIMEVAL  DC    1                                        EXR02440
                            245  *                                                        EXR02450
                            246  *                                                        EXR02460
                            247  *                                                        EXR02470
02E8  0700                  248  START    XHR   ZERO,ZERO                                EXR02480
02EA  C810 1C6E             249          LHI   R1,INTERUPT     IMMEDIATE INTERRUPT HANDLER EXR02490
02EE  C880 02FC             250          LHI   TEMP,INITIAL                             EXR02500
02F2  4000 0034             251          STH   ZERO,X'34'      NEW PSW FOR ILLEGAL INSTRUCTION EXR02510
02F6  4080 0036             252          STH   TEMP,X'36'                               EXR02520
02FA  0000                  253          DC    X'0000'         FORCE AN ILLEGAL INSTRUCTION EXR02530
                            254  *                                                        EXR02540
02FC  C8A0 A800             255  INITIAL  LHI   STATE,ENTRFLAG+LOGSWTCH+BCKSWTCH        EXR02550
0300  C880 056A             256          LHI   TEMP,REGSAVE    GENERAL REGISTER SAVE AREA EXR02560
0304  4080 0022             257          STH   TEMP,X'22'                               EXR02570
0308  07EE                  258          XHR   R14,R14                                  EXR02580
030A  40E0 07DA             259          STH   R14,MOVER       CLEAR MOVABLE BUFFER POINTER EXR02590
030E  40E0 07DC             260          STH   R14,MOVER+2                              EXR02600
0312  C8F0 18F8             261          LHI   R15,FFAULT                               EXR02610
0316  D0E0 002C             262          STM   R14,X'2C'       FLOATING POINT FAULT NEW PSW EXR02620
031A  C8F0 18B0             263          LHI   R15,ILLEGINS                             EXR02630
031E  D0E0 0034             264          STM   R14,X'34'       ILLEGAL INSTRUCTION NEW PSW EXR02640
0322  C8F0 1978             265          LHI   R15,MALFUNCT                             EXR02650
0326  D0E0 003C             266          STM   R14,X'3C'       MACHINE MALFUNCTION NEW PSW EXR02660
032A  C8F0 1C5C             267          LHI   R15,EXTINT                               EXR02670
032E  D0E0 0044             268          STM   R14,X'44'       I/O INTERRUPT NEW PSW    EXR02680
0332  C8F0 1916             269          LHI   R15,AFAULT                               EXR02690
0336  D0E0 004C             270          STM   R14,X'4C'       DIVIDE FAULT NEW PSW     EXR02700
033A  4000 009A             271          STH   ZERO,X'9A'      SUPERVISOR CALL NEW STATUS EXR02710
033E  C880 1944             272          LHI   TEMP,SVCERR                              EXR02720
0342  C890 001E             273          LHI   DAT,30                                   EXR02730
0346  4089 009C             274  SVCFILL  STH   TEMP,X'9C'(DAT) FILL IN ALL 16 SVC NEW  EXR02740
034A  2792                  275          SIS   DAT,2           LOCATION COUNTER VALUES  EXR02750
034C  2283                  276          BNLS  SVCFILL         X'9C' THROUGH 'BF'       EXR02760
034E  C880 0534             277          LHI   TEMP,CONPRINT                            EXR02770
0352  4080 009E             278          STH   TEMP,X'9E'      SVC 1 FOR CONSOLE PRINT  EXR02780
                            279  *                                                        EXR02790
0356  D1E0 07DE             280          LM    R14,MEMSTART    SET TOP OF MEMORY ADDRESS EXR02800
035A  D0E0 07E2             281          STM   R14,MEMTOP      EQUAL TO TOP OF EXERCISOR EXR02810
```

INITIALIZATION, START AND RESTART

```
                  *                      STARTING AT TOP OF EXERCISOR         EXR02820
                  *                      SEARCH FOR TOP OF MEMORY             EXR02830
035E  4000 0ADC          STH   ZERO,MEMMAP      CLEAR MEMORY MAP                  EXR02840
0362  4000 0ADE          STH   ZERO,MEMMAP+2                                      EXR02850
0366  ECE0 000D          SRL   R14,13           SEE WHICH 8K BLOCK WE END IN      EXR02860
036A  089F               LHR   DAT,R15                                            EXR02870
036C  0A99               AHR   DAT,DAT                                            EXR02880
036E  4889 1D74          LH    TEMP,BIT0(DAT)   MARK MEMORY UP TO END OF          EXR02890
0372  6180 0ADC    TOM1  AHM   TEMP,MEMMAP      EXERCISOR AS PRESENT              EXR02900
0376  0A88               AHR   TEMP,TEMP                                          EXR02910
0378  2283               BNCS  TOM1                                               EXR02920
037A  26F1               AIS   R15,1            ADVANCE TO NEXT 8K BLOCK          EXR02930
037C  088F               LHR   TEMP,R15                                           EXR02940
037E  0A88               AHR   TEMP,TEMP                                          EXR02950
0380  4888 1D74          LH    TEMP,BIT0(TEMP)                                    EXR02960
0384  4000 0000          STH   ZERO,0           CLEAR FOR WRAP AROUND CHECK       EXR02970
0388  EDE0 000D          SLL   R14,13           GET ACTUAL ADDRESS FOR START      EXR02980
038C  40FF 0000    TOM2  STH   R15,0(R15)       STORE PATTERN                     EXR02990
0390  4000 056A          STH   ZERO,REGSAVE     CLEAR MEMORY INTERFACE            EXR03000
0394  45FF 0000          CLH   R15,0(R15)       SEE IF PATTERN COMES BACK         EXR03010
0398  4230 0414          BNE   FOUNDT           NO...1ST 64KB MUST BE CONTIG.  R04 EXR03020
039C  4870 0000          LH    CHAR,0           CHECK FOR WRAP                    EXR03030
03A0  4230 0414          BNZ   FOUNDT           BRANCH IF WRAP                    EXR03040
03A4  6180 0ADC          AHM   TEMP,MEMMAP      MARK BLOCK AS PRESENT             EXR03050
03A8  9081         TOM3  SRLS  TEMP,1           SHIFT CURSOR                      EXR03060
03AA  CAF0 2000          AHI   R15,X'2000'      INCREMENT BY 8K                   EXR03070
03AE  4330 038C          BNC   TOM2             LOOP WITHIN FIRST 64 KB           EXR03080
03B2  C8D0 0080          LHI   R13,X'0080'      SET CURSOR TO 64K                 EXR03090
03B6  C890 2424          LHI   DAT,X'2424'                                        EXR03100
03BA  4090 FFFE          STH   DAT,X'FFFE'      LAST HALFWORD IN 64 KB            EXR03110
03BE  C890 0010          LHI   DAT,X'0010'                                        EXR03120
03C2  9589               EPSR  TEMP,DAT         CHANGE BANK SELECT BITS           EXR03130
03C4  4890 FFFE          LH    DAT,X'FFFE'                                        EXR03140
03C8  24E1               LIS   R14,1                                              EXR03150
03CA  07FF               XHR   R15,R15                                            EXR03160
03CC  C590 2424          CLHI  DAT,X'2424'      SEE IF SAME PATTERN               EXR03170
03D0  4330 0414          BE    FOUNDT           IF YES, SYSTEM HAS 64KB           EXR03180
                  *                      IF NO, MORE THAN 64KB                EXR03190
03D4  C6A0 0100          OHI   STATE,EXTMEM     SET EXTENDED MEMORY BIT           EXR03200
03D8  085E         TOM4  LHR   STAT,R14                                           EXR03210
03DA  087F               LHR   CHAR,R15         STAT,CHAR = PHYSICAL ADDRESS      EXR03220
03DC  41C0 0DE2          BAL   RET3,ADRSET      CONVERT TO PROGRAM ADDRESS        EXR03230
03E0  40F7 0000          STH   R15,0(CHAR)      STORE PATTERN                     EXR03240
03E4  4000 056A          STH   ZERO,REGSAVE     CLEAR MDR                         EXR03250
03E8  45F7 0000          CLH   R15,0(CHAR)      SEE IF PATTERN COMES BACK         EXR03260
03EC  2133               BNES  TOM5                                               EXR03270
03EE  C5E0 0002          CLHI  R14,2                                              EXR03280
03F2  2184               BLS   TOM4A                                              EXR03290
03F4  61D0 0ADE          AHM   R13,MEMMAP+2     SET BIT IN 2ND 128K MAP           EXR03300
03F8  2303               BS    TOM5                                               EXR03310
03FA  61D0 0ADC    TOM4A AHM   R13,MEMMAP       SET BIT IN 1ST 128K MAP           EXR03320
03FE  CAF0 2000    TOM5  AHI   R15,X'2000'      NEXT 8K                           EXR03330
0402  0EE0               ACHR  R14,ZERO                                           EXR03340
```

```
0404  90D1            335          SRLS  R13,1              SHIFT CURSOR                                EXR03350
0406  2363            336          BNCS  TOM3A                                                       EXR03360
0408  C8D0 8000       337          LHI   R13,X'8000'        SET CURSOR TO 128K                          EXR03370
040C  C5E0 0004       338  TOM3A   CLHI  R14,4                                                        EXR03380
0410  4280 03D8       339          BL    TOM4                                                        EXR03390
                      340  *                                                                          EXR03400
0414  9580            341  FOUNDT  EPSR  TEMP,ZERO          CLEAR PSW                                   EXR03410
0416  D1E0 0ADC       342          LM    R14,MEMMAP         PICK UP ENTIRE MAP                          EXR03420
041A  2591            343          LIS   DAT,1                                                        EXR03430
041C  2691            344  FOUNDT1 AIS   DAT,1              INCREMENT COUNT                             EXR03440
041E  EDE0 0001       345          SLL   R14,1              SHIFT PATTERN                               EXR03450
0422  2083            346          BCS   FOUNDT1            LOOP UNTIL FIRST 0 BIT                      EXR03460
0424  07EE            347          XHR   R14,R14                                                        EXR03470
0426  08F9            348          LHR   R15,DAT            R14,R15 = COUNT                             EXR03480
0428  EDE0 000D       349          SLL   R14,13             FORM ADDRESS                                EXR03490
042C  27F2            350          SIS   R15,2              DECREMENT TO GET ADDRESS OF                 EXR03500
042E  0FE0            351          SCHR  R14,ZERO           LAST HALFWORD IN THE FIRST                  EXR03510
0430  D0E0 07E2       352          STM   R14,MEMTOP         CONTIGUOUS SEGMENT                          EXR03520
                      353  *                                                                          EXR03530
0434  088A            354          LHR   TEMP,STATE         SAVE STATE REGISTER                         EXR03540
                      355  *                                                                          EXR03550
                      356  *                          ISR  DS   2              OLD PSW                  EXR03560
                      357  *                               DS   2              OLD LOC                  EXR03570
0436  07AA            358          XHR   R10,R10            DCX  0000           NEW PSW                  EXR03580
0438  C8B0 D020       359          LHI   R11,X'D020'        STM  R2,INTSAVE     SAVE R2:R15              EXR03590
043C  C8C0 1D16       360          LHI   R12,INTSAVE                                                     EXR03600
0440  C8D0 C840       361          LHI   R13,X'C840'        LHI  DEV,0                                  EXR03610
0444  07EE            362          XHR   R14,R14                                                        EXR03620
0446  C8F0 0301       363          LHI   R15,X'0301'        BR   R1             GO TO INTRUPT           EXR03630
044A  0799            364          XHR   DAT,DAT                                                        EXR03640
044C  D0A9 597A       365  ISRFILL STM   R10,AUTOIO+4(DAT)  FILL IN ALL 256 INTERRUPT                   EXR03650
0450  26E1            366          AIS   R14,1              SERVICE ROUTINES.  EACH ISR                 EXR03660
0452  CA90 0010       367          AHI   DAT,16             LOADS REGISTER "DEV" WITH A                 EXR03670
0456  C5E0 0100       368          CLHI  R14,256            DIFFERENT DEVICE NUMBER FROM                EXR03680
045A  2087            369          BLS   ISRFILL            '00' THROUGH 'FF'                           EXR03690
                      370  *                                                                          EXR03700
045C  08A8            371          LHR   STATE,TEMP         RESTORE STATE REGISTER                      EXR03710
045E  C860 2290       372          LHI   DCBADR,CONDCB      INITIALIZE CONSOLE DCB                      EXR03720
0462  D206 0000       373          STB   ZERO,FLAGS(DCBADR) RESET ALL FLAGS                             EXR03730
0466  4890 02D8       374          LH    DAT,CONTYP         GET CONSOLE TYPE                            EXR03740
046A  C590 0006       375          CLHI  DAT,6                                                          EXR03750
046E  2182            376          BLS   CONSET1                                                        EXR03760
0470  2492            377          LIS   DAT,2              DEFAULT X'06':X'FF' TO X'02'                EXR03770
0472  D389 0B04       378  CONSET1 LB    TEMP,TYPETAB(DAT)  SET STATE REGISTER BITS                     EXR03780
0476  06A8            379          OHR   STATE,TEMP                                                     EXR03790
0478  0A99            380          AHR   DAT,DAT                                                        EXR03800
047A  4889 02DA       381          LH    TEMP,CONADR(DAT)   SELECT CONSOLE ADDRESS                     EXR03810
047E  4080 02DA       382          STH   TEMP,CONADR                                                    EXR03820
0482  4086 0006       383          STH   TEMP,DEVADR(DCBADR) FILL IN CONSOLE ADDRESS                    EXR03830
                      384  *                                                                          EXR03840
                      385  * CLEAR THE DEVICE SERVICE TABLE                                           EXR03850
                      386  *                                                                          EXR03860
0486  C880 1B0E       387          LHI   TEMP,DST                                                     EXR03870
```

INITIALIZATION, START AND RESTART

```
048A   4080 1B50          388          STH   TEMP,DSTNEXT       INITIALLY, FIRST SLOT IS NEXT          EXR03880
048E   2782               389          SIS   TEMP,2             ADDRESS OF LAST USED PRECEEDS          EXR03890
0490   4080 1B4E          390          STH   TEMP,DSTLAST       FIRST SLOT, TABLE IS EMPTY.            EXR03900
                          391  *                                                                      EXR03910
                          392  * CLEAR THE MOVING BUFFER ASSIGN TABLE                                  EXR03920
                          393  *                                                                      EXR03930
0494   C880 1F40          394          LHI   TEMP,MOVETAB                                            EXR03940
0498   4080 1F58          395          STH   TEMP,MOVENEXT       INITIALLY, FIRST SLOT IS NEXT          EXR03950
049C   2782               396          SIS   TEMP,2             ADDRESS OF LAST USED PRECEEDS          EXR03960
049E   4080 1F5A          397          STH   TEMP,MOVELAST       FIRST SLOT...TABLE IS EMPTY            EXR03970
04A2   4000 07F8          398          STH   ZERO,FMDRIVE        CLEAR DRIVE SELECT                     EXR03980
                          399  *                                                                      EXR03990
                          400  * PUT SELCHES ON THE DEVICE SERVICE TABLE.                              EXR04000
                          401  * IGNORE FLAG WILL GET SET BY RESTART SEQUENCE.                         EXR04010
                          402  *                                                                      EXR04020
04A6   C820 0F62          403          LHI   R2,SLCHLIST         TABLE OF SELCH DCB ADDRESSES           EXR04030
04AA   4862 0000          404  ADDSLCH LH    DCBADR,0(R2)        FETCH DCB ADDRESS                      EXR04040
04AE   41C0 1B52          405          BAL   RET3,DSTADD         ADD IT TO THE LIST                     EXR04050
04B2   2622               406          AIS   R2,2                                                    EXR04060
04B4   C520 0F6A          407          CLHI  R2,SLCHLEND                                             EXR04070
04B8   2087               408          BLS   ADDSLCH                                                 EXR04080
                          409  *                                                                      EXR04090
04BA   E110 05CA          410          SVC   1,IDMESS            OUTPUT IDENTIFICATION MESSAGE          EXR04100
04BE   230B               411          BS    COMN                GO TO COMMON INITIALIZATION            EXR04110
```

INITIALIZATION, START AND RESTART

```
04C0  0700            413  RESTART  XHR   ZERO,ZERO                                          EXR04130
04C2  48A0 0ADA       414           LH    STATE,STATESAV                                     EXR04140
04C6  C2A0 8000       415           THI   STATE,ENTRFLAG     TEST PRIMARY ENTRY FLAG. MUST   EXR04150
04CA  4330 02E8       416           BZ    START              GO THRU START AT LEAST ONCE.    EXR04160
04CE  9580            417           EPSR  TEMP,ZERO          CLEAR PSW                       EXR04170
04D0  E110 05F6       418           SVC   1,REMESS           OUTPUT RESTART MESSAGE          EXR04180

                      420  * START AND RESTART COMMON INITIALIZATION                          EXR04200
                      421  *                                                                  EXR04210
04D4  0799            422  COMN     XHR   DAT,DAT            DEVICE ZERO                     EXR04220
04D6  C880 5976       423           LHI   TEMP,AUTOIO        ISR ADDRESS                     EXR04230
04DA  4089 0000       424  INTFILL  STH   TEMP,X'D0'(DAT)    FILL IN INTERRUPT SERVICE       EXR04240
04DE  CA80 0010       425           AHI   TEMP,16            POINTER WITH ADDRESS            EXR04250
04E2  2692            426           AIS   DAT,2              OF EACH ISR.                    EXR04260
04E4  C590 0200       427           CLHI  DAT,512                                            EXR04270
04E8  2087            428           BLS   INTFILL                                            EXR04280
                      429  *                                                                  EXR04290
04EA  0744            430           XHR   DEV,DEV            DISARM ALL DEVICES              EXR04300
04EC  DE40 0D16       431  COMN1    OC    DEV,DISARM                                         EXR04310
04F0  2641            432           AIS   DEV,1                                              EXR04320
04F2  C540 0100       433           CLHI  DEV,256                                            EXR04330
04F6  2085            434           BLS   COMN1                                              EXR04340
                      435  *                                                                  EXR04350
04F8  9F47            436  COMN1A   ACKR  DEV,CHAR           CLEAR ATN                       EXR04360
04FA  2241            437           BNOS  COMN1A             LOOP TIL FALSE SYNC             EXR04370
                      438  *                                                                  EXR04380
04FC  C890 0F62       439           LHI   DAT,SLCHLIST       SET IGNORE IN SELCH DCB'S       EXR04390
0500  C880 0080       440           LHI   TEMP,X'80'         IGNORE BIT SET, ALL OTHERS RESET EXR04400
0504  4869 0000       441  COMN2    LH    DCBADR,0(DAT)                                      EXR04410
0508  0288 0000       442           STB   TEMP,FLAGS(DCBADR)                                 EXR04420
050C  2692            443           AIS   DAT,2                                              EXR04430
050E  C590 0F6A       444           CLHI  DAT,SLCHLEND                                       EXR04440
0512  2087            445           BLS   COMN2                                              EXR04450
                      446  *                                                                  EXR04460
0514  0788            447           XHR   TEMP,TEMP                                          EXR04470
0516  D288 3E06       448  DATASTUP STB   TEMP,DATAPTRN(TEMP) SET UP FIXED DATA PATTERN BUFFER EXR04480
051A  2681            449           AIS   TEMP,1                                           EXR04490
051C  C580 0100       450           CLHI  TEMP,X'100'                                        EXR04500
0520  2083            451           BLS   DATASTUP                                           EXR04510
                      452  *                                                                  EXR04520
0522  258C            453           LCS   TEMP,12                                           EXR04530
0524  4880 084C       454           STH   TEMP,ERRORQ        CLEAR THE ERROR QUEUE           EXR04540
0528  C4A8 F F0       455           NHI   STATE,-1-QFULL     CLEAR QUEUE FULL FLAG           EXR04550
                      456  *                                                                  EXR04560
                      457  * ALL COMMON INITIALIZATION COMPLETE, GO TO COMMAND PROCESSOR      EXR04570
                      458  *                                                                  EXR04580
052C  C800 0530       459           LPSW  CMNDPSW                                            EXR04590
                      460  *                                                                  EXR04600
0530  0000            461  CMNDPSW  DC    0,CMNDPROC                                         EXR04610
0532  [illegible]0
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CONSOLE PRINT ROUTINE

```
                                463  *     S U B R O U T I N E   C O N P R I N T                    EXR04630
                                464  *                                                              EXR04640
                                465  * PRINT A MESSAGE ON THE CONSOLE                              EXR04650
                                466  *                                                              EXR04660
                                467  * CALLING SEQUENCE:       SVC  1,MESSAGE START ADDRESS        EXR04670
                                468  *                                                              EXR04680
                                469  * REGISTERS USED: RET1,TEMP,CHAR,R13                          EXR04690
                                470  * SUBROUTINES USED: PHASE 3 OF CONSOLE DEVICE DRIVER          EXR04700

0534  D000 05AA                 472  CONPRINT STM   R0,CONSAV          SAVE REGISTERS             EXR04720
0538  4800 0094                 473           LH    R13,X'94'          PICK UP MESSAGE START ADDRESS EXR04730
053C  C860 2290                 474           LHI   DCBADR,CONDCB      CONSOLE DCB                EXR04740
0540  4846 0006                 475           LH    DEV,DEVADR(DCBADR) DEVICE ADDRESS             EXR04750
0544  2486                     476           LIS   TEMP,THREE                                      EXR04760
0546  4086 0002                 477           STH   TEMP,PHASE(DCBADR) SPECIAL DRIVER PHASE 3    EXR04770
054A  D37D 0000                 478  CONPRNT1 LB    CHAR,0(R13)        PICK UP CHARACTER          EXR04780
054E  4130 1CC2                 479           BAL   RET1,INTRUPT1      PICK UP DVRENTRY & CALL DRIVER EXR04790
0552  2601                     480           AIS   R13,1               INCREMENT INDEX            EXR04800
0554  C470 007F                 481           NHI   CHAR,X'7F'                                     EXR04810
0558  C570 007F                 482           CLHI  CHAR,X'7F'         SEE IF LAST                EXR04820
055C  2039                     483           BNES  CONPRNT1           LOOP                       EXR04830
055E  D100 05AA                 484           LM    R0,CONSAV          RESTORE REGISTERS          EXR04840
0562  C200 0096                 485           LPSW  X'96'              RETURN                     EXR04850
                                486  *                                                              EXR04860
                                487  *                                                              EXR04870
0566  0000                     488  OPSW     DC    0,0                                             EXR04880
0568  0000
056A                           489  REGSAVE  DS    64                                              EXR04890
05AA                           490  CONSAV   DS    32                                              EXR04900
```

MESSAGES AND BUFFERS

```
05CA   0D0A                    492  IDMESS   DCX   0D0A,0000                                          EXR04920
05CC   0000
05CE   5345 5249 4553 2031     493           DC    C'SERIES 16 SYSTEM EXERCISER 06-136R04'            EXR04930
05D6   3620 5359 5354 454D
05DE   2045 5845 5243 4953
05E6   4552 2030 3620 3133
05EE   3652 3034
05F2   0D0A                    494           DCX   0D0A,00FF                                          EXR04940
05F4   00FF
05F6   0D0A                    495  REMESS   DCX   0D0A,0000                                          EXR04950
05F8   0000
05FA   5245 5354 4152 5420     496           DC    C'RESTART',X'0D0A',X'00FF'                         EXR04960
0602   0D0A
0604   00FF
0606   464F 524D 4154 2045     497  ERR1MESS DC    C'FORMAT ERROR',X'0D0A',X'00FF'                    EXR04970
060E   5252 4F52
0612   0D0A
0614   00FF
0616   4441 5441 2045 5252     498  ERR2MESS DC    C'DATA ERROR',X'0D0A',X'00FF'                      EXR04980
061E   4F52
0620   0D0A
0622   00FF
0624   5359 4E54 4158 2045     499  ERR3MESS DC    C'SYNTAX ERROR',X'0D0A',X'00FF'                    EXR04990
062C   5252 4F52
0630   0D0A
0632   00FF
0634   4E4F 5420 4F4E 2054     500  ERR4MESS DC    C'NOT ON TABLE',X'0D0A',X'00FF'                    EXR05000
063C   4142 4C45
0640   0D0A
0642   00FF
0644   5245 2D53 454C 4543     501  ERR5MESS DC    C'RE-SELECTED',X'0D0A',X'00FF'                     EXR05010
064C   5445 4420
0650   0D0A
0652   00FF
0654   4453 5420 4F56 4552     502  ERR6MESS DC    C'DST OVERFLOW',X'0D0A',X'00FF'                    EXR05020
065C   464C 4F57
0660   0D0A
0662   00FF
0664   5052 4F47 5241 4D20     503  ERR7MESS DC    C'PROGRAM ERROR, ERRORLOG',X'0D0A',X'00FF'         EXR05030
066C   4552 524F 522C 2045
0674   5252 4F52 4C4F 4720
067C   0D0A
067E   00FF
0680   4552 524F 5220 5155     504  ERR8MESS DC    C'ERROR QUEUE FULL',X'0D0A',X'00FF'                EXR05040
0688   4555 4520 4655 4C4C
0690   0D0A
0692   00FF
0694   5052 4F47 5241 4D20     505  ERR9MESS DC    C'PROGRAM ERROR, ABORT HANDLER',X'0D0A',X'00FF'    EXR05050
069C   4552 524F 522C 2041
06A4   424F 5254 2048 414E
06AC   444C 4552
06B0   0D0A
06B2   00FF
```

MESSAGES AND BUFFERS

```
06B4   4D4F 5645 2054 4142   506  ERRAMESS DC    C'MOVE TABLE OVERFLOW',X'0D0A',X'00FF'                    EXR05060
06BC   4C45 204F 5645 5246
06C4   4C4F 5720
06C8   0D0A
06CA   00FF
06CC   4E4F 5420 454E 4F55   507  ERRBMESS DC    C'NOT ENOUGH SELCH DCBS',X'0D0A',X'00FF'                  EXR05070
06D4   4748 2053 454C 4348
06DC   2044 4342 5320
06E2   0D0A
06E4   00FF
06E6   4455 504C 4943 4154   508  ERRCMESS DC    C'DUPLICATE DEVICE    ',X'0D0A',X'00FF'                   EXR05080
06EE   4520 4445 5649 4345
06F6   2020 2020
06FA   0D0A
06FC   00FF
06FE   4641 4C53 4520 5359   509  ERRDMESS DC    C'FALSE SYNC    ',X'0D0A',X'00FF'                         EXR05090
0706   4E43 2020 2020
070C   0D0A
070E   00FF
0710   5052 4F47 5241 4D20   510  ERREMESS DC    C'PROGRAM ERROR, NO MNEMONIC FOR DCB'                     EXR05100
0718   4552 524F 522C 204E
0720   4F20 4D4E 454D 4F4E
0728   4943 2046 4F52 2044
0730   4342
0732   0D0A                 511          DCX     0D0A,00FF                                                 EXR05110
0734   00FF
0736   5345 5155 454E 4345   512  ERRFMESS DC    C'SEQUENCE ERROR',X'0D0A',X'00FF'                         EXR05120
073E   2045 5252 4F52
0744   0D0A
0746   00FF
0748   4445 5620 2041 4452   513  ERRSUM   DC    C'DEV  ADR  ERRORS',X'0D0A',X'00FF'                       EXR05130
0750   2020 4552 524F 5253
0758   0D0A
075A   00FF
075C   0000                 514  PROMPTS  DCX   0000,2AFF          *                                       EXR05140
075E   2AFF
0760                        515  OUTBUF   DS    80                                                        EXR05150
       0000 07AF            516  OUTBUFE  EQU   *-1                                                       EXR05160
07B0   4F50 5449 4F4E 533A  517  OPTBUF   DC    C'OPTIONS:                                    '           EXR05170
07B8   2020 2020 2020 2020
07C0   2020 2020 2020 2020
07C8   2020 2020 2020 2020
07D0   2020 2020 2020 2020
07D8   0000                 518  ZEROS    DCX   0                                                         EXR05180
07DA   0000                 519  MOVER    DC    0,0                                                       EXR05190
07DC   0000
07DE   0000                 520  MEMSTART DC    0,EXEREND                                                 EXR05200
07E0   6976
07E2   0000                 521  MEMTOP   DC    0,EXEREND                                                 EXR05210
07E4   6976
07E8   0000 0000            522  BLINKY   DCY   0                                                         EXR05220
                            523  *                                                                       EXR05230
07EC   0000                 524  OPENCELL DCX   0000,0000          ADDRESS OF CURRENT OPEN CELL           EXR05240
```

MESSAGES AND BUFFERS

```
07EE  0000
07F0  0000                  525  MNEMONIC DCX   0000,0000                                                    EXR05250
07F2  0000
07F4  0000                  526  DCBSAVE  DCX   0                                                            EXR05260
07F6  0000                  527  R13SAVE  DCX   0                                                            EXR05270
07F8  0000                  528  FMDRIVE  DCX   0000              DRIVE SELECT                               EXR05280
07FA  0000                  529  DSPCHCNT DCX   0                                                            EXR05290
      0000 07FC             530  CMNDBUFS EQU   *                                                            EXR05300
07FC                        531  CMNDBUF  DS    80                                                           EXR05310
      0000 084B             532  CMNDBUFE EQU   *-1                                                          EXR05320
084C  FFF4                  533  ERRORQ   DC    -12                                                          EXR05330
084E                        534           DS    QUEUESIZ                                                     EXR05340
08D2  0000                  535  COMMANDE DCX   0000                                                         EXR05350
08D4  0004 0000 0810        536  TYPETAB  DB    0,PASLAFLG,0,0,CARSL300,MICROBUS                             EXR05360
08DA                        537           DB    *                                                            EXR05370
08DA                        538  DCBTAB   DS    512                                                          EXR05380
0ADA  0000                  539  STATESAV DCX   0                                                            EXR05390
                            540  *                                                                          EXR05400
                            541  * MEMORY MAP...EACH BIT IS 8K BYTES                                         EXR05410
                            542  *                          TWO MOST SIGNIFICANT ADRS DIGITS                EXR05420
                            543  *                          (LS 3 DIGITS ARE ZERO                           EXR05430
                            544  *                    BIT:  0  1  2  3  4  5  6  7                          EXR05440
0ADC  00                    545  MEMMAP   DB    0          00 02 04 06 08 0A 0C 0E                         EXR05450
0ADD  00                    546           DB    0          10 12 14 16 18 1A 1C 1E                         EXR05460
0ADE  00                    547           DB    0          20 22 24 26 28 2A 2C 2E                         EXR05470
0ADF  00                    548           DB    0          30 32 34 36 38 3A 3C 3E                         EXR05480
```

```
                        550  * RUNS UNDER PSW AT LOCATION CMNDPSW                                    EXR05500
                        551  *                                                                       EXR05510
                        552  * COMMAND FORMAT:                                                       EXR05520
                        553  *        CMND PARM1,PARM2,PARM3,...,PARMN                               EXR05530
                        554  *                                                                       EXR05540
                        555  * CMND IS THREE OR FOUR LETTER COMMAND NAME, FOLLOWED                   EXR05550
                        556  * BY ONE AND ONLY ONE BLANK OR LINE TERMINATOR.                         EXR05560
                        557  * PARAMETERS ARE POSITIONAL, SEPARATED BY COMMAS, WITH                  EXR05570
                        558  * NO EMBEDDED BLANKS.  DEFAULTS ARE USED FOR MISSING PARAMETERS         EXR05580

0AE0  E110 075C         560  CMNDPROC SVC   1,PROMPTS          OUTPUT PROMPT CHARACTER              EXR05600
0AE4  C4A0 FF7F         561           NHI   STATE,-1-ERRBIT     CLEAR DELETE FLAG                    EXR05610
0AE8  C890 004E         562           LHI   DAT,78                                                  EXR05620
0AEC  C870 2020         563           LHI   CHAR,X'2020'                                           EXR05630
0AF0  4079 07FC         564  BLANK    STH   CHAR,CMNDBUF(DAT)  BLANK OUT 80-BYTE COMMAND BUFFER    EXR05640
0AF4  2792              565           SIS   DAT,2                                                  EXR05650
0AF6  2283              566           BNLS  BLANK                                                  EXR05660
0AF8  C8D0 07FC         567           LHI   R13,CMNDBUFS        COMMAND BUFFER START ADDRESS       EXR05670
0AFC  C860 2290         568  CONREAD  LHI   DCBADR,CONDCB       DRIVER PARAMETER BLOCK             EXR05680
0B00  4846 0006         569           LH    DEV,DEVADR(DCBADR)  DEVICE ADDRESS                     EXR05690
0B04  4006 0002         570  CONREAD1 STH   ZERO,PHASE(DCBADR)  SPECIAL PHASE ZERO                 EXR05700
0B08  C4A0 FBFF         571           NHI   STATE,-1-UTILITY    CLEAR SPACE FLAG                   EXR05710
0B0C  413B 1CC2         572  CONREAD2 BAL   RET1,INTRUPT1       CALL DRIVER, READ A CHARACTER      EXR05720
0B10  C470 007F         573           NHI   CHAR,X'7F'          STRIP PARITY                       EXR05730
0B14  C570 0060         574           CLHI  CHAR,X'60'          LOWER CASE ALPHA?                  EXR05740
0B18  2183              575           BLS   RDCHAR0             SKIP IF NO                         EXR05750
0B1A  CB70 0020         576           SHI   CHAR,X'20'          CONVERT TO UPPER CASE              EXR05760
0B1E  C570 005F         577  RDCHAR0  CLHI  CHAR,X'5F'          BACK ARROW?                        EXR05770
0B22  213C              578           BNES  RDCHAR1             NO                                 EXR05780
0B24  27D1              579           SIS   R13,1               IF YES, DELETE PREVIOUS CHARACTER  EXR05790
0B26  C5D0 07FC         580           CLHI  R13,CMNDBUFS                                           EXR05800
0B2A  4320 0B7C         581           BNP   CONREAD3            RESTART INPUT IF DELETED ALL       EXR05810
0B2E  C870 0020         582           LHI   CHAR,X'20'                                             EXR05820
0B32  D27D 0000         583           STB   CHAR,0(R13)         BLANK OUT PREVIOUS CHARACTER       EXR05830
0B36  4300 0B0C         584           B     CONREAD2                                               EXR05840
0B3A  C570 0020         585  RDCHAR1  CLHI  CHAR,X'20'          SPACE ?                            EXR05850
0B3E  2138              586           BNES  RDCHAR2             SKIP IF NO                         EXR05860
0B40  C3A0 0400         587           THI   STATE,UTILITY       IF SPACE, AND SPACE FLAG IS        EXR05870
0B44  4230 0AFC         588           BNZ   CONREAD             SET, IGNORE AND READ NEXT          EXR05880
0B48  C6A0 0400         589           OHI   STATE,UTILITY       ELSE, THIS IS FIRST SPACE          EXR05890
0B4C  2303              590           BS    RDCHAR3             SET UTILITY AND STORE CHARACTER    EXR05900
0B4E  C4A0 FBFF         591  RDCHAR2  NHI   STATE,-1-UTILITY    CLEAR SPACE FLAG ON NON SPACE      EXR05910
0B52  D27D 0000         592  RDCHAR3  STB   CHAR,0(R13)         STORE CHARACTER IN BUFFER          EXR05920
0B56  C570 000D         593           CLHI  CHAR,X'0D'          CARRIAGE RETURN?                   EXR05930
0B5A  4330 0B86         594           BE    CONREAD4            BRANCH IF YES                      EXR05940
0B5E  C570 000A         595           CLHI  CHAR,X'0A'          LINE-FEED'                         EXR05950
0B62  4330 0B8E         596           BE    CONREAD5            BRANCH IF YES                      EXR05960
0B66  C570 0023         597           CLHI  CHAR,X'23'          # LINE DELETE CHARACTER            EXR05970
0B6A  2339              598           BES   CONREAD3            BRANCH IF YES                      EXR05980
0B6C  26D1              599           AIS   R13,1                                                  EXR05990
0B6E  C5D0 0848         600           CLHI  R13,CMNDBUFE        AT END OF 80 BYTE BUFFER?          EXR06000
```

COMMAND PROCESSOR

```
0B72  4280 0B0C        601           BL    CONREAD2                                    EXR06010
0B76  C870 0A0D        602           LHI   CHAR,X'0A0D'      BUFFER FULL, QUEUE CR,LF  EXR06020
0B7A  230D             603           BS    CONREAD6          AND GO TO COMMON WRAP-UP  EXR06030
0B7C  C6A0 0080        604 CONREAD3  OHI   STATE,ERRBIT       SET LINE DELETE FLAG      EXR06040
0B80  C870 0A0D        605           LHI   CHAR,X'0A0D'      QUEUE CR,LF               EXR06050
0B84  2308             606           BS    CONREAD6          EXIT                      EXR06060
0B86  26D1             607 CONREAD4  AIS   R13,1            UPDATE POINTER, CR RECEIVED EXR06070
0B88  C870 0A00        608           LHI   CHAR,X'0A00'      QUEUE NULL,LF FOR ECHO    EXR06080
0B8C  2304             609           BS    CONREAD6                                    EXR06090
0B8E  26D1             610 CONREAD5  AIS   R13,1            UPDATE POINTER, LF RECEIVED EXR06100
0B90  C870 000D        611           LHI   CHAR,X'000D'      ECHO WITH CR,NULL         EXR06110
0B94  2486             612 CONREAD6  LIS   TEMP,THREE                                  EXR06120
0B96  4086 0002        613           STH   TEMP,PHASE(DCBADR) SPECIAL PHASE THREE     EXR06130
0B9A  4130 1CC2        614           BAL   RET1,INTRUPT1     WRITE FIRST BYTE          EXR06140
0B9E  9078             615           SRLS  CHAR,8            POSITION SECOND           EXR06150
0BA0  4130 1CC2        616           BAL   RET1,INTRUPT1     OUTPUT IT                 EXR06160
0BA4  2470             617           LIS   CHAR,0                                      EXR06170
0BA6  4130 1CC2        618           BAL   RET1,INTRUPT1     FOLLOW WITH NULL          EXR06180
0BAA  C3A0 0080        619           THI   STATE,ERRBIT      CHECK IF LINE DELETE SET  EXR06190
0BAE  4230 0AE0        620           BNZ   CMNDPROC          RESTART IF SET            EXR06200
0BB2  27D1             621           SIS   R13,1             ADDRESS OF LAST BYTE INPUT EXR06210
0BB4  4000 08D2        622           STH   R13,COMMANDE      SET ASIDE                 EXR06220
                       623 *                                                           EXR06230
                       624 *                                                           EXR06240
0BB8  C8D0 07FF        625 CMND01    LHI   R13,CMNDBUFS+3    COMMAND BUFFER ADDRESS    EXR06250
0BBC  4890 07FC        626           LH    DAT,CMNDBUFS      DAT CONTAINS FIRST TWO COMMAND EXR06260
0BC0  D370 07FE        627           LB    CHAR,CMNDBUFS+2   CHARACTERS. CHAR HAS THE EXR06270
0BC4  9178             628           SLLS  CHAR,8            THIRD CHARACTER           EXR06280
0BC6  D38D 0000        629           LB    TEMP,0(R13)       TEST FOURTH CHARACTER     EXR06290
0BCA  C360 0026        630           CLHI  TEMP,X'26'        IS IT A TERMINATOR?       EXR06300
0BCE  2184             631           BLS   CMND02            BRANCH IF IT IS           EXR06310
0BD0  0678             632           OHR   CHAR,TEMP         ELSE, 4 CHARACTER COMMAND EXR06320
0BD2  26D1             633           AIS   R13,1            ADVANCE CURSOR            EXR06330
0BD4  2303             634           BS    CMND04                                      EXR06340
0BD6  C670 0020        635 CMND02    OHI   CHAR,X'20'       3 CHARACTER COMMAND, PAD WITH EXR06350
                       636 *                                 SPACE CHARACTER.          EXR06360
                       637 *                                                           EXR06370
                       638 * HAVE ASSEMBLED COMMAND IN REGISTERS DAT AND CHAR          EXR06380
                       639 * R13 POINTS TO LEADING PARM DELIMITER                       EXR06390
                       640 * LOOK FOR COMMAND IN COMMAND ACTION TABLE                  EXR06400
                       641 *                                                           EXR06410
0BDA  4090 07F0        642 CMND04    STH   DAT,MNEMONIC      SAVE COMMAND MNEMONIC     EXR06420
0BDE  4070 07F2        643           STH   CHAR,MNEMONIC+2                             EXR06430
0BE2  C820 0E1E        644           LHI   R2,ACMNDTBL       TABLE START ADDRESS       EXR06440
0BE6  4592 0000        645 CMND05    CLH   DAT,0(R2)         COMPARE FIRST 2 CHARACTERS EXR06450
0BEA  2134             646           BNES  CMND05A           SKIP IF NO MATCH          EXR06460
0BEC  4572 0002        647           CLH   CHAR,2(R2)        COMPARE SECOND 2 CHARACTERS EXR06470
0BF0  2336             648           BES   CMND06            BRANCH IF MATCH           EXR06480
0BF2  2626             649 CMND05A   AIS   R2,6              INCREMENT TABLE ADDRESS   EXR06490
0BF4  C520 0E72        650           CLHI  R2,ACMNDEND       TEST IF END OF TABLE      EXR06500
0BF8  2389             651           BLS   CMND05            LOOK AT NEXT COMMAND      EXR06510
0BFA  2304             652           BS    CMND07            NO MATCH IN ACTION TABLE  EXR06520
                       653 *                                                           EXR06530
```

COMMAND PROCESSOR

```
0BFC   4822 0004          654  CMND06   LH    R2,4(R2)        COMMAND ROUTINE ADDRESS FROM TABLE    EXR06540
0C00   0302               655            BR    R2              CALL COMMAND ROUTINE                  EXR06550
```

```
                        657  * LOOK FOR DEVICE IN DCB TABLE                                          EXR06570
                        658  *                                                                      EXR06580
0C02   C820 0E72        659  CMND07   LHI   R2,DEV2DCB          TABLE START ADDRESS               EXR06590
0C06   4000 12CC        660           STH   ZERO,LASTDCB                                           EXR06600
0C0A   4592 0000        661  CMND08   CLH   DAT,0(R2)           FIRST 2 CHARACTERS                EXR06610
0C0E   2134             662           BNES  CMND08A             SKIP IF NO MATCH                  EXR06620
0C10   4572 0002        663           CLH   CHAR,2(R2)          SECOND 2 CHARACTERS               EXR06630
0C14   2339             664           BES   CMND09              BRANCH IF MATCH                   EXR06640
0C16   2626             665  CMND08A  AIS   R2,6                INCREMENT TABLE ADDRESS           EXR06650
0C18   C520 0F62        666           CLHI  R2,DEV2DCBE         END OF TABLE?                     EXR06660
0C1C   2089             667           BLS   CMND08              LOOP IF NO                        EXR06670
0C1E   E110 0624        668           SVC   1,ERR3MESS          COMMAND OR DEVICE NOT FOUND       EXR06680
0C22   4300 0AE0        669           B     CMNDPROC            GET NEXT COMMAND                  EXR06690
                        670  *                                                                      EXR06700
0C26   4862 0004        671  CMND09   LH    DCBADR,4(R2)        GET DCB ADDRESS                   EXR06710
0C2A   41C0 1B72        672           BAL   RET3,DSTFIND        ALREADY IN TABLE?                 EXR06720
0C2E   2338             673           BZS   CMND10              BRANCH IF YES                     EXR06730
0C30   D37D 0000        674           LB    CHAR,0(R13)         PICK UP DELIMITER                 EXR06740
0C34   C570 0025        675           CLHI  CHAR,X'25'          IF '%', THIS IS DELETE COMMAND    EXR06750
0C38   4230 0C6C        676           BNE   CMND11              BRANCH IF NO                      EXR06760
0C3C   E110 0634        677           SVC   1,ERR4MESS          ERROR IF TRY TO DELETE A          EXR06770
                        678  *                                  DEVICE THAT'S NOT ON THE DST      EXR06780
0C40   4300 0AE0        679           B     CMNDPROC                                              EXR06790
                        680  *                                                                      EXR06800
0C44   41C0 1B88        681  CMND10   BAL   RET3,DSTREMOV      REMOVE DEVICE BEFORE CONTINUING   EXR06810
0C48   4006 0002        682           STH   ZERO,PHASE(DCBADR)  CLEAR OUT PHASE COUNTER           EXR06820
0C4C   D37D 0000        683           LB    CHAR,0(R13)         CHECK DELIMITER                   EXR06830
0C50   C570 0025        684           CLHI  CHAR,X'25'          IF %, WE'RE DONE                  EXR06840
0C54   4330 0AE0        685           BE    CMNDPROC            NEXT COMMAND                      EXR06850
0C58   40D0 07F6        686           STH   R13,R13SAVE         SAVE CURSOR                       EXR06860
0C5C   4060 07F4        687           STH   DCBADR,DCBSAVE      SAVE THIS DCB ADDRESS             EXR06870
0C60   E110 0644        688           SVC   1,ERR5MESS          DEVICE ALREADY SELECTED           EXR06880
                        689  *                                  PRINT WARNING                     EXR06890
0C64   48D0 07F6        690           LH    R13,R13SAVE         RESTORE CURSOR                    EXR06900
0C68   4860 07F4        691           LH    DCBADR,DCBSAVE      RESTORE DCB ADDRESS               EXR06910
                        692  *                                                                      EXR06920
       0000 0C6C        693  CMND11   EQU   *                   CHECK PARAMATERS & ADD DEVICE     EXR06930
                        694  *                                                                      EXR06940
                        695  * PARAMETER FLAG ZERO...DEVICE ADDRESS                                 EXR06950
                        696  *                                                                      EXR06960
0C6C   4826 0004        697  PARMFLG0 LH    R2,PARM(DCBADR)                                       EXR06970
0C70   2315             698           BNMS  PARMFLG1            BRANCH IF BIT0 NOT SET            EXR06980
0C72   4130 0D1C        699           BAL   RET1,NEXTPARM       CONVERT NEXT PARAMETER            EXR06990
0C76   4096 0006        700           STH   DAT,DEVADR(DCBADR)  DEVICE ADDRESS TO DCB             EXR07000
                        701  *                                                                      EXR07010
                        702  * PARAMETER FLAG ONE...CONTROLLER ADDRESS                             EXR07020
                        703  *                                                                      EXR07030
0C7A   0A22             704  PARMFLG1 AHR   R2,R2               TEST BIT 1                        EXR07040
0C7C   2315             705           BNMS  PARMFLG2            SKIP IF NOT SET                   EXR07050
0C7E   4130 0D1C        706           BAL   RET1,NEXTPARM       CONVERT NEXT PARAMETER            EXR07060
0C82   4096 0028        707           STH   DAT,CONTADR(DCBADR) CONTROLLER ADDRESS TO DCB         EXR07070
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                          709  * PARAMETER FLAG TWO...SELCH ADDRESS                                    EXR07090
                          710  *                                                                       EXR07100
0C86   0A22               711  PARMFLG2 AHR   R2,R2              TEST BIT 2                         EXR07110
0C88   2315               712           BNMS  PARMFLG3           SKIP IF NOT SET                    EXR07120
0C8A   4130 0D1C          713           BAL   RET1,NEXTPARM      CONVERT NEXT PARAMETER             EXR07130
0C8E   4096 0024          714           STH   DAT,SELCHADR(DCBADR) SELCH ADDRESS TO DCB             EXR07140
                          715  *                                                                       EXR07150
                          716  * PARAMETER FLAG THREE...NOT USED                                       EXR07160
                          717  *                                                                       EXR07170
0C92   0A22               718  PARMFLG3 AHR   R2,R2                                                  EXR07180
                          719  *                                                                       EXR07190
                          720  * PARAMETER FLAG FOUR...NOT USED                                        EXR07200
                          721  *                                                                       EXR07210
0C94   0A22               722  PARMFLG4 AHR   R2,R2                                                  EXR07220
                          723  *                                                                       EXR07230
                          724  *PARAMETER FLAG FIVE...CYLINDER ADDRESS OR LRN LIMITS                  EXR07240
                          725  *                                                                       EXR07250
0C96   0A22               726  PARMFLG5 AHR   R2,R2              TEST BIT 5                         EXR07260
0C98   231C               727           BNMS  PARMFLG6           SKIP IF NOT SET                    EXR07270
0C9A   4130 0D1C          728           BAL   RET1,NEXTPARM      CONVERT NEXT PARAMETER             EXR07280
0C9E   4096 002A          729           STH   DAT,CYLLOW(DCBADR) CYLINDER LOW OR LRN LOW            EXR07290
                          730  *                                TEST THE DELIMITER                 EXR07300
0CA2   C570 002D          731           CLHI  CHAR,X'2D'         IF HYPHEN, HIGH LIMIT NEXT         EXR07310
0CA6   2133               732           BNES  PFLG5L1            IF NO, HIGH LIMIT EQUALS LOW       EXR07320
0CA8   4130 0D1C          733           BAL   RET1,NEXTPARM      CONVERT NEXT PARAMETER             EXR07330
0CAC   4096 002C          734  PFLG5L1  STH   DAT,CYLHIGH(DCBADR) CYLINDER HIGH LIMIT TO DCB        EXR07340
                          735  *                                                                       EXR07350
                          736  * PARAMETER FLAG SIX...HEAD ADDRESS LIMITS                             EXR07360
                          737  *                                                                       EXR07370
0CB0   0A22               738  PARMFLG6 AHR   R2,R2              TEST BIT 6                         EXR07380
0CB2   231C               739           BNMS  PARMFLG7           SKIP IF NOT SET                    EXR07390
0CB4   4130 0D1C          740           BAL   RET1,NEXTPARM      CONVERT NEXT PARAMETER             EXR07400
0CB8   D296 002E          741           STB   DAT,HEADLOW(DCBADR) HEAD LOW LIMIT TO DCB            EXR07410
0CBC   C570 002D          742           CLHI  CHAR,X'2D'         IF HYPHEN, HIGH LIMIT NEXT         EXR07420
0CC0   2133               743           BNES  PFLG6L1            IF NO, HIGH LIMIT EQUALS LOW       EXR07430
0CC2   4130 0D1C          744           BAL   RET1,NEXTPARM      CONVERT NEXT PARAMETER             EXR07440
0CC6   D296 002F          745  PFLG6L1  STB   DAT,HEADHIGH(DCBADR) HEAD HIGH LIMIT TO DCB           EXR07450
                          746  *                                                                       EXR07460
                          747  * PARAMETER FLAG SEVEN...SECTOR ADDRESS LIMITS                         EXR07470
                          748  *                                                                       EXR07480
0CCA   0A22               749  PARMFLG7 AHR   R2,R2              TEST BIT 7                         EXR07490
0CCC   231C               750           BNMS  PARMFLG8           SKIP IF NOT SELECTED               EXR07500
0CCE   4130 0D1C          751           BAL   RET1,NEXTPARM      CONVERT NEXT PARAMETER             EXR07510
0CD2   4096 0030          752           STH   DAT,SCTRLOW(DCBADR) SECTOR LOW ADDRESS TO DCB         EXR07520
0CD6   C570 002D          753           CLHI  CHAR,X'2D'         IF HYPHEN, HIGH LIMIT NEXT         EXR07530
0CDA   2133               754           BNES  PFLG7L1            IF NO, HIGH LIMIT EQUALS LOW       EXR07540
0CDC   4130 0D1C          755           BAL   RET1,NEXTPARM      CONVERT NEXT PARAMETER             EXR07550
0CE0   4096 0032          756  PFLG7L1  STH   DAT,SCTRHIGH(DCBADR) SECTOR HIGH ADDRESS TO DCB       EXR07560
                          757  *                                                                       EXR07570
                          758  * PARAMETER FLAG EIGHT...MEMORY LIMITS                                 EXR07580
                          759  *                                                                       EXR07590
0CE4   0A22               760  PARMFLG8 AHR   R2,R2              TEST BIT 8                         EXR07600
0CE6   231D               761           BNMS  PARMFLG9           SKIP IF NOT SELECTED               EXR07610
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0CE8  4130 0D1C   762          BAL   RET1,NEXTPARM       CONVERT NEXT PARAMETER                EXR07620
0CEC  D286 001C   763          STB   TEMP,BUF1EXT(DCBADR) MS DIGIT OF LOW LIMIT                EXR07630
0CF0  4096 0012   764          STH   DAT,MEMLOW(DCBADR)  MEMORY LOW LIMIT TO DCB               EXR07640
0CF4  4130 0D1C   765          BAL   RET1,NEXTPARM       CONVERT NEXT PARAMETER                EXR07650
0CF8  D286 001D   766          STB   TEMP,BUF2EXT(DCBADR) MS DIGIT OF HIGH LIMIT               EXR07660
0CFC  4096 0014   767          STH   DAT,MEMHIGH(DCBADR) MEMORY HIGH LIMIT TO DCB              EXR07670
                  768  *                                                                        EXR07680
                  769  * PARAMETER FLAGS 9 THRU F UNASSIGNED                                    EXR07690
                  770  *                                                                        EXR07700
      0000 0D00   771  PARMFLG9 EQU   *                                                        EXR07710
                  772  *                                                                        EXR07720
                  773  * CALL PARAMETER CHECK ROUTINE TO VERIFY & SUPPLY DEFAULTS               EXR07730
                  774  *                                                                        EXR07740
0D00  4886 0010   775          LH    TEMP,PARMCHCK(DCBADR)                                     EXR07750
0D04  0138        776          BALR  RET1,TEMP                                                 EXR07760


                  778  * ADD DEVICE TO TABLE                                                   EXR07780
                  779  *                                                                        EXR07790
0D06  41C0 1B52   780  CMND12  BAL   RET3,DSTADD                                               EXR07800
0D0A  4330 0AE0   781          BZ    CMNDPROC            OK IF ADDED SUCCESSFULLY            EXR07810
                  782  *                                  DEVICE SERVICE TABLE FULL,          EXR07820
0D0E  E110 0654   783          SVC   1,ERR6MESS          DCB NOT ADDED, PRINT ERROR          EXR07830
0D12  4300 0AE0   784          B     CMNDPROC                                                  EXR07840
                  785  *                                                                        EXR07850
0D16  C0          786  DISARM  DB    X'C0'                                                     EXR07860
0D17  40          787  ENABLE  DB    X'40'                                                     EXR07870
0D18  08          788  STOPCMND DB   X'08'               SELCH STOP                          EXR07880
0D19  80          789  DSPLYMOD DB   X'80'                                                     EXR07890
0D1A  40          790  DSPLYINC DB   X'40'                                                     EXR07900
0D1B  00          791          DB    *                                                         EXR07910
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                                793  *     S U B R O U T I N E   N E X T P A R M                    EXR07930
                                794  *                                                              EXR07940
                                795  * COMMON ROUTINE FOR PARAMATER DECODE                         EXR07950
                                796  * R13 CONTAINS DELIMITER ADDRESS IN COMMAND LINE              EXR07960
                                797  * PARAMETERS HAVE A LEADING AND TRAILING DELIMITER, WHERE THE EXR07970
                                798  * TRAILING DELIMITER OF ONE IS THE LEADING DELIMETER OF THE NEXT EXR07980
                                799  * R13 HOLDS THE ADDRESS IN CMNDBUFS OF A LEADING DELIMITER.   EXR07990
                                800  * SCANNING TERMINATES WHEN THE BUFFER LIMIT IS REACHED, OR A   EXR08000
                                801  * CARRIAGE RETURN OR LINE FEED IS FOUND                       EXR08010
                                802  *                                                             EXR08020
                                803  * CALLING SEQUENCE:      BAL  RET1,NEXTPARM                   EXR08030
                                804  *                                                             EXR08040
                                805  * REGISTERS USED: RET1,DAT,CHAR,TEMP,R13                      EXR08050
                                806  * SUBROUTINES USED: CONPRINT                                  EXR08060

0D1C   0788            808  NEXTPARM XHR   TEMP,TEMP          VALUE INITIALLY ZERO                 EXR08080
0D1E   0799            809           XHR   DAT,DAT                                                  EXR08090
0D20   D37D 0000       810           LB    CHAR,0(R13)         LOOK AT FIRST CHARACTER              EXR08100
0D24   45D0 08D2       811           CLH   R13,COMMANDE        TEST IF PASSED END OF BUFFER         EXR08110
0D28   0383            812           BNLR  RET1                RETURN IF YES...NO PARAMETER         EXR08120
0D2A   C570 000E       813           CLHI  CHAR,X'0E'                                               EXR08130
0D2E   0283            814           BLR   RET1                IF CR OR LF, NO PARAMETER            EXR08140
0D30   C570 002E       815           CLHI  CHAR,X'2E'          CHECK FOR LEADING DELIMITER          EXR08150
0D34   4380 0D78       816           BNL   CMNDERR1            BAD DELIMITER                        EXR08160
0D38   26D1            817  PRMSCN2  AIS   R13,1               ADVANCE TO NEXT BYTE                 EXR08170
0D3A   D37D 0000       818           LB    CHAR,0(R13)         NEXT CHARACTER                       EXR08180
0D3E   45D0 08D2       819           CLH   R13,COMMANDE        SEE IF END OF BUFFER                 EXR08190
0D42   0383            820           BNLR  RET1                IF YES, NO VALUE                     EXR08200
0D44   C570 002E       821           CLHI  CHAR,X'2E'          CHECK FOR TRAILING DELIMITER         EXR08210
0D48   0283            822           BLR   RET1                RETURN IF YES                        EXR08220
0D4A   C570 0030       823           CLHI  CHAR,X'30'          TEST LOW HEX RANGE                   EXR08230
0D4E   4280 0D80       824           BL    CMNDERR2            EXIT, BAD HEX                        EXR08240
0D52   C570 003A       825           CLHI  CHAR,X'3A'                                               EXR08250
0D56   2189            826           BLS   PRMSCN3             VALID 0:9                            EXR08260
0D58   C570 0041       827           CLHI  CHAR,X'41'                                               EXR08270
0D5C   4280 0D80       828           BL    CMNDERR2            EXIT, BAD HEX                        EXR08280
0D60   C570 0047       829           CLHI  CHAR,X'47'                                               EXR08290
0D64   238E            830           BNLS  CMNDERR2            EXIT, BAD HEX                        EXR08300
0D66   2679            831           AIS   CHAR,9              ADJUST A:F                           EXR08310
0D68   C470 000F       832  PRMSCN3  NHI   CHAR,X'F'          MASK LS 4 BITS                       EXR08320
0D6C   0889            833           LHR   TEMP,DAT                                                 EXR08330
0D6E   908C            834           SRLS  TEMP,12             CAPTURE MS DIGIT                     EXR08340
0D70   9194            835           SLLS  DAT,4               SHIFT PREVIOUS RESULT                EXR08350
0D72   0697            836           OHR   DAT,CHAR            ADD NEW DIGIT                        EXR08360
0D74   4300 0D38       837           B     PRMSCN2             CONTINUE SCANNING                    EXR08370
                       838  *                                                                        EXR08380
0D78   E110 0606       839  CMNDERR1 SVC   1,ERR1MESS          BAD DELIMITER, PRINT ERROR           EXR08390
0D7C   4300 0AE0       840           B     CMNDPROC                                                 EXR08400
                       841  *                                                                        EXR08410
0D80   E110 0616       842  CMNDERR2 SVC   1,ERR2MESS          BAD HEX CHARACTER, PRINT ERROR       EXR08420
0D84   4300 0AE0       843           B     CMNDPROC                                                 EXR08430
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                        845  *     S U B R O U T I N E   C R L F N U L L                    EXR08450
                        846  *                                                              EXR08460
                        847  * SUBROUTINE STORES A CARRIAGE RETURN, LINE FEED AND DELETE   EXR08470
                        848  * CHARACTERS INTO MEMORY STARTING AT THE LOCATION SPFCIFIED    EXR08480
                        849  * BY (R13)                                                    EXR08490
                        850  *                                                              EXR08500
                        851  * CALLING SEQUENCE:      BAL  RET1,CRLFNULL                   EXR08510
                        852  *                                                              EXR08520
                        853  * REGISTERS USED: RET1,CHAR,R13                               EXR08530
                        854  * SUBROUTINES USED: NONE                                      EXR08540

0D88   247D             856  CRLFNULL LIS   CHAR,X'0D'                                   EXR08560
0D8A   D27E 0000        857           STB   CHAR,0(R14)        CARRIAGE RETURN          EXR08570
0D8E   247A             858           LIS   CHAR,X'0A'                                   EXR08580
0D90   D27E 0001        859           STB   CHAR,1(R14)        LINE FEED                EXR08590
0D94   2571             860           LCS   CHAR,1                                       EXR08600
0D96   D27E 0002        861           STB   CHAR,2(R14)        DELETE                   EXR08610
0D9A   0303             862           BR    RET1                                         EXR08620

                        864  *     S U B R O U T I N E   C V T A S C I I                    EXR08640
                        865  *                                                              EXR08650
                        866  * CONVERT THE CONTENTS OF REGISTER DAT INTO FOUR ASCII        EXR08660
                        867  * CHARACTERS STORED IN CONSECUTIVE LOCATIONS STARTING         EXR08670
                        868  * AT THE ADDRESS SPECIFIED BY REGISTER R14.                   EXR08680
                        869  *                                                              EXR08690
                        870  * CALLING SEQUENCE:      BAL  RET1,CVTASCII                   EXR08700
                        871  *                                                              EXR08710
                        872  * REGISTERS USED: RET1,R15,RET2,TEMP,R14                      EXR08720
                        873  * SUBROUTINES USED: HEXASCII                                  EXR08730

0D9C   24F4             875  CVTASCII LIS   R15,4             FOUR HEX DIGITS          EXR08750
0D9E   41B0 0DAA        876  CVTASCI1 BAL   RET2,HEXASCII     CONVERT TO ASCII         EXR08760
0DA2   D28E 0000        877           STB   TEMP,0(R14)       STORE TRAILING CHARACTER EXR08770
0DA6   26E1             878           AIS   R14,1             BUMP ADDRESS             EXR08780
0DA8   0303             879           BR    RET1                                         EXR08790
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                                881  *     S U B R O U T I N E   H E X A S C I I                    EXR08810
                                882  *                                                              EXR08820
                                883  * CONVERT THE CONTENTS OF REGISTER DAT INTO ASCII             EXR08830
                                884  * CHARACTERS STORED AT CONSECUTIVE LOCATIONS STARTING         EXR08840
                                885  * AT THE ADDRESS SPECIFIED BY REGISTER R14. R15 CONTAINS      EXR08850
                                886  * THE NUMBER OF DIGITS TO CONVERT.                           EXR08860
                                887  *                                                            EXR08870
                                888  * CALLING SEQUENCE:      BAL  RET2,HEXASCII                  EXR08880
                                889  *                                                            EXR08890
                                890  * REGISTERS USED: RET2,R15,CHAR,DAT,R14                      EXR08900
                                891  * SUBROUTINES USED: NONE                                     EXR08910

0DAA  C5F0 0004                 893  HEXASCII CLHI  R15,4              FOUR CHARACTERS TO CONVERT?  EXR08930
0DAE  2337                      894           BES   HEXASCI2           YES, NO ADJUSTMENT REQUIRED  EXR08940
0DB0  087F                      895           LHR   CHAR,R15                                       EXR08950
0DB2  9194                      896  HEXASCI1 SLLS  DAT,4              LEFT JUSTIFY DAT             EXR08960
0DB4  2671                      897           AIS   CHAR,1                                         EXR08970
0DB6  C570 0004                 898           CLHI  CHAR,4                                         EXR08980
0DBA  2084                      899           BLS   HEXASCI1                                      EXR08990
0DBC  0879                      900  HEXASCI2 LHR   CHAR,DAT                                       EXR09000
0DBE  907C                      901           SRLS  CHAR,12             PICK OFF MOST SIGNIFICANT    EXR09010
0DC0  D377 0DD2                 902           LB    CHAR,HEXTAB(CHAR)   DIGIT.  CONVERT TO ASCII    EXR09020
0DC4  D27E 0000                 903           STB   CHAR,0(R14)         STORE IN MEMORY              EXR09030
0DC8  9194                      904           SLLS  DAT,4               POSITION NEXT DIGIT FOR PICK-UP EXR09040
0DCA  26E1                      905           AIS   R14,1               INCREMENT CHARACTER ADDRESS  EXR09050
0DCC  27F1                      906           SIS   R15,1               DECREMENT DIGIT COUNT        EXR09060
0DCE  2029                      907           BPS   HEXASCI2           LOOP                         EXR09070
0DD0  0308                      908           BR    RET2                RETURN TO CALL               EXR09080
                                909  *                                                              EXR09090
0DD2  3031 3233 3435 3637       910  HEXTAB   DC    C'0123456789ABCDEF'                            EXR09100
0DDA  3839 4142 4344 4546
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EXTENDED ADDRESS SET-UP

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                                912  *       S U B R O U T I N E   A D R S E T                          EXR09120
                                913  * IF EXTENDED MEMORY, TRANSLATE PHYSICAL ADDRESS CONTAINED       EXR09130
                                914  * IN REGISTER PAIR STAT,CHAR INTO A PROGRAM ADDRESS IN           EXR09140
                                915  * REGISTER CHAR AND A PSW SETTING (BITS 8:11)                    EXR09150
                                916  *                                                                EXR09160
                                917  * CALLING SEQUENCE:       BAL  RET3,ADRSET                       EXR09170
                                918  *                                                                EXR09180
                                919  * REGISTERS USED: RET3,ZERO,STAT,CHAR                            EXR09190
                                920  * SUBROUTINES USED: NONE                                         EXR09200

0DE2  C3A0 0100                 922  ADRSET   THI   STATE,EXTMEM        MORE THAN 64KB?              EXR09220
0DE6  033C                      923           BZR   RET3                EXIT IF NO                   EXR09230
0DE8  9500                      924           EPSR  ZERO,ZERO           CAPTURE CURRENT PSW          EXR09240
0DEA  C400 FF0F                 925           NHI   ZERO,X'FF0F'       CLEAR BANK SELECT FIELD      EXR09250
0DEE  C450 0003                 926           NHI   STAT,3             MS 2 ADDRESS BITS            EXR09260
0DF2  2338                      927           BZS   ADRSETX            NO CHANGE IF 1ST 64KB        EXR09270
0DF4  D355 0E0E                 928           LB    STAT,XADRTAB(STAT)  TRANSLATE                    EXR09280
0DF8  CA70 8000                 929           AHI   CHAR,X'8000'       ADRS BIT 0 TO CARRY          EXR09290
0DFC  4E50 07D8                 930           ACH   STAT,ZEROS          MODIFY FIELD BITS            EXR09300
0E00  C670 8000                 931           OHI   CHAR,X'8000'       FORCE BIT 0 SET              EXR09310
0E04  9154                      932           SLLS  STAT,4              POSITION FIELD               EXR09320
0E06  0605                      933           OHR   ZERO,STAT           COMBINE PSW BITS             EXR09330
                                934  *                                                                EXR09340
0E08  9550                      935  ADRSETX  EPSR  STAT,ZERO           SET NEW PSW                  EXR09350
0E0A  0700                      936           XHR   ZERO,ZERO                                         EXR09360
0E0C  030C                      937           BR    RET3                                              EXR09370
                                938  *                                                                EXR09380
                                939  *                                                                EXR09390
0E0E  0001 0305                 940  XADRTAB  DB    0,1,3,5                                           EXR09400

                                942  *       S U B R O U T I N E   U N S E T                        EXR09420
                                943  *                                                                EXR09430
                                944  * CLEAR THE BANK SELECT BITS IN PSW                              EXR09440
                                945  *                                                                EXR09450
                                946  * CALLING SEQUENCE:       BAL  RET3,UNSET                        EXR09460
                                947  *                                                                EXR09470
                                948  * REGISTERS USED: RET3,TEMP,ZERO                                 EXR09480
                                949  * SUBROUTINES USED: NONE                                         EXR09490

0E12  9588                      951  UNSET    EPSR  TEMP,TEMP           CAPTURE CURRENT PSW          EXR09510
0E14  C480 FF0F                 952           NHI   TEMP,X'FF0F'       CLEAR BANK SELECT BITS       EXR09520
0E18  9508                      953           EPSR  ZERO,TEMP           MODIFY CURRENT PSW           EXR09530
0E1A  0700                      954           XHR   ZERO,ZERO           RESTORE ZERO                 EXR09540
0E1C  030C                      955           BR    RET3                RETURN                       EXR09550
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                                957  *    A C T I O N   C O M M A N D   T A B L E                    EXR09570
                                958  *                                                              EXR09580
      0000 0E1E                 959  ACMNDTBL EQU   *                                               EXR09590
0E1E  4243 4B20                 960           DC    C'BCK ',BACKCMND    RUN BACKGROUND TESTS       EXR09600
0E22  0F6A
0E24  4446 4C54                 961           DC    C'DFLT',DFLTCMND    RUN DOUBLE FLOATING POINT  EXR09610
0E28  0F70
0E2A  464C 5420                 962           DC    C'FLT ',FLTCMND     RUN SINGLE FLOATING POINT  EXR09620
0E2E  0F76
0E30  4C4F 4720                 963           DC    C'LOG ',LOGCMND     LOG MESSAGES               EXR09630
0E34  0F7C
0E36  484C 5420                 964           DC    C'HLT ',HLTCMND     HALT ON ERROR              EXR09640
0E3A  0F82
0E3C  4F50 5420                 965           DC    C'OPT ',OPTCMND     LIST OPTIONS               EXR09650
0E40  0F9A
0E42  4D41 5020                 966           DC    C'MAP',MAPCMND      SHOW MEMORY MAP            EXR09660
0E46  12CE
0E48  4552 5220                 967           DC    C'ERR ',ERRCMND     LIST ERRORS                EXR09670
0E4C  1008
0E4E  4453 5420                 968           DC    C'DST',DSTCMND      LIST DEVICE SERVICE TABLE  EXR09680
0E52  10A4
0E54  4D4F 5645                 969           DC    C'MOVE',MOVECMND    MOVING BUFFER COMMAND      EXR09690
0E58  1254
0E5A  4F50 4E20                 970           DC    C'OPN ',OPNCMND     OPEN MEMORY CELL           EXR09700
0E5E  11DA
0E60  5245 5020                 971           DC    C'REP ',REPCMND     MODIFY (REPLACE) MEMORY CELL EXR09710
0E64  11FC
0E66  0A20                      972           DC    X'0A20',X'2020',NXTCMND OPEN NEXT CELL           EXR09720
0E68  2020
0E6A  11EA
0E6C  5255 4E20                 973           DC    C'RUN ',RUNCMD                                   EXR09730
0E70  12F2
      0000 0E72                 974  ACMNDEND EQU   *                                               EXR09740
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COMMAND AND DEVICE TABLES

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                                976  *        D E V I C E   D C B   T A B L E                                EXR09760
                                977  *                                                                       EXR09770
                                978  * TABLE USED TO LOOK UP A DCB ADDRESS GIVEN A DEVICE MNEMONIC          EXR09780
                                979  * OR TO LOOK UP A MNEMONIC GIVEN A DCB ADDRESS                         EXR09790
                                980  * TO ADD A DEVICE, PLACE THE 4 CHARACTER MNEMONIC AND THE             EXR09800
                                981  * ADDRESS OF THE DCB IN THIS TABLE.                                    EXR09810
                                982  *                                                                       EXR09820
      0000 0E72                 983  DEV2DCB  EQU   *                                                        EXR09830
0E72                            984           IFNZ  PAPRTAPE                                                 EXR09840
0E72  5054 5250                 985           DC    C'PTRP',PTRPDCB                                          EXR09850
0E76  247E
0E78  5054 5020                 986           DC    C'PTP ',PTRPDCB                                          EXR09860
0E7C  247E
0E7E  5054 5220                 987           DC    C'PTR ',PTRPDCB                                          EXR09870
0E82  247E
                                988           ENDC                                                           EXR09880
0E84                            989           IFNZ  CARDROR                                                  EXR09890
0E84  4352 4420                 990           DC    C'CRD ',CRDDCB      CARD READER                          EXR09900
0E88  2BAA
                                991           ENDC                                                           EXR09910
0E8A                            992           IFNZ  PRINTERS                                                 EXR09920
0E8A  4C4E 5031                 993           DC    C'LNP1',LNPDCB1     LINE PRINTER 1                       EXR09930
0E8E  2D2A
0E90                            994           IFP   PRINTERS-1                                               EXR09940
0E90  4C4E 5032                 995           DC    C'LNP2',LNPDCB2     LINE PRINTER 2                       EXR09950
0E94  2DA6
                                996           ENDC                                                           EXR09960
                                997           ENDC                                                           EXR09970
0E96                            998           IFNZ  CLOCK                                                    EXR09980
0E96  4143 4C20                 999           DC    C'ACL ',ACLDCB      AC LINE CLOCK                        EXR09990
0E9A  2E3E
0E9C  5049 4320                1000           DC    C'PIC ',PICDCB      PRECISION INTERVAL CLOCK             EXR10000
0EA0  2EA2
0EA2  434C 4B20                1001           DC    C'CLK ',CLKDCB      5/16 EXTERNAL CLOCK                  EXR10010
0EA6  2F2A
                               1002           ENDC                                                           EXR10020
0EA8                           1003           IFNZ  CASSETTE                                                 EXR10030
0EA8  4341 5331                1004           DC    C'CAS1',CASDCB1     INTERTAPE CASSETTE 1                 EXR10040
0EAC  2632
0EAE                           1005           IFP   CASSETTE-1                                               EXR10050
0EAE  4341 5332                1006           DC    C'CAS2',CASDCB2     INTERTAPE CASSETTE 2                 EXR10060
0EB2  2656
0EB4                           1007           IFP   CASSETTE-2                                               EXR10070
0EB4  4341 5333                1008           DC    C'CAS3',CASDCB3     INTERTAPE CASSETTE 3                 EXR10080
0EB8  267A
0EBA                           1009           IFP   CASSETTE-3                                               EXR10090
0EBA  4341 5334                1010           DC    C'CAS4',CASDCB4     INTERTAPE CASSETTE 4                 EXR10100
0EBE  269E
                               1011           ENDC                                                           EXR10110
                               1012           ENDC                                                           EXR10120
                               1013           ENDC                                                           EXR10130
                               1014           ENDC                                                           EXR10140
0EC0                           1015           IFNZ  SLCHTSTR                                                 EXR10150
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COMMAND AND DEVICE TABLES

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0EC0  534C 4348          1016        DC    C'SLCH',SLCHTDCB    SELCH TESTER                          EXR10160
0EC4  3284
                         1017        ENDC                                                            EXR10170
0EC6                     1018        IFNZ  MAGTAPE                                                 EXR10180
0EC6  4D41 4731          1019        DC    C'MAG1',MAGDCB1     9 TRACK,800/1600 BPI MAG TAPE 1       EXR10190
0ECA  33EC
0ECC                     1020        IFP   MAGTAPE-1                                               EXR10200
0ECC  4D41 4732          1021        DC    C'MAG2',MAGDCB2     9 TRACK,800/1600 BPI MAG TAPE 2       EXR10210
0ED0  3414
0ED2                     1022        IFP   MAGTAPE-2                                               EXR10220
0ED2  4D41 4733          1023        DC    C'MAG3',MAGDCB3     9 TRACK,800/1600 BPI MAG TAPE 3       EXR10230
0ED6  343C
0ED8                     1024        IFP   MAGTAPE-3                                               EXR10240
0ED8  4D41 4734          1025        DC    C'MAG4',MAGDCB4     9 TRACK,800/1600 BPI MAG TAPE 4       EXR10250
0EDC  3464
                         1026        ENDC                                                            EXR10260
                         1027        ENDC                                                            EXR10270
                         1028        ENDC                                                            EXR10280
                         1029        ENDC                                                            EXR10290
0EDE                     1030        IFNZ  DISCS                                                   EXR10300
0EDE  4453 4331          1031        DC    C'DSC1',DSCDCB1     2.5-10MB DISC 1                       EXR10310
0EE2  3606
0EE4                     1032        IFP   DISCS-1                                                 EXR10320
0EE4  4453 4332          1033        DC    C'DSC2',DSCDCB2     2.5-10MB DISC 2                       EXR10330
0EE8  3710
0EEA                     1034        IFP   DISCS-2                                                 EXR10340
0EEA  4453 4333          1035        DC    C'DSC3',DSCDCB3     2.5-10MB DISC 3                       EXR10350
0EEE  374A
0EF0                     1036        IFP   DISCS-3                                                 EXR10360
0EF0  4453 4334          1037        DC    C'DSC4',DSCDCB4     2.5-10 MB DISC 4                      EXR10370
0EF4  3784
                         1038        ENDC                                                            EXR10380
                         1039        ENDC                                                            EXR10390
                         1040        ENDC                                                            EXR10400
                         1041        ENDC                                                            EXR10410
0EF6                     1042        IFNZ  DSK40MB                                                 EXR10420
0EF6  4453 4341          1043        DC    C'DSCA',DSCDCBA     40MB DISC 1                           EXR10430
0EFA  37BE
0EFC                     1044        IFP   DSK40MB-1                                               EXR10440
0EFC  4453 4342          1045        DC    C'DSCB',DSCDCBB     40MB DISC 2                           EXR10450
0F00  37F8
0F02                     1046        IFP   DSK40MB-2                                               EXR10460
0F02  4453 4343          1047        DC    C'DSCC',DSCDCBC     40MB DISC 3                           EXR10470
0F06  3832
0F08                     1048        IFP   DSK40MB-3                                               EXR10480
0F08  4453 4344          1049        DC    C'DSCD',DSCDCBD     40MB DISC 4                           EXR10490
0F0C  386C
                         1050        ENDC                                                            EXR10500
                         1051        ENDC                                                            EXR10510
                         1052        ENDC                                                            EXR10520
                         1053        ENDC                                                            EXR10530
0F0E                     1054        IFNZ  MSMDISC                                                 EXR10540
0F0E  4D53 4D31          1055        DC    C'MSM1',MSMDCB1     MSM DISC 1                            EXR10550
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COMMAND AND DEVICE TABLES

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0F12   38A6
0F14                        1056           IFP   MSMDISC-1                                                EXR10560
0F14   4D53 4D32            1057           DC    C'MSM2',MSMDCB2     MSM DISC 2                           EXR10570
0F18   38E0
0F1A                        1058           IFP   MSMDISC-2                                                EXR10580
0F1A   4D53 4D33            1059           DC    C'MSM3',MSMDCB3     MSM DISC 3                           EXR10590
0F1E   391A
0F20                        1060           IFP   MSMDISC-3                                                EXR10600
0F20   4D53 4D34            1061           DC    C'MSM4',MSMDCB4     MSM DISC 4                           EXR10610
0F24   3954
                            1062           ENDC                                                           EXR10620
                            1063           ENDC                                                           EXR10630
                            1064           ENDC                                                           EXR10640
                            1065           ENDC                                                           EXR10650
       0000 0F26            1066  FMDSEL   EQU   *                                                        EXR10660
0F26                        1067           IFNZ  FLOPPY                                                   EXR10670
0F26   464D 4431            1068           DC    C'FMD1',FMDDCB1     FLOPPY DISC 1                        EXR10680
0F2A   28D4
0F2C                        1069           IFP   FLOPPY-1                                                 EXR10690
0F2C   464D 4432            1070           DC    C'FMD2',FMDDCB2     FLOPPY DISC 2                        EXR10700
0F30   2902
0F32                        1071           IFP   FLOPPY-2                                                 EXR10710
0F32   464D 4433            1072           DC    C'FMD3',FMDDCB3     FLOPPY DISC 3                        EXR10720
0F36   2930
0F38                        1073           IFP   FLOPPY-3                                                 EXR10730
0F38   464D 4434            1074           DC    C'FMD4',FMDDCB4     FLOPPY DISC 4                        EXR10740
0F3C   295E
                            1075           ENDC                                                           EXR10750
                            1076           ENDC                                                           EXR10760
                            1077           ENDC                                                           EXR10770
                            1078           ENDC                                                           EXR10780
0F3E                        1079           IFNZ  PASLA                                                    EXR10790
                            1080           DC    C'PSLA',PSLADCB     PASLA                                EXR10800
                            1081           ENDC                                                           EXR10810
0F3E                        1082           IFNZ  ULI                                                      EXR10820
0F3E   554C 4920            1083           DC    C'ULI ',ULIDCB      UNIVERSAL LOGIC INTERFACE            EXR10830
0F42   3040
                            1084           ENDC                                                           EXR10840
0F44                        1085           IFNZ  DIGTLMPX                                                 EXR10850
0F44   444D 5558            1086           DC    C'DMUX',DMUXDCB     DIGITAL MULTIPLEXOR                  EXR10860
0F48   312A
                            1087           ENDC                                                           EXR10870
0F4A                        1088           IFNZ  DIGTLIO                                                  EXR10880
                            1089           DC    C'DIO ',DIODCB      DIGITAL I/O                          EXR10890
                            1090           ENDC                                                           EXR10900
0F4A                        1091           IFNZ  EIGHTINT                                                 EXR10910
0F4A   494E 5438            1092           DC    C'INT8',INT8DCB     EIGHT LINE INTERRUPT MODULE          EXR10920
0F4E   2FA6
                            1093           ENDC                                                           EXR10930
0F50   4D45 4D20            1094           DC    C'MEM ',MEMDCB      MEMORY TEST PROGRAM                  EXR10940
0F54   3CB8
0F56   4D50 5220            1095           DC    C'MPR ',MMPDCB      MEMORY PROTECT CONTROLLER            EXR10950
0F5A   3E22
```

COMMAND AND DEVICE TABLES

```
0F5C   5350 434C          1096           DC    C'SPCL',SPCLDCB     SPECIAL DEVICE ENTRY          EXR10960
0F60   3EAE
       0000 0F62          1097  DEV2DCBE EQU   *                                                 EXR10970
                          1098  *                                                                EXR10980
                          1099  *                                                                EXR10990
0F62   3244               1100  SLCHLIST DC    SLCH1DCB                                          EXR11000
0F64                      1101           IFP   SELCHS-1                                          EXR11010
0F64   3254               1102           DC    SLCH2DCB                                          EXR11020
0F66                      1103           IFP   SELCHS-2                                          EXR11030
0F66   3264               1104           DC    SLCH3DCB                                          EXR11040
0F68                      1105           IFP   SELCHS-3                                          EXR11050
0F68   3274               1106           DC    SLCH4DCB                                          EXR11060
                          1107           ENDC                                                    EXR11070
                          1108           ENDC                                                    EXR11080
                          1109           ENDC                                                    EXR11090
       0000 0F6A          1110  SLCHLEND EQU   *                                                 EXR11100
```

PROGRAM CONTROL SWITCH ROUTINES

```
                          1112  * IF COMMAND IS FOLLOWED BY %, SWITCH IS TURNED OFF                    EXR11120
                          1113  * OTHERWISE, SWITCH IS TURNED ON                                       EXR11130
                          1114  *                                                                      EXR11140
                          1115  * BACKGROUND TESTING                                                   EXR11150
                          1116  *                                                                      EXR11160
0F6A   C880 0800          1117  BACKCMND LHI   TEMP,BCKSWTCH                                         EXR11170
0F6E   230C               1118           BS    SWTCHCOM                                               EXR11180
                          1119  *                                                                      EXR11190
                          1120  * DOUBLE PRECISION FLOATING POINT                                      EXR11200
                          1121  *                                                                      EXR11210
0F70   C880 0040          1122  DFLTCMND LHI   TEMP,DFLTSWCH       MASK FOR DP FLOATING POINT        EXR11220
0F74   2309               1123           BS    SWTCHCOM                                               EXR11230
                          1124  *                                                                      EXR11240
                          1125  * SINGLE PRECISION FLOATING POINT                                      EXR11250
                          1126  *                                                                      EXR11260
0F76   C880 1000          1127  FLTCMND  LHI   TEMP,FLTSWTCH       MASK FOR SP FLOATING POINT        EXR11270
0F7A   2306               1128           BS    SWTCHCOM                                               EXR11280
                          1129  *                                                                      EXR11290
                          1130  * LOG ERRORS SWITCH                                                   EXR11300
                          1131  *                                                                      EXR11310
0F7C   C880 2000          1132  LOGCMND  LHI   TEMP,LOGSWTCH       MASK FOR LOG ERRORS               EXR11320
0F80   2303               1133           BS    SWTCHCOM                                               EXR11330
                          1134  *                                                                      EXR11340
                          1135  * HALT ON ERROR SWITCH                                                EXR11350
                          1136  *                                                                      EXR11360
0F82   C880 4000          1137  HLTCMND  LHI   TEMP,HLTSWTCH       MASK FOR HALT ON ERROR            EXR11370
                          1138  *                                                                      EXR11380
0F86   D37D 0000          1139  SWTCHCOM LB    CHAR,0(R13)         PICK UP DELIMITER                 EXR11390
0F8A   06A8               1140           OHR   STATE,TEMP          SET THE STATE REGISTER BIT        EXR11400
0F8C   C570 0025          1141           CLHI  CHAR,X'25'          PERCENT?                          EXR11410
0F90   4230 0AE0          1142           BNE   CMNDPROC           EXIT, FLAG IS SET                 EXR11420
0F94   07A8               1143           XHR   STATE,TEMP          RESET THE BIT                     EXR11430
0F96   4300 0AE0          1144           B     CMNDPROC            NEXT COMMAND                      EXR11440
```

DISPLAY OPTIONS COMMAND

```
                                1146  * PRINT CURRENT OPTIONS                                                    EXR11460
                                1147  *                                                                         EXR11470
0F9A   C820 0FE0                1148  OPTCMND  LHI   R2,OPTWORDS                                               EXR11480
0F9E   C8D0 0788                1149           LHI   R13,OPTBUF+8       LOCATION FOR FIRST OPTION            EXR11490
0FA2   C3A0 4000                1150           THI   STATE,HLTSWTCH     TEST HALT ON ERROR OPTION            EXR11500
0FA6   4130 0FF8                1151           BAL   RET1,OPTCOPY       COPY CHARACTERS TO OPTION BUFFER     EXR11510
0FAA   C3A0 2000                1152           THI   STATE,LOGSWTCH     TEST LOG MESSAGE OPTION              EXR11520
0FAE   4130 0FF8                1153           BAL   RET1,OPTCOPY       COPY CHARACTERS TO OPTION BUFFER     EXR11530
0FB2   C3A0 1000                1154           THI   STATE,FLTSWTCH     TEST SP FLOATING POINT OPTION        EXR11540
0FB6   4130 0FF8                1155           BAL   RET1,OPTCOPY       COPY CHARACTERS TO OPTION BUFFER     EXR11550
0FBA   C3A0 0040                1156           THI   STATE,DFLTSWCH     TEST DP FLOATING POINT OPTION        EXR11560
0FBE   4130 0FF8                1157           BAL   RET1,OPTCOPY       COPY CHARACTERS TO OPTION BUFFER     EXR11570
0FC2   C3A0 0800                1158           THI   STATE,BCKSWTCH     TEST BACKGROUND OPTION               EXR11580
0FC6   4130 0FF8                1159           BAL   RET1,OPTCOPY       COPY CHARACTERS TO OPTION BUFFER     EXR11590
0FCA   C3A0 0002                1160           THI   STATE,MOVING                                             EXR11600
0FCE   4130 0FF8                1161           BAL   RET1,OPTCOPY                                           EXR11610
0FD2   08ED                     1162           LHR   R14,R13                                                EXR11620
0FD4   4130 0D88                1163           BAL   RET1,CRLFNULL      CLOSE WITH CR, LF, DELETE           EXR11630
0FD8   E110 07B0                1164           SVC   1,OPTBUF           PRINT LINE                          EXR11640
0FDC   4300 0AE0                1165           B     CMNDPROC           NEXT COMMAND                        EXR11650
                                1166  *                                                                      EXR11660
0FE0   2048 4C54 204C 4F47      1167  OPTWORDS DC    C' HLT LOG FLT DFL BCK MOV'                            EXR11670
0FE8   2046 4C54 2044 464C
0FF0   2042 434B 204D 4F56

                                1169  *     S U B R O U T I N E   O P T C O P Y                              EXR11690
                                1170  *                                                                      EXR11700
                                1171  * IF THE CONDITION CODE IS NOT ZERO, COPY THE FOUR BYTES              EXR11710
                                1172  * FROM THE MEMORY LOCATION SPECIFIED BY R2 TO MEMORY STARTING         EXR11720
                                1173  * AT THE LOCATION SPECIFIED BY R13.  INCREMENT R13 AND R2 BY FOUR.     EXR11730
                                1174  *                                                                      EXR11740
                                1175  * CALLING SEQUENCE:      BAL  RET1,OPTCOPY                           EXR11750
                                1176  *                                                                      EXR11760
                                1177  * REGISTERS USED: RET1,R14,R15,R2,R13                                 EXR11770
                                1178  * SUBROUTINES USED: NONE                                              EXR11780

0FF8   2336                     1180  OPTCOPY  BZS   OPTCOPYX          EXIT IF NOT SELECTED                 EXR11800
0FFA   D1E2 0000                1181           LM    R14,0(R2)          PICK UP FOUR BYTES                   EXR11810
0FFE   D0ED 0000                1182           STM   R14,0(R13)         STORE IN PRINT BUFFER                EXR11820
1002   26D4                     1183           AIS   R13,4              INCREMENT BUFFER INDEX               EXR11830
1004   2624                     1184  OPTCOPYX AIS   R2,4               INCREMENT CHARACTER INDEX            EXR11840
1006   0303                     1185           BR    RET1               RETURN TO CALL                       EXR11850
```

```
                                1187  * PRINT ERROR SUMMARY FOR DEVICES ON THE DST                                EXR11870
                                1188  *                                                                          EXR11880
1008   E110 0748                1189  ERRCMND  SVC   1,ERRSUM            PRINT HEADING                         EXR11890
100C   C880 1B0E                1190           LHI   TEMP,DST                                                   EXR11900
1010   4060 1B50                1191           STH   TEMP,DSTNEXT         INITIALIZE POINTER                    EXR11910
1014   4880 1B50                1192  ERRCMND1 LH    TEMP,DSTNEXT                                                EXR11920
1018   4580 1B4E                1193           CLH   TEMP,DSTLAST         END OF TABLE?                         EXR11930
101C   2333                     1194           BES   ERRCMND2                                                    EXR11940
101E   4380 0AE0                1195           BNL   CMNDPROC            RETURN TO COMMAND PROCESSOR           EXR11950
1022   4863 0000                1196  ERRCMND2 LH    DCBADR,0(TEMP)        FETCH DCB ADDRESS                     EXR11960
1026   2682                     1197           AIS   TEMP,2               INCREMENT POINTER                     EXR11970
1028   4080 1B50                1198           STH   TEMP,DSTNEXT                                               EXR11980
102C   4846 0006                1199           LH    DEV,DEVADR(DCBADR)    GET DEVICE ADDRESS IF ANY             EXR11990
1030   4896 0000                1200           LH    DAT,FLAGS(DCBADR)                                           EXR12000
1034   C390 0040                1201           THI   DAT,MEMORY            PSUEDO DCB FOR MEMORY:                EXR12010
1038   213D                     1202           BNZS  ERRCMND3              SKIP ADDRESS CHECK IF YES             EXR12020
103A   0844                     1203           LHR   DEV,DEV               CHECK DEVICE ADDRESS                  EXR12030
103C   4330 1014                1204           BZ    ERRCMND1              IGNORE THIS DCB IF NO ADDRESS         EXR12040
1040   C390 0080                1205           THI   DAT,SELCH             IS THIS A SELCH DCB?                  EXR12050
1044   2337                     1206           BZS   ERRCMND3              GET MNEMONIC IF NO                    EXR12060
1046   C8E0 534C                1207           LHI   R14,C'SL'                                                  EXR12070
104A   C8F0 4348                1208           LHI   R15,C'CH'             R14,R15 = C'SLCH'                     EXR12080
104E   4300 1074                1209           B     ERRCMND6                                                    EXR12090
1052   C820 0E72                1210  ERRCMND3 LHI   R2,DEV2DCB           START OF LOOK-UP TABLE                EXR12100
1056   4562 0004                1211  ERRCMND4 CLH   DCBADR,4(R2)         FIND THE DCB ADDRESS                  EXR12110
105A   2336                     1212           BES   ERRCMND5                                                   EXR12120
105C   2626                     1213           AIS   R2,6                                                      EXR12130
105E   C520 0F62                1214           CLHI  R2,DEV2DCBE                                              EXR12140
1062   2086                     1215           BLS   ERRCMND4              LOOP THROUGH TABLE                    EXR12150
1064   E110 0710                1216           SVC   1,ERREMESS           PROGRAM ERROR                         EXR12160
1068   C8E0 3F3F                1217           LHI   R14,C'??'             NO MNEMONIC FOR DCB                   EXR12170
106C   08FE                     1218           LHR   R15,R14                                                    EXR12180
106E   2303                     1219           BS    ERRCMND6                                                   EXR12190
1070   D1E2 0000                1220  ERRCMND5 LM    R14,0(R2)             GET MNEMONIC FROM TABLE               EXR12200
1074   D0E0 0760                1221  ERRCMND6 STM   R14,OUTBUF           STORE MNEMONIC IN OUTBUF              EXR12210
1078   C870 0020                1222           LHI   CHAR,X'20'                                               EXR12220
107C   D270 0764                1223           STB   CHAR,OUTBUF+4         SPACE FOLLOWS MNEMONIC                EXR12230
1080   C8E0 0765                1224           LHI   R14,OUTBUF+5                                             EXR12240
1084   24F3                     1225           LIS   R15,3                                                    EXR12250
1086   C880 0020                1226           LHI   TEMP,X'20'                                               EXR12260
108A   0894                     1227           LHR   DAT,DEV                                                  EXR12270
108C   4130 0D9E                1228           BAL   RET1,CVTASCI1         CONVERT DEVICE ADDRESS                EXR12280
1090   4896 000E                1229           LH    DAT,ERRCOUNT(DCBADR)                                     EXR12290
1094   4130 0D9C                1230           BAL   RET1,CVTASCII         CONVERT ERROR COUNT                   EXR12300
1098   4130 0D88                1231           BAL   RET1,CRLFNULL                                            EXR12310
109C   E110 0760                1232           SVC   1,OUTBUF              PRINT LINE                            EXR12320
10A0   4300 1014                1233           B     ERRCMND1                                                   EXR12330
```

LIST DEVICES ON THE DEVICE SERVICE TABLE

```
                                1235  * LIST THE DEVICES AND PARAMETERS CURRENTLY SELECTED                    EXR12350
                                1236  * FOR EACH DCB ON THE DEVICE SERVICE TABLE, USE THE DEV2DCB             EXR12360
                                1237  * TABLE TO OBTAIN THE DEVICE MNEMONIC.  USE THE PARM FLAGS TO          EXR12370
                                1238  * PRINT THE PARAMETERS CURRENTLY SELECTED FOR THE DEVICE.              EXR12380
                                1239  *                                                                      EXR12390
10A4   C880 1B0E                1240  DSTCMND  LHI   TEMP,DST                                               EXR12400
10A8   4080 1B50                1241           STH   TEMP,DSTNEXT          INITIALIZE POINTER               EXR12410
10AC   4880 1B50                1242  DSTCMND1 LH    TEMP,DSTNEXT          NEXT ENTRY ADDRESS ON DST        EXR12420
10B0   4980 1B4E                1243           CH    TEMP,DSTLAST          SEE IF DONE                      EXR12430
10B4   4220 0AE0                1244           BP    CMNDPROC              NEXT COMMAND IF DONE             EXR12440
10B8   4868 0000                1245  DSTCMND2 LH    DCBADR,0(TEMP)        GET DCB ADDRESS                  EXR12450
10BC   2682                     1246           AIS   TEMP,2                INCREMENT DST ADDRESS            EXR12460
10BE   4080 1B50                1247           STH   TEMP,DSTNEXT                                           EXR12470
10C2   46E6 0000                1248           LH    R14,FLAGS(DCBADR)                                      EXR12480
10C6   C3E0 0080                1249           THI   R14,SELCH             IS THIS A SELCH?                 EXR12490
10CA   4230 10AC                1250           BNZ   DSTCMND1              LOOP BACK IF YES, NO PRINTING    EXR12500
10CE   C820 0E72                1251           LHI   R2,DEV2DCB            TABLE START ADDRESS              EXR12510
10D2   4562 0004                1252  DSTCMND3 CLH   DCBADR,4(R2)          LOOK FOR THIS DCB ADDRESS        EXR12520
10D6   2339                     1253           BES   DSTCMND4              FOUND IT                         EXR12530
10D8   2626                     1254           AIS   R2,6                   NO MATCH, NEXT ENTRY TO DEV2DCB  EXR12540
10DA   C520 0F62                1255           CLHI  R2,DEV2DCBE                                            EXR12550
10DE   2086                     1256           BLS   DSTCMND3              LOOK THROUGH ENTIRE TABLE        EXR12560
10E0   E110 0710                1257           SVC   1,ERREMESS            NO MNEMONIC FOR THIS DCB         EXR12570
10E4   4300 10AC                1258           B     DSTCMND1              CONTINUE                         EXR12580
                                1259  *                                                                      EXR12590
10E8   D1E2 0000                1260  DSTCMND4 LM    R14,0(R2)             GET DEVICE MNEMONIC              EXR12600
10EC   C560 247E                1261           CLHI  DCBADR,PTRPDCB                                         EXR12603
10F0   213E                     1262           BNES  DSTCMND6              SKIP IF NOT PTRP                 EXR12604
10F2   48D6 0000                1263           LH    R13,FLAGS(DCBADR)                                      EXR12605
10F6   C3D0 0800                1264           THI   R13,DEVCNTL1          SEE IF READER SELECTED           EXR12606
10FA   2134                     1265           BNZS  DSTCMND5              SKIP IF YES                      EXR12607
10FC   C8F0 5020                1266           LHI   R15,C'P '             PUNCH ONLY, R14/R15=C'PTP '      EXR12610
1100   2306                     1267           BS    DSTCMND6                                               EXR12613
1102   C3D0 0400                1268  DSTCMND5 THI   R13,DEVCNTL2          SEE IF PUNCH SELECTED            EXR12614
1106   2133                     1269           BNZS  DSTCMND6              READER PUNCH COMBO               EXR12615
1108   C8F0 5220                1270           LHI   R15,C'R '             READER ONLY                      EXR12616
110C   D0E0 0760                1271  DSTCMND6 STM   R14,OUTBUF            COPY MNEMONIC TO OUTBUF          EXR12617
1110   C880 0020                1272           LHI   TEMP,X'20'                                             EXR12620
1114   D280 0764                1273           STB   TEMP,OUTBUF+4          FOLLOW WITH SPACE                EXR12630
1118   C8E0 0765                1274           LHI   R14,OUTBUF+5                                           EXR12640
                                1275  *                                                                      EXR12650
                                1276  * USE PARM FLAGS TO PRINT PARAMETERS                                   EXR12660
                                1277  *                                                                      EXR12670
111C   48D6 0004                1278  DSTPRM0  LH    R13,PARM(DCBADR)      TEST BIT 0                       EXR12680
1120   2316                     1279           BNMS  DSTPRM1               SKIP IF NOT SELECTED             EXR12690
1122   4896 0006                1280           LH    DAT,DEVADR(DCBADR)    DEVICE ADDRESS                   EXR12700
1126   24F3                     1281           LIS   R15,3                 THREE HEX DIGITS                 EXR12710
1128   4130 0D9E                1282           BAL   RET1,CVTASCI1         CONVERT TO ASCII                 EXR12720
112C   0ADD                     1283  DSTPRM1  AHR   R13,R13               TEST BIT 1                       EXR12730
112E   2316                     1284           BNMS  DSTPRM2               SKIP IF NOT SELECTED             EXR12740
1130   4896 0028                1285           LH    DAT,CONTADR(DCBADR)   CONTROLLER ADDRESS               EXR12750
1134   24F3                     1286           LIS   R15,3                 THREE DIGITS                     EXR12760
1136   4130 0D9E                1287           BAL   RET1,CVTASCI1         CONVERT TO ASCII                 EXR12770
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LIST DEVICES ON THE DEVICE SERVICE TABLE

```
113A  0ADD           1288 DSTPRM2  AHR   R13,R13               TEST BIT 2                          EXR12780
113C  2316           1289          BNMS  DSTPRM3               SKIP IF NOT SELECTED                EXR12790
113E  4896 0024      1290          LH    DAT,SELCHADR(DCBADR)  SELCH ADDRESS                       EXR12800
1142  24F3           1291          LIS   R15,3                 THREE DIGITS                        EXR12810
1144  4130 0D9E      1292          BAL   RET1,CVTASCI1         CONVERT TO ASCII                    EXR12820
1148  0ADD           1293 DSTPRM3  AHR   R13,R13               BIT 3 NOT USED                      EXR12830
114A  0ADD           1294 DSTPRM4  AHR   R13,R13               BIT 4 NOT USED                      EXR12840
114C  0ADD           1295 DSTPRM5  AHR   R13,R13               TEST BIT 5                          EXR12850
114E  2318           1296          BNMS  DSTPRM6               SKIP IF NOT SELECTED                EXR12860
1150  4896 002A      1297          LH    DAT,CYLLOW(DCBADR)    CYLINDER LOW LIMIT                  EXR12870
1154  268D           1298          AIS   TEMP,13               FOLLOWED BY HYPHEN                  EXR12880
1156  4130 0D9C      1299          BAL   RET1,CVTASCII                                             EXR12890
115A  4896 002C      1300          LH    DAT,CYLHIGH(DCBADR)   CYLINDER HIGH LIMIT                 EXR12900
115E  278D           1301          SIS   TEMP,13               FOLLOWED BY SPACE                   EXR12910
1160  4130 0D9C      1302          BAL   RET1,CVTASCII                                             EXR12920
1164  0ADD           1303 DSTPRM6  AHR   R13,R13               TEST BIT 6                          EXR12930
1166  2318           1304          BNMS  DSTPRM7               SKIP IF NOT SELECTED                EXR12940
1168  D396 002E      1305          LB    DAT,HEADLOW(DCBADR)   HEAD LOW LIMIT                      EXR12950
116C  268D           1306          AIS   TEMP,13               FOLLOWED BY HYPHEN                  EXR12960
116E  4130 0D9C      1307          BAL   RET1,CVTASCII                                             EXR12970
1172  D396 002F      1308          LB    DAT,HEADHIGH(DCBADR)  HEAD HIGH LIMIT                     EXR12980
1176  278D           1309          SIS   TEMP,13               FOLLOWED BY SPACE                   EXR12990
1178  4130 0D9C      1310          BAL   RET1,CVTASCII                                             EXR13000
117C  0ADD           1311 DSTPRM7  AHR   R13,R13               TEST BIT 7                          EXR13010
117E  2318           1312          BNMS  DSTPRM8               SKIP IF NOT SELECTED                EXR13020
1180  4896 0030      1313          LH    DAT,SCTRLOW(DCBADR)   SECTOR LOW LIMIT                    EXR13030
1184  268D           1314          AIS   TEMP,13               FOLLOWED BY HYPHEN                  EXR13040
1186  4130 0D9C      1315          BAL   RET1,CVTASCII                                             EXR13050
118A  4896 0032      1316          LH    DAT,SCTRHIGH(DCBADR)  SECTOR HIGH LIMIT                   EXR13060
118E  278D           1317          SIS   TEMP,13               FOLLOWED BY SPACE                   EXR13070
1190  4130 0D9C      1318          BAL   RET1,CVTASCII                                             EXR13080
1194  0ADD           1319 DSTPRM8  AHR   R13,R13               TEST BIT 8                          EXR13090
1196  4310 11CE      1320          BNM   DSTPRM9               SKIP IF NOT SET                     EXR13100
119A  D396 001C      1321          LB    DAT,BUF1EXT(DCBADR)   MS 4 BITS OF 20 BIT ADDRESS         EXR13110
119E  D399 0DD2      1322          LB    DAT,HEXTAB(DAT)       CONVERT TO ASCII                    EXR13120
11A2  D29E 0000      1323          STB   DAT,0(R14)                                                EXR13130
11A6  26E1           1324          AIS   R14,1                                                     EXR13140
11A8  4896 0012      1325          LH    DAT,MEMLOW(DCBADR)    MEMORY LOW LIMIT                    EXR13150
11AC  C880 002D      1326          LHI   TEMP,X'2D'            FOLLOWED BY HYPHEN                  EXR13160
11B0  4130 0D9C      1327          BAL   RET1,CVTASCII                                             EXR13170
                     1328 *                                                                        EXR13180
11B4  D396 001D      1329          LB    DAT,BUF2EXT(DCBADR)                                       EXR13190
11B8  D399 0DD2      1330          LB    DAT,HEXTAB(DAT)       CONVERT MSD OF HIGH LIMIT           EXR13200
11BC  D29E 0000      1331          STB   DAT,0(R14)                                                EXR13210
11C0  26E1           1332          AIS   R14,1                                                     EXR13220
11C2  4896 0014      1333          LH    DAT,MEMHIGH(DCBADR)   MEMORY HIGH LIMIT                   EXR13230
11C6  C880 0020      1334          LHI   TEMP,X'20'                                                EXR13240
11CA  4130 0D9C      1335          BAL   RET1,CVTASCII                                             EXR13250
      0000 11CE      1336 DSTPRM9  EQU   *                     REMAINING FLAGS NOT ASSIGNED        EXR13260
11CE  4130 0D88      1337          BAL   RET1,CRLFNULL                                            EXR13270
11D2  E110 0760      1338          SVC   1,OUTBUF              PRINT THIS LINE                     EXR13280
11D6  4300 10AC      1339          B     DSTCMND1              LOOP FOR ALL DEVICES                EXR13290
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OPEN AND REPLACE COMMANDS

```
                                1341  * OPEN MEMORY CELL COMMAND                                                    EXR13310
                                1342  *                                                                            EXR13320
11DA   4130 0D1C                1343  OPNCMND  BAL   RET1,NEXTPARM      FETCH ADDRESS                          EXR13330
11DE   4080 07EC                1344           STH   TEMP,OPENCELL      STORE OPEN CELL ADDRESS                EXR13340
11E2   4090 07EE                1345           STH   DAT,OPENCELL+2                                              EXR13350
11E6   4300 1214                1346           B     PRNTCELL          PRINT ADDRESS & CONTENTS               EXR13360
                                1347  *                                                                            EXR13370
                                1348  * OPEN NEXT MEMORY CELL                                                      EXR13380
                                1349  *                                                                            EXR13390
11EA   2492                     1350  NXTCMND  LIS   DAT,2                                                        EXR13400
11EC   6190 07EE                1351           AHM   DAT,OPENCELL+2      INCREMENT OPEN CELL ADDRESS            EXR13410
11F0   4E00 07EC                1352           ACH   ZERO,OPENCELL                                               EXR13420
11F4   4000 07EC                1353           STH   ZERO,OPENCELL                                               EXR13430
11F8   0700                     1354           XHR   ZERO,ZERO                                                   EXR13440
11FA   230D                     1355           BS    PRNTCELL                                                    EXR13450
                                1356  *                                                                            EXR13460
                                1357  * REPLACE CONTENTS OF OPEN CELL                                             EXR13470
                                1358  *                                                                            EXR13480
11FC   4130 0D1C                1359  REPCMND  BAL   RET1,NEXTPARM      FETCH DATA TO STORE                    EXR13490
1200   4850 07EC                1360           LH    STAT,OPENCELL                                               EXR13500
1204   4870 07EE                1361           LH    CHAR,OPENCELL+2     STAT,CHAR = OPEN CELL ADRS             EXR13510
1208   41C0 0DE2                1362           BAL   RET3,ADRSET         TRANSLATE                              EXR13520
120C   4097 0000                1363           STH   DAT,0(CHAR)         STORE THE DATA                         EXR13530
1210   41C0 0E12                1364           BAL   RET3,UNSET          CLEAN-UP PSW                           EXR13540
                                1365  *                                                                            EXR13550
                                1366  * PRINT ADDRESS AND CONTENTS OF OPEN CELL                                    EXR13560
                                1367  *                                                                            EXR13570
1214   4890 07EC                1368  PRNTCELL LH    DAT,OPENCELL       MS ADDRESS (ONE DIGIT)                 EXR13580
1218   D399 0DD2                1369           LB    DAT,HEXTAB(DAT)    CONVERT TO ASCII                       EXR13590
121C   D290 0760                1370           STB   DAT,OUTBUF         STORE IT                               EXR13600
1220   C8E0 0761                1371           LHI   R14,OUTBUF+1                                               EXR13610
1224   4890 07EE                1372           LH    DAT,OPENCELL+2     LS ADDRESS                             EXR13620
1228   C880 0020                1373           LHI   TEMP,X'20'                                                 EXR13630
122C   4130 0D9C                1374           BAL   RET1,CVTASCII      COPY ADDRESS TO OUTPUT BUFFER          EXR13640
1230   4850 07EC                1375           LH    STAT,OPENCELL                                               EXR13650
1234   4870 07EE                1376           LH    CHAR,OPENCELL+2    STAT,CHAR = ADDRESS                    EXR13660
1238   41C0 0DE2                1377           BAL   RET3,ADRSET         TRANSLATE                              EXR13670
123C   4897 0000                1378           LH    DAT,0(CHAR)        CONTENTS OF OPENCELL                   EXR13680
1240   41C0 0E12                1379           BAL   RET3,UNSET         CLEAN-UP PSW                           EXR13690
1244   4130 0D9C                1380           BAL   RET1,CVTASCII      COPY DATA TO OUTBUF                    EXR13700
1248   4130 0D88                1381           BAL   RET1,CRLFNULL                                             EXR13710
124C   E110 0760                1382           SVC   1,OUTBUF           PRINT                                  EXR13720
1250   4300 0AE0                1383           B     CMNDPROC           PROCESS NEXT COMMAND                   EXR13730
```

MOVING BUFFER COMMAND

```
                        1385  * MOVECMND...ADD LAST SPECIFIED DEVICE TO THE MOVING BUFFER TABLE          EXR13750
                        1386  *                                                                         EXR13760
                        1387  * IF THE LAST COMMAND ENTRY WAS NOT DIRECTED TO A DEVICE, OR THE          EXR13770
                        1388  * SLECTED DEVICE DOESN'T ALLOW FOR A MOVING BUFFER, AN ERROR              EXR13780
                        1389  * MESSAGE IS OUTPUT.  OTHERWISE THE LAST DEVICE DCB ADDRESS IS           EXR13790
                        1390  * ADDED TO THE MOVING BUFFER TABLE.                                       EXR13800

1254  D37D 0000         1392  MOVECMND LB    CHAR,0(R13)          CHECK TERMINATOR                    EXR13820
1258  C570 0025         1393           CLHI  CHAR,X'25'           PERCENT?                            EXR13830
125C  4330 12A4         1394           BE    MOVECMD4             DELETE IF YES                       EXR13840
1260  4870 12CC         1395           LH    CHAR,LASTDCB         CHECK LAST DCB ADDRESS              EXR13850
1264  2135              1396           BNZS  MOVECMD1             IF NOT ZERO, CONTINUE               EXR13860
1266  E110 0736         1397           SVC   1,ERRFMESS           ELSE SEQUENCE ERROR                 EXR13870
126A  4300 0AE0         1398           B     CMNDPROC                                                 EXR13880
126E  4897 0004         1399  MOVECMD1 LH    DAT,PARM(CHAR)       SEE IF MOVING BUFFER ALLOWED        EXR13890
1272  C390 0040         1400           THI   DAT,X'0040'          TEST PARM FLAG 9                    EXR13900
1276  2135              1401           BNZS  MOVECMD2             SKIP IF SET                         EXR13910
1278  E110 0606         1402           SVC   1,ERR1MESS           ELSE, FORMAT ERROR                  EXR13920
127C  4300 0AE0         1403           B     CMNDPROC             NEXT COMMAND                        EXR13930
1280  4880 1F5A         1404  MOVECMD2 LH    TEMP,MOVELAST        ADRS OF LAST TABLE ENTRY            EXR13940
1284  2682              1405           AIS   TEMP,2               PLUS 2 = ADRS OF NEXT SLOT          EXR13950
1286  C580 1F58         1406           CLHI  TEMP,MOVEEND         END OF TABLE?                       EXR13960
128A  2185              1407           BLS   MOVECMD3             CONTINUE IF NO                      EXR13970
128C  E110 06B4         1408           SVC   1,ERRAMESS           OVERFLOW MESSAGE                    EXR13980
1290  4300 0AE0         1409           B     CMNDPROC             GO FOR NEXT COMMAND                 EXR13990
1294  4078 0000         1410  MOVECMD3 STH   CHAR,0(TEMP)         ADD DCB ADDRESS                     EXR14000
1298  4080 1F5A         1411           STH   TEMP,MOVELAST        UPDATE POINTER                      EXR14010
129C  C6A0 0002         1412           OHI   STATE,MOVING         SET MOVE OPTION INDICATOR           EXR14020
12A0  4300 0AE0         1413           B     CMNDPROC             NEXT COMMAND                        EXR14030
12A4  C3A0 0001         1414  MOVECMD4 THI   STATE,MOVEBUSY       SEE IF MOVER IS ACTIVE              EXR14040
12A8  2337              1415           BZS   MOVECMD5             SKIP IF NOT ACTIVE                  EXR14050
12AA  4880 1F5A         1416           LH    TEMP,MOVELAST                                            EXR14060
12AE  4868 0000         1417           LH    DCBADR,0(TEMP)       PICK UP LAST USER                   EXR14070
12B2  41B0 1F1A         1418           BAL   RET2,BUFRESTR        RESTORE ORIGINAL ADDRESSES          EXR14080
12B6  C880 1F40         1419  MOVECMD5 LHI   TEMP,MOVETAB         CLEAR THE MOVE TABLE                EXR14090
12BA  4080 1F58         1420           STH   TEMP,MOVENEXT                                            EXR14100
12BE  2782              1421           SIS   TEMP,2                                                   EXR14110
12C0  4080 1F5A         1422           STH   TEMP,MOVELAST                                            EXR14120
12C4  C4A0 FFFC         1423           NHI   STATE,-1-MOVING-MOVEBUSY                                 EXR14130
12C8  4300 0AE0         1424           B     CMNDPROC                                                 EXR14140
12CC  0000              1425  LASTDCB  DC    0                                                        EXR14150
```

MEMORY MAP COMMAND

```
12CE  C6E0 0760          1427  MAPCMND  LHI   R14,OUTBUF                          EXR14170
12D2  4890 0ADC          1428           LH    DAT,MEMMAP        FIRST HALFWORD   EXR14180
12D6  C880 0020          1429           LHI   TEMP,X'20'                         EXR14190
12DA  4130 0D9C          1430           BAL   RET1,CVTASCII     CONVERT TO ASCII EXR14200
12DE  4890 0ADE          1431           LH    DAT,MEMMAP+2      SECOND HALFWORD  EXR14210
12E2  4130 0D9C          1432           BAL   RET1,CVTASCII                      EXR14220
12E6  4130 0D88          1433           BAL   RET1,CRLFNULL                      EXR14230
12EA  E110 0760          1434           SVC   1,OUTBUF          PRINT THE LINE   EXR14240
12EE  4300 0AE0          1435           B     CMNDPROC          NEXT COMMAND     EXR14250
```

```
                        1437  * RUNCMD..INITIALIZE DCBS AND TABLES FOR DISPATCHER                    EXR14270
                        1438  *                                                                     EXR14280
                        1439  * TWO PASSES ARE MADE THROUGH THE DEVICE SERVICE TABLE.  ON THE       EXR14290
                        1440  * FIRST PASS, THE SELECTOR CHANNEL DCB'S ARE FILLED IN FROM THE       EXR14300
                        1441  * DCB'S OF DEVICES WHICH USE THE SELECTOR CHANNELS.  AN OUTPUT       EXR14310
                        1442  * COMMAND STOP IS ISSUED TO EACH SELCH.  IF THERE ARE MORE SELCH     EXR14320
                        1443  * ADDRESSES THAN SELCH DCB'S, AN ERROR MESSAGE IS PRINTED.           EXR14330
                        1444  *                                                                     EXR14340
                        1445  * ON THE SECOND PASS THROUGH THE DST, EACH DCB IS ENTERED IN THE      EXR14350
                        1446  * DCB LOOK-UP TABLE.  VARIOUS FIELDS IN THE DCB ARE INITIALIZED.      EXR14360
                        1447  * EACH DEVICE IS CHECKED FOR FALSE-SYNC.  IF FALSE-SYNC OCCURS,      EXR14370
                        1448  * AN ERROR IS PRINTED AND THE "IGNORE" BIT IS SET IN THE DEVICES      EXR14380
                        1449  * DCB.  IF TWO OR MORE DEVICES HAVE THE SAME ADDRESS, AN ERROR       EXR14390
                        1450  * MESSAGE IS PRINTED.                                                EXR14400
                        1451  *                                                                     EXR14410
                        1452  * FINALLY, SEVERAL GLOBAL CONTROL WORDS ARE INITIALIZED AND THE      EXR14420
                        1453  * ECHO TEST IS STARTED ON THE CONSOLE IF NO ERRORS HAVE OCCURED.      EXR14430
                        1454  * RETURN IS MADE TO THE COMMAND PROCESSOR IF ERRORS HAVE OCCURED.    EXR14440
                        1455  * OTHERWISE, PSW DSPCHER IS LOADED TO START TESTING.                  EXR14450

12F2  C4A0 FF7F         1457  RUNCMD   NHI   STATE,-1-ERRBIT     CLEAR ERROR FLAG                 EXR14470
12F6  40A0 0ADA         1458           STH   STATE,STATESAV      SAVE FOR RESTART                 EXR14480
                        1459  *                                                                     EXR14490
                        1460  * BUILD SELCH DCB'S FROM OTHER DCB'S ON DEVICE SERVICE TABLE          EXR14500
                        1461  *                                                                     EXR14510
12FA  C880 0F62         1462           LHI   TEMP,SLCHLIST       START OF SELCH LIST              EXR14520
12FE  0700              1463           XHR   ZERO,ZERO                                            EXR14530
1300  4868 0000         1464  RUN00    LH    DCBADR,0(TEMP)                                       EXR14540
1304  4006 0006         1465           STH   ZERO,DEVADR(DCBADR) CLEAR DEVICE ADDRESS FIELDS      EXR14550
1308  2682              1466           AIS   TEMP,2                                               EXR14560
130A  C580 0F6A         1467           CLHI  TEMP,SLCHLEND                                        EXR14570
130E  2087              1468           BLS   RUN00               LOOP THROUGH ALL SELCH'S         EXR14580
                        1469  *                                                                     EXR14590
1310  C880 1B0E         1470           LHI   TEMP,DST            START OF DEVICE SERVICE TABLE    EXR14600
1314  4868 0000         1471  RUN01    LH    DCBADR,0(TEMP)      LOOK AT A DCB                    EXR14610
1318  2682              1472           AIS   TEMP,2                                               EXR14620
131A  4080 1B50         1473           STH   TEMP,DSTNEXT                                         EXR14630
131E  4896 0000         1474           LH    DAT,FLAGS(DCBADR)   PICK UP DEVICE TYPE FLAGS        EXR14640
1322  C390 00C0         1475           THI   DAT,SELCH+MEMORY    IF SELCH OR MEMORY DCB           EXR14650
1326  4230 1366         1476           BNZ   RUN05               SKIP                             EXR14660
132A  C390 0020         1477           THI   DAT,USESELCH        DOES THIS DEVICE USE A SELCH?    EXR14670
132E  4330 1366         1478           BZ    RUN05               BRANCH IF NO                     EXR14680
1332  4646 0024         1479           LH    DEV,SELCHADR(DCBADR) HERE IS THE SELCH ADDRESS       EXR14690
                        1480  *                                                                     EXR14700
                        1481  * LOOK FOR A SELCH DCB                                              EXR14710
                        1482  *                                                                     EXR14720
1336  C690 0F62         1483           LHI   DAT,SLCHLIST        START OF SELCH LIST              EXR14730
133A  4879 0000         1484  RUN02    LH    CHAR,0(DAT)         IS THIS DCB AVAILABLE?           EXR14740
133E  48D7 0006         1485           LH    R13,DEVADR(CHAR)                                     EXR14750
1342  2136              1486           BNZS  RUN03               BRANCH IF NO                     EXR14760
1344  4047 0006         1487           STH   DEV,DEVADR(CHAR)    PUT IN SELCH ADDRESS             EXR14770
```

RUN COMMAND

```
1348  DE40 0D18  1488          OC    DEV,STOPCMND        STOP COMMAND TO THE SELHC          EXR14780
134C  230D       1489          BS    RUN05               LOOK AT NEXT DCB ON LIST           EXR14790
                 1490  *                                                                    EXR14800
                 1491  * THIS SELCH DCB USED                                               EXR14810
                 1492  *                                                                    EXR14820
134E  4547 0006  1493  RUN03   CLH   DEV,DEVADR(CHAR)    SAME SELCH?                        EXR14830
1352  233A       1494          BES   RUN05               BRANCH IF YES                      EXR14840
1354  2692       1495  RUN04   AIS   DAT,2               LOOK AT NEXT SELCH DCB             EXR14850
1356  C590 0F6A  1496          CLHI  DAT,SLCHLEND                                           EXR14860
135A  4280 133A  1497          BL    RUN02               LOOP THROUGH SELCH LIST            EXR14870
                 1498  *                                                                    EXR14880
                 1499  *       ALL SELCH DCB'S ARE USED.                                    EXR14890
                 1500  *                                                                    EXR14900
135E  E110 06CC  1501          SVC   1,ERRBMESS          NO MATCH FOR THIS DEVICE           EXR14910
1362  C6A0 0080  1502          OHI   STATE,ERRBIT        SET ERROR FLAG                     EXR14920
                 1503  *                                                                    EXR14930
1366  4880 1B50  1504  RUN05   LH    TEMP,DSTNEXT                                          EXR14940
136A  4580 1B4E  1505          CLH   TEMP,DSTLAST                                          EXR14950
136E  4320 1314  1506          BNP   RUN01               LOOP THROUGH DST                   EXR14960


                 1508  * DST SECOND PASS...DCB INITIALIZATION                              EXR14980
                 1509  *                                                                    EXR14990
1372  C890 01FE  1510          LHI   DAT,510             CLEAR THE DCB LOOK-UP TABLE        EXR15000
1376  4009 08DA  1511  COMN3   STH   ZERO,DCBTAB(DAT)    WILL BE BUILT BY RUN COMMAND       EXR15010
137A  2792       1512          SIS   DAT,2                                                 EXR15020
137C  2283       1513          BNLS  COMN3                                                 EXR15030
                 1514  *                                                                    EXR15040
                 1515  * ENTER CONSOLE IN DCB LOOK-UP TABLE                                EXR15050
                 1516  *                                                                    EXR15060
137E  C860 2290  1517          LHI   DCBADR,CONDCB                                         EXR15070
1382  4846 0006  1518          LH    DEV,DEVADR(DCBADR)  CONSOLE DEVICE ADDRESS             EXR15080
1386  0A44       1519          AHR   DEV,DEV             INDEX FOR DCBTAB                   EXR15090
1388  4064 08DA  1520          STH   DCBADR,DCBTAB(DEV)  STORE DCB ADDRESS IN DCB TABLE     EXR15100
138C  C3A0 000C  1521          THI   STATE,CARSL300+PASLAFLG                               EXR15110
1390  2333       1522          BZS   RUN05A              SKIP IF NOT PASLA/PALM             EXR15120
1392  4064 08DC  1523          STH   DCBADR,DCBTAB+2(DEV) USE TWO CONSECUTIVE SLOTS        EXR15130
                 1524  *                                                                    EXR15140
1396  C880 1B0E  1525  RUN05A  LHI   TEMP,DST            START OF DEVICE SERVICE TABLE      EXR15150
139A  4868 0000  1526  RUN06   LH    DCBADR,0(TEMP)      GET DEVICE DCB                     EXR15160
139E  2682       1527          AIS   TEMP,2                                                EXR15170
13A0  4080 1B50  1528          STH   TEMP,DSTNEXT                                          EXR15180
13A4  4896 0000  1529          LH    DAT,FLAGS(DCBADR)                                     EXR15190
13A8  4846 0006  1530          LH    DEV,DEVADR(DCBADR)  DEVICE ADDRESS                    EXR15200
13AC  2139       1531          BNZS  RUN06A              BRANCH IF GOOD ADDRESS             EXR15210
13AE  C390 0080  1532          THI   DAT,SELCH           CHECK FOR SELCH                    EXR15220
13B2  4230 1466  1533          BNZ   RUN09               SKIP SELCH WITH ZERO ADDRESS       EXR15230
13B6  C390 0040  1534          THI   DAT,MEMORY                                            EXR15240
13BA  4230 1412  1535          BNZ   RUN070A             BRANCH IF MEMORY DCB               EXR15250
13BE  0A44       1536  RUN06A  AHR   DEV,DEV             INDEX FOR DCBTAB                   EXR15260
13C0  4884 08DA  1537          LH    TEMP,DCBTAB(DEV)    SEE IF SLOT IS EMPTY               EXR15270
13C4  4330 13EA  1538          BZ    RUN07               BRANCH IF YES...OK                 EXR15280
```

RUN COMMAND

```
13C8  C390 0008          1539           THI   DAT,FMD              ALL FLOPPY DRIVES HAVE                EXR15290
13CC  4230 1412          1540           BNZ   RUN070A             THE SAME DEVICE NUMBER                EXR15300
13D0  C8E0 06F7          1541           LHI   R14,ERRCMESS+17                                            EXR15310
13D4  4896 0006          1542           LH    DAT,DEVADR(DCBADR)   DEVICE ADDRESS                       EXR15320
13D8  24F3               1543           LIS   R15,3                CONVERT 3 DIGITS                      EXR15330
13DA  41B0 0DAA          1544           BAL   RET2,HEXASCII        PUT ADDRESS IN ERROR MESSAGE          EXR15340
13DE  E110 06E6          1545           SVC   1,ERRCMESS           DUPLICATE DEVICE                      EXR15350
13E2  C6A0 0080          1546           OHI   STATE,ERRBIT        SET ERROR FLAG                        EXR15360
13E6  4300 1466          1547           B     RUN09                SKIP REMAINING SETUP THIS DEVICE      EXR15370
13EA  4064 08DA          1548  RUN07    STH   DCBADR,DCBTAB(DEV)   ADD DCB TO TABLE                     EXR15380
13EE                     1549           IFNZ  EIGHTINT                                                   EXR15390
13EE  C560 2FA6          1550           CLHI  DCBADR,1NT8DCB       8-LINE INTERRUPT MODULE?              EXR15400
13F2  4230 1412          1551           BNE   RUN070A              SKIP IF NO                            EXR15410
13F6  4064 08DC          1552           STH   DCBADR,DCBTAB+2(DEV) IF YES, TAKE 8 CONSECUTIVE SLOTS      EXR15420
13FA  4064 08DE          1553           STH   DCBADR,DCBTAB+4(DEV)                                       EXR15430
13FE  4064 08E0          1554           STH   DCBADR,DCBTAB+6(DEV)                                       EXR15440
1402  4064 08E2          1555           STH   DCBADR,DCBTAB+8(DEV)                                       EXR15450
1406  4064 08E4          1556           STH   DCBADR,DCBTAB+10(DEV)                                      EXR15460
140A  4064 08E6          1557           STH   DCBADR,DCBTAB+12(DEV)                                      EXR15470
140E  4064 08E8          1558           STH   DCBADR,DCBTAB+14(DEV)                                      EXR15480
                         1559           ENDC                                                             EXR15490
1412  C490 8FFF          1560  RUN070A  NHI   DAT,-1-BUSY-BADSTAT-NOTCOUNT CLEAR FLAGS                   EXR15500
1416  4096 0000          1561           STH   DAT,FLAGS(DCBADR)                                          EXR15510
141A  4006 0002          1562           STH   ZERO,PHASE(DCBADR)   CLEAR DRIVER PHASE COUNT              EXR15520
141E  4006 000E          1563           STH   ZERO,ERRCOUNT(DCBADR) CLEAR ERROR COUNT                    EXR15530
                         1564  *                                                                          EXR15540
                         1565  * CHECK FOR FALSE SYNC                                                    EXR15550
                         1566  *                                                                          EXR15560
1422  C390 00C0          1567           THI   DAT,MEMORY+SELCH     IF MEMORY OR SELCH, NO CHECK          EXR15570
1426  4230 1454          1568           BNZ   RUN08                                                      EXR15580
142A  C560 2F2A          1569           CLHI  DCBADR,CLKDCB        NO CHECK IF 5/16 EXTERNAL CLOCK       EXR15590
142E  4330 145E          1570           BE    RUN08A                                                     EXR15600
1432  4896 0006          1571           LH    DAT,DEVADR(DCBADR)   DEVICE ADDRESS                       EXR15610
1436  9D95               1572           SSR   DAT,STAT             GET THE STATUS                        EXR15620
1438  D256 0008          1573           STB   STAT,STATUS(DCBADR)  SAVE FOR USER                         EXR15630
143C  2754               1574           SIS   STAT,4               SEE IF EQUAL TO X'04'                 EXR15640
143E  213B               1575           BNZS  RUN08                BRANCH IF NOT FALSE SYNC              EXR15650
1440  C8E0 0709          1576           LHI   R14,ERRDMESS+11                                            EXR15660
1444  24F3               1577           LIS   R15,3                                                      EXR15670
1446  41B0 0DAA          1578           BAL   RET2,HEXASCII        CONVERT TO ASCII IN OUTBUF            EXR15680
144A  E110 06FE          1579           SVC   1,ERRDMESS           FALSE SYNC ERROR MESSAGE              EXR15690
144E  C6A0 0080          1580           OHI   STATE,ERRBIT         SET ERROR FLAG                        EXR15700
1452  230A               1581           BS    RUN09                BYPASS NEXT TEST                      EXR15710
                         1582  *                                                                          EXR15720
1454  4896 0000          1583  RUN08    LH    DAT,FLAGS(DCBADR)                                          EXR15730
1458  C390 0080          1584           THI   DAT,SELCH                                                  EXR15740
145C  2135               1585           BNZS  RUN09                SKIP IF SELCH                         EXR15750
145E  C490 7FFF          1586  RUN08A   NHI   DAT,-1-IGNORE        CLEAR IGNORE FLAG                     EXR15760
1462  4096 0000          1587           STH   DAT,FLAGS(DCBADR)                                          EXR15770
                         1588  *                                                                          EXR15780
1466  4880 1B50          1589  RUN09    LH    TEMP,DSTNEXT         NEXT DCB ADDRESS                      EXR15790
146A  4580 1B4E          1590           CLH   TEMP,DSTLAST         SEE IF DONE                           EXR15800
146E  4320 139A          1591           BNP   RUN06                LOOP THROUGH DST                      EXR15810
```

RUN COMMAND

```
                        1593  * DISPATCHER INITIALIZATION                                                    EXR15830
                        1594  *                                                                             EXR15840
1472  C880 1B0E         1595          LHI   TEMP,DST                                                        EXR15850
1476  4080 1B50         1596          STH   TEMP,DSTNEXT        RESET DST POINTER                           EXR15860
147A  4000 07E8         1597          STH   ZERO,BLINKY         CLEAR DISPLAY                               EXR15870
147E  4000 07FA         1598          STH   ZERO,DSPCHCNT       CLEAR DISPATCH COUNTER                      EXR15880
1482  4880 14F0         1599          LH    TEMP,DSPCHER        SET UP DISPATCHER PSW                       EXR15890
1486  C480 7C00         1600          NHI   TEMP,X'7C00'        CLEAR PROTECT, QUEUE                        EXR15900
148A  C680 4800         1601          OHI   TEMP,X'4800'        SET IMMEDIATE INTERRUPT                     EXR15910
148E  4080 14F0         1602          STH   TEMP,DSPCHER                                                    EXR15920
1492  4870 07F8         1603          LH    CHAR,FMDRIVE                                                    EXR15930
1496  C470 000F         1604          NHI   CHAR,X'F'           SEE IF ANY FLOPPY                           EXR15940
149A  2335              1605          BZS   RUN09A              SKIP IF NO                                  EXR15950
149C  D370 07F8         1606          LB    CHAR,FMDRIVE                                                    EXR15960
14A0  4130 2B3C         1607          BAL   RET1,FMDSELCT       SELECT FIRST FLOPPY DRIVE                   EXR15970
                        1608  *                                                                             EXR15980
                        1609  * CLEAR INTERLOCK ARRAY                                                       EXR15990
                        1610  *                                                                             EXR16000
14A4  C880 001E         1611  RUN09A  LHI   TEMP,30                                                         EXR16010
14A8  4008 1D94         1612  RUN10   STH   ZERO,INTRLOCK(TEMP) CLEAR 32 BYTE ARRAY                        EXR16020
14AC  2782              1613          SIS   TEMP,2                                                        EXR16030
14AE  2283              1614          BNLS  RUN10                                                         EXR16040
                        1615  *                                                                             EXR16050
                        1616  * IF ANY ERRORS, GO TO RESTART SEQUENCE TO CLEAN UP                           EXR16060
                        1617  * AND START THE COMMAND PROCESSOR AGAIN.                                     EXR16070
                        1618  *                                                                             EXR16080
14B0  C3A0 0080         1619          THI   STATE,ERRBIT        TEST ERROR FLAG                             EXR16090
14B4  4230 04C0         1620          BNZ   RESTART             BRANCH IF ERROR                             EXR16100
14B8  C810 1C6E         1621          LHI   R1,INTERUPT         INITIALIZE R1 FOR INTERRUPT                 EXR16110
                        1622  *                                 SERVICE ROUTINES...BR  R1                   EXR16120
                        1623  * START ECHO TEST ON CONSOLE                                                   EXR16130
                        1624  *                                                                             EXR16140
14BC  C860 2290         1625          LHI   DCBADR,CONDCB                                                 EXR16150
14C0  C880 07FC         1626          LHI   TEMP,CMNDBUFS       ECHO BUFFER                               EXR16160
14C4  4086 001E         1627          STH   TEMP,BUF2STRT(DCBADR) START ADDRESS EQUALS END ADDRESS        EXR16170
14C8  4086 0020         1628          STH   TEMP,BUF2END(DCBADR) SINGLE BYTE BUFFER.  INPUT               EXR16180
14CC  D208 0000         1629          STB   ZERO,0(TEMP)        INITIALIZE BUFFER TO ZERO (NULL)          EXR16190
14D0  4896 0000         1630          LH    DAT,FLAGS(DCBADR)                                             EXR16200
14D4  9399              1631          LBR   DAT,DAT             CLEAR MS8 FLAG BITS                       EXR16210
14D6  C690 4800         1632          OHI   DAT,BUSY+DEVCNTL1   ACTIVE ECHO TEST                           EXR16220
14DA  4096 0000         1633          STH   DAT,FLAGS(DCBADR)                                             EXR16230
14DE  249C              1634          LIS   DAT,SIX                                                       EXR16240
14E0  4096 0002         1635          STH   DAT,PHASE(DCBADR)   SET PHASE EQUALS 6                        EXR16250
14E4  4846 0006         1636          LH    DEV,DEVADR(DCBADR)                                            EXR16260
14E8  E204 0000         1637          SINT  0(DEV)              START IT GOING                            EXR16270
                        1638  *                                                                             EXR16280
                        1639  * BEGIN TESTING SELECTED DEVICES                                              EXR16290
                        1640  *                                                                             EXR16300
14EC  C200 14F0         1641  GO,DSPCH LPSW  DSPCHER            GO TO DISPATCHER                  R04     EXR16310
                        1642  *                                                                             EXR16320
14F0  7C00              1643  DSPCHER  DC    X'7C00',DISPATCH                                               EXR16330
14F2  14F4
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DEVICE DISPATCHER

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                        1645  * THE DISPATCHER ATTEMPTS TO KEEP ALL DEVICES BUSY                          EXR16350
                        1646  * THE CONSOLE DEVICE IS NOT BUSY, FORMAT AND PRINT NEXT                    EXR16360
                        1647  * ERROR MESSAGE.  IF CONSOLE IS NOT BUSY OR IF THERE ARE                   EXR16370
                        1648  * NO ERRORS TO PRINT, SEARCH DEVICE SERVICE TABLE FOR A                    EXR16380
                        1649  * DEVICE TO DISPATCH.  COUNT BUSY PASSES AND DISPATCH PASSES               EXR16390
                        1650  * FOR EACH DEVICE.  RUNS UNDER PSW 'DSPCHER.                               EXR16400

14F4   C860 2290        1652  DISPATCH LHI   DCBADR,CONDCB       CHECK IF CONSOLE NEEDS SERVICE        EXR16420
14F8   4896 0000        1653           LH    DAT,FLAGS(DCBADR)                                         EXR16430
14FC   C390 0400        1654           THI   DAT,DEVCNTL2        SEE IF ERROR PRINT IN PROGRESS        EXR16440
1500   4230 1542        1655           BNZ   DSPCH01             SKIP IF YES                           EXR16450
                        1656  * GET NEXT ERROR MESSAGE TO PRINT                                         EXR16460
1504   4880 084C        1657           LH    TEMP,ERRORQ                                               EXR16470
1508   4210 1542        1658           BM    DSPCH01             BRANCH IF QUEUE IS EMPTY              EXR16480
150C   9599             1659           EPSR  DAT,DAT                                                   EXR16490
150E   C490 B7FF        1660           NHI   DAT,X'B7FF'         DISABLE INTERRUPTS                    EXR16500
1512   9529             1661           EPSR  R2,DAT                                                    EXR16510
1514   C8D8 084E        1662           LHI   R13,ERRORQ+2(TEMP)                                        EXR16520
1518   278C             1663           SIS   TEMP,12             DECREMENT ERROR QUEUE INDEX           EXR16530
151A   4080 084C        1664           STH   TEMP,ERRORQ                                               EXR16540
151E   4130 1A3C        1665           BAL   RET1,FORMAT         FORMAT MESSAGE                        EXR16550
1522   40E6 0014        1666           STH   R14,BUF1END(DCBADR) STORE FINAL ADDRESS                   EXR16560
1526   C880 0760        1667           LHI   TEMP,OUTBUF                                               EXR16570
152A   4086 0012        1668           STH   TEMP,BUF1STRT(DCBADR) STORE START ADRS                    EXR16580
152E   2482             1669           LIS   TEMP,ONE            DRIVER PHASE 1                        EXR16590
1530   4086 0002        1670           STH   TEMP,PHASE(DCBADR)                                        EXR16600
1534   4826 000A        1671           LH    R2,DVRENTRY(DCBADR) DRIVER ENTRY ADDRESS                  EXR16610
1538   4130 1CC6        1672           BAL   RET1,DRIVER         CALL DRIVER                           EXR16620
153C   4890 14F0        1673           LH    DAT,DSPCHER                                               EXR16630
1540   9529             1674           EPSR  R2,DAT              ENABLE INTERRUPTS AND GO ON           EXR16640
                        1675  *                                                                         EXR16650
                        1676  * CHECK THE MOVING BUFFER                                                 EXR16660
                        1677  *                                                                         EXR16670
1542   C3A0 0001        1678  DSPCH01  THI   STATE,MOVEBUSY     IS MOVING BUFFER BEING USED?          EXR16680
1546   4230 1568        1679           BNZ   DSPCH02             IF YES, WAIT UNTIL FREE               EXR16690
154A   C3A0 0002        1680           THI   STATE,MOVING        HAS MOVE BEEN SPECIFIED?              EXR16700
154E   4330 1568        1681           BZ    DSPCH02             SKIP IF NO                            EXR16710
1552   4880 1F58        1682           LH    TEMP,MOVENEXT       ADDRESS OF NEXT TABLE ENTRY           EXR16720
1556   4980 1F5A        1683           CH    TEMP,MOVELAST       END OF TABLE?                         EXR16730
155A   2324             1684           BNPS  DSPCH01A            BRANCH IF NO                          EXR16740
155C   C880 1F40        1685           LHI   TEMP,MOVETAB        ELSE RESET TO START                   EXR16750
1560   2302             1686           BS    DSPCH01B                                                  EXR16760
1562   2682             1687  DSPCH01A AIS   TEMP,2                                                    EXR16770
1564   4090 1F58        1688  DSPCH01B STH   TEMP,MOVENEXT       UPDATE POINTER                        EXR16780
                        1689  *                                                                         EXR16790
                        1690  * CHECK IF ANY DEVICE ON TABLE NEEDS SERVICE                              EXR16800
                        1691  *                                                                         EXR16810
1568   C6A0 0020        1692  DSPCH02  OHI   STATE,PARITY       ENABLE ALL MACHINE MALFUNCTION        EXR16820
156C   4880 1B50        1693           LH    TEMP,DSTNEXT        ADDRESS OF NEXT TABLE ENTRY           EXR16830
1570   4980 1B4E        1694           CH    TEMP,DSTLAST        END OF TABLE ?                        EXR16840
1574   4320 159C        1695           BNP   DSPCH03             BRANCH IF NO                          EXR16850
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DEVICE DISPATCHER

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1578 C880 1B0E 1696          LHI   TEMP,DST                                          EXR16860
157C 4080 1B50 1697          STH   TEMP,DSTNEXT       RESET TO START OF TABLE       EXR16870
1580 2441      1698          LIS   DEV,1              DISPLAY PANEL DEVICE NO.      EXR16880
1582 6140 07FA 1699          AHM   DEV,DSPCHCNT       BUMP COUNT                    EXR16890
1586 4890 07FA 1700          LH    DAT,DSPCHCNT       NEW COUNT FOR DISPLAY         EXR16900
158A DE40 0D1A 1701          OC    DEV,DSPLYINC       INCREMENTAL MODE              EXR16910
158E D840 07E8 1702          WH    DEV,BLINKY         DEVICE BITS OUT FIRST         EXR16920
1592 9499      1703          EXBR  DAT,DAT                                          EXR16930
1594 9849      1704          WHR   DEV,DAT            FOLLOWED BY DISPATCH COUNT    EXR16940
1596 0766      1705          XHR   DCBADR,DCBADR      NO DCB FOR BACKGROUND         EXR16950
1598 4300 1616 1706          B     BACKGRND                                         EXR16960
               1707  *                                                             EXR16970
               1708  * SERVICE NEXT DEVICE                                        EXR16980
               1709  *                                                             EXR16990
159C 4868 0000 1710  DSPCH03 LH    DCBADR,0(TEMP)     GET ADDRESS OF NEXT ENTRY     EXR17000
15A0 2682      1711          AIS   TEMP,2                                          EXR17010
15A2 4080 1B50 1712          STH   TEMP,DSTNEXT       UPDATE POINTER                EXR17020
15A6 4896 0000 1713          LH    DAT,FLAGS(DCBADR)                                EXR17030
15AA C390 0008 1714          THI   DAT,FMD            FLOPPY?                       EXR17040
15AE 2337      1715          BZS   DSPCH03A           SKIP IF NO                    EXR17050
15B0 D370 07F8 1716          LB    CHAR,FMDRIVE       PICK UP ACTIVE DRIVE          EXR17060
15B4 4576 001A 1717          CLH   CHAR,DVRWRK2(DCBADR) EQUALS CURRENT DCB?         EXR17070
15B8 4230 14EC 1718          BNE   GO,DSPCH           IGNORE IF NO          R04     EXR17080
15BC 0899      1719  DSPCH03A LHR   DAT,DAT           CHECK IGNORE BIT              EXR17090
15BE 4210 14EC 1720          BM    GO,DSPCH           IS SET, DO NEXT ENTRY R04     EXR17100
15C2 C390 4000 1721          THI   DAT,BUSY           CHECK BUSY FLAG               EXR17110
15C6 4330 160A 1722          BZ    DSPCH04            BRANCH IF NOT BUSY            EXR17120
               1723  * DEVICE BUSY, CHECK FOR TIME OUT                             EXR17130
15CA C390 2000 1724          THI   DAT,NOTCOUNT       ARE WE COUNTING BUSY PASSES?  EXR17140
15CE 4230 14EC 1725          BNZ   GO,DSPCH           BRANCH IF NO          R04     EXR17150
15D2 4880 02E6 1726          LH    TEMP,TIMEVAL                                     EXR17160
15D6 6186 000C 1727          AHM   TEMP,CURWAIT(DCBADR) INCREMENT WAIT COUNT       EXR17170
15DA 4886 000C 1728          LH    TEMP,CURWAIT(DCBADR)                             EXR17180
15DE C580 7FF8 1729          CLHI  TEMP,MAXWAIT       LESS THAN MAXIMUM?            EXR17190
15E2 4280 14EC 1730          BL    GO,DSPCH           BRANCH IF YES         R04     EXR17200
               1731  *                                                             EXR17210
               1732  * DEVICE HAS TIMED OUT, GENERATE ERROR                       EXR17220
               1733  *                                                             EXR17230
15E6 41C0 1BCE 1734          BAL   RET3,ERRORLOG      GET SPACE ON ERROR QUEUE      EXR17240
15EA C890 8033 1735          LHI   DAT,X'8033'         DEVICE,STATUS,ERROR 33        EXR17250
15EE 4098 0000 1736          STH   DAT,0(TEMP)                                      EXR17260
15F2 4846 0006 1737          LH    DEV,DEVADR(DCBADR) DEVICE ADDRESS                EXR17270
15F6 4048 0002 1738          STH   DEV,2(TEMP)                                      EXR17280
15FA D356 0008 1739          LB    STAT,STATUS(DCBADR) DEVICE STATUS                EXR17290
15FE 4058 0004 1740          STH   STAT,4(TEMP)                                     EXR17300
1602 41C0 1C0C 1741          BAL   RET3,QUEUECHK      TEST THE QUEUE                EXR17310
1606 4300 14EC 1742          B     GO,DSPCH           SERVICE NEXT DEVICE   R04     EXR17320
               1743  *                                                             EXR17340
               1744  * DEVICE NOT BUSY, TRY TO GO TO DRIVER                       EXR17350
               1745  *                                                             EXR17360
160A 4826 000A 1746  DSPCH04 LH    R2,DVRENTRY(DCBADR) DRIVER ENTRY ADDRESS       EXR17370
160E 4130 1CC6 1747          BAL   RET1,DRIVER        CALL DRIVER                   EXR17380
1612 4300 14EC 1748          B     GO,DSPCH           LOOP                  R04     EXR17390
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BACKGROUND TESTING

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1616  C3A0 0800          1750  BACKGRND THI   STATE,BCKSWTCH     BACKGROUND TESTING SELECTED?   EXR17410
161A  2133               1751        BNZS  ILLEGAL                                          EXR17420
161C  C200 14F0          1752        LPSW  DSPCHER             RETURN TO DISPATCHER         EXR17430
                         1753  *                                                             EXR17440
1620  0000               1754  ILLEGAL  DCX   0000              FORCE ILLEGAL                EXR17450
1622  2303               1755        BS    ILG1                BRANCH IF NO INTERRUPT       EXR17460
1624  4300 1646          1756        B     SIMULATE            GO ON IF INTERRUPT OK        EXR17470
1628  41C0 1BCE          1757  ILG1     BAL   RET3,ERRORLOG       GET SPACE ON ERROR QUEUE     EXR17480
162C  C890 3005          1758        LHI   DAT,X'3005'         ERROR NUMBER                 EXR17490
1630  4098 0000          1759        STH   DAT,0(TEMP)                                      EXR17500
1634  9599               1760        EPSR  DAT,DAT                                          EXR17510
1636  4098 0008          1761        STH   DAT,8(TEMP)         OLD PSW                      EXR17520
163A  C890 1620          1762        LHI   DAT,ILLEGAL                                      EXR17530
163E  4098 000A          1763        STH   DAT,10(TEMP)        OLD LOC                      EXR17540
1642  41C0 1C0C          1764        BAL   RET3,QUEUECHK                                    EXR17550
                         1765  *                                                             EXR17560
1646  C880 167E          1766  SIMULATE LHI   TEMP,SIMINT                                   EXR17570
164A  4080 00D2          1767        STH   TEMP,X'D2'          FILL IN ISP SLOT 1           EXR17580
164E  E200 0001          1768  SINT1    SINT  1                 SIMULATE INTERRUPT, DEVICE 1 EXR17590
1652  41C0 1BCE          1769        BAL   RET3,ERRORLOG       GET SPACE ON ERROR QUEUE     EXR17600
1656  C890 B034          1770        LHI   DAT,X'B034'         ERROR NUMBER                 EXR17610
165A  4098 0000          1771        STH   DAT,0(TEMP)                                      EXR17620
165E  2441               1772        LIS   DEV,1                                            EXR17630
1660  4048 0002          1773        STH   DEV,2(TEMP)         DEVICE NUMBER                EXR17640
1664  9D45               1774        SSR   DEV,STAT                                         EXR17650
1666  4058 0004          1775        STH   STAT,4(TEMP)        STATUS                       EXR17660
166A  9599               1776        EPSR  DAT,DAT                                          EXR17670
166C  4098 0008          1777        STH   DAT,8(TEMP)         OLD PSW                      EXR17680
1670  C890 164E          1778        LHI   DAT,SINT1                                        EXR17690
1674  4098 000A          1779        STH   DAT,10(TEMP)        OLD LOC                      EXR17700
1678  41C0 1C0C          1780        BAL   RET3,QUEUECHK                                    EXR17710
167C  2307               1781        BS    SINT2                                            EXR17720
                         1782  *                                                             EXR17730
167E                     1783  SIMINT   DS    4                 OLD PSW & LOC                EXR17740
1682  0000               1784        DCX   0000              NEW PSW                      EXR17750
1684  4890 167E          1785        LH    DAT,SIMINT                                       EXR17760
1688  9589               1786        EPSR  TEMP,DAT          RESTORE PSW                  EXR17770
168A  C890 5982          1787  SINT2    LHI   DAT,AUTOIO+12                                 EXR17780
168E  4090 00D2          1788        STH   DAT,X'D2'         RESTORE ISP SLOT 1           EXR17790
                         1789  *                                                             EXR17800
1692  E120 1698          1790        SVC   2,SVCTEST+2                                      EXR17810
1696  2303               1791  SVCTEST  BS    SVCTST1           SVC FAILURE                  EXR17820
1698  4300 16BA          1792        B     ARITH               CONTINUE                     EXR17830
169C  41C0 1BCE          1793  SVCTST1  BAL   RET3,ERRORLOG                                  EXR17840
16A0  C890 3007          1794        LHI   DAT,X'3007'         ERROR NUMBER                 EXR17850
16A4  4098 0000          1795        STH   DAT,0(TEMP)                                      EXR17860
16A8  9599               1796        EPSR  DAT,DAT                                          EXR17870
16AA  4098 0008          1797        STH   DAT,8(TEMP)         OLD PSW                      EXR17880
16AE  C890 1692          1798        LHI   DAT,SVCTEST-4                                    EXR17890
16B2  4098 000A          1799        STH   DAT,10(TEMP)        OLD LOC                      EXR17900
16B6  41C0 1C0C          1800        BAL   RET3,QUEUECHK                                    EXR17910
                         1801  *                                                             EXR17920
16BA  2451               1802  ARITH    LIS   STAT,1                                       EXR17930
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BACKGROUND TESTING

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16BC  2440          1803           LIS   DEV,0                                  EXR17940
16BE  0D44          1804  FIXTEST  DHR   DEV,DEV        DIVISION BY ZERO         EXR17950
16C0  2303          1805           BS    ARITH1        ERROR                    EXR17960
16C2  4300 16E4     1806           B     DFLOAT                                 EXR17970
16C6  41C0 1BCE     1807  ARITH1   BAL   RET3,ERRORLOG  GET SPACE ON ERROR QUEUE EXR17980
16CA  C890 3013     1808           LHI   DAT,X'3013'   ERROR NUMBER             EXR17990
16CE  4098 0000     1809           STH   DAT,0(TEMP)                            EXR18000
16D2  9599          1810           EPSR  DAT,DAT                                EXR18010
16D4  4098 0008     1811           STH   DAT,8(TEMP)    OLD PSW                  EXR18020
16D8  C890 16BE     1812           LHI   DAT,FIXTEST                            EXR18030
16DC  4098 000A     1813           STH   DAT,10(TEMP)   OLD LOC                  EXR18040
16E0  41C0 1C0C     1814           BAL   RET3,QUEUECHK                          EXR18050
                    1815  *                                                      EXR18060
16E4  C3A0 0040     1816  DFLOAT   THI   STATE,DFLTSWCH DOUBLE FLOATING POINT SELECTED? EXR18070
16E8  4330 1772     1817           BZ    FLOAT         SKIP IF NO               EXR18080
16EC  C880 0200     1818           LHI   TEMP,X'0200'   BLINK BIT 14            EXR18090
16F0  41C0 1DE8     1819           BAL   RET3,BLINK                             EXR18100
16F4  7820 1860     1820           LD    2,FLP1                                 EXR18110
16F8  7C20 1860     1821           MD    2,FLP1         1*1 = 1                 EXR18120
16FC  7840 1860     1822           LD    4,FLP1                                 EXR18130
1700  7A20 1860     1823           AD    2,FLP1         1+1 = 2                 EXR18140
1704  3A24          1824           ADR   2,4            2+1 = 3                 EXR18150
1706  7B20 1860     1825           SD    2,FLP1         3-1 = 2                 EXR18160
170A  7920 1868     1826           CD    2,FLP2         2 = 2 ?                 EXR18170
170E  4330 1746     1827           BE    DFLOAT1        SKIP IF YES             EXR18180
1712  41C0 1BCE     1828           BAL   RET3,ERRORLOG  GET SPACE ON ERROR QUEUE EXR18190
1716  C890 3C45     1829           LHI   DAT,X'3C45'    ERROR NUMBER            EXR18200
171A  4098 0000     1830           STH   DAT,0(TEMP)                            EXR18210
171E  7020 056A     1831           STD   2,REGSAVE                              EXR18220
1722  4890 056A     1832           LH    DAT,REGSAVE                            EXR18230
1726  4098 0004     1833           STH   DAT,4(TEMP)    STORE ENTIRE ACTUAL RESULT EXR18240
172A  4890 056C     1834           LH    DAT,REGSAVE+2                          EXR18250
172E  4098 0006     1835           STH   DAT,6(TEMP)                            EXR18260
1732  4890 056E     1836           LH    DAT,REGSAVE+4                          EXR18270
1736  4098 0008     1837           STH   DAT,8(TEMP)                            EXR18280
173A  4890 0570     1838           LH    DAT,REGSAVE+6                          EXR18290
173E  4098 000A     1839           STH   DAT,10(TEMP)                           EXR18300
1742  41C0 1C0C     1840           BAL   RET3,QUEUECHK                          EXR18310
1746  7820 1860     1841  DFLOAT1  LD    2,FLP1                                 EXR18320
174A  7D20 1858     1842  DFLTEST2 CD    2,FLP0         DIVISION BY ZERO        EXR18330
174E  2303          1843           BS    DFLOAT2                                EXR18340
1750  4300 1772     1844           B     FLOAT                                  EXR18350
1754  41C0 1BCE     1845  DFLOAT2  BAL   RET3,ERRORLOG  GET SPACE ON ERROR QUEUE EXR18360
1758  C890 3044     1846           LHI   DAT,X'3044'    ERROR NUMBER            EXR18370
175C  4098 0000     1847           STH   DAT,0(TEMP)                            EXR18380
1760  9599          1848           EPSR  DAT,DAT                                EXR18390
1762  4098 0008     1849           STH   DAT,8(TEMP)    OLD PSW                 EXR18400
1766  C890 174A     1850           LHI   DAT,DFLTEST2                           EXR18410
176A  4098 000A     1851           STH   DAT,10(TEMP)   OLD LOC                 EXR18420
176E  41C0 1C0C     1852           BAL   RET3,QUEUECHK                          EXR18430
                    1853  *                                                      EXR18440
1772  C3A0 1000     1854  FLOAT    THI   STATE,FLTSWTCH SINGLE FLOATING POINT SELECTED? EXR18450
1776  4330 17F0     1855           BZ    REGISTER       SKIP IF NO              EXR18460
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177A C880 1000          1856          LHI   TEMP,X'1000'       BLINK BIT 11                EXR18470
177E 41C0 1DE8          1857          BAL   RET3,BLINK                                     EXR18480
1782 6820 1860          1858          LE    2,FLP1                                        EXR18490
1786 6C20 1860          1859          ME    2,FLP1             1*1 = 1                    EXR18500
178A 6840 1860          1860          LE    4,FLP1                                        EXR18510
178E 6A20 1860          1861          AE    2,FLP1             1+1 = 2                    EXR18520
1792 2A24               1862          AER   2,4                2+1 = 3                    EXR18530
1794 6B20 1860          1863          SE    2,FLP1             3-1 = 2                    EXR18540
1798 6920 1868          1864          CE    2,FLP2             2 = 2?                     EXR18550
179C 4330 17C4          1865          BE    FLOAT1                                        EXR18560
17A0 41C0 1BCE          1866          BAL   RET3,ERRORLOG      GET SPACE ON ERROR QUEUE   EXR18570
17A4 C890 3015          1867          LHI   DAT,X'3015'        ERROR NUMBER               EXR18580
17A8 4098 0000          1868          STH   DAT,0(TEMP)                                   EXR18590
17AC 6020 056A          1869          STE   2,REGSAVE                                     EXR18600
17B0 4890 056A          1870          LH    DAT,REGSAVE                                   EXR18610
17B4 4098 0008          1871          STH   DAT,8(TEMP)        STORE ACTUAL RESULT        EXR18620
17B8 4890 056C          1872          LH    DAT,REGSAVE+2                                 EXR18630
17BC 4098 000A          1873          STH   DAT,10(TEMP)                                  EXR18640
17C0 41C0 1C0C          1874          BAL   RET3,QUEUECHK                                 EXR18650
17C4 6820 1860          1875 FLOAT1   LE    2,FLP1                                        EXR18660
17C8 6D20 1858          1876 FLTTEST2 DE    2,FLP0             DIVISION BY ZERO           EXR18670
17CC 2303               1877          BS    FLOAT2                                        EXR18680
17CE 4300 17F0          1878          B     REGISTER                                      EXR18690
17D2 41C0 1BCE          1879 FLOAT2   BAL   RET3,ERRORLOG      GET SPACE ON ERROR QUEUE   EXR18700
17D6 C890 3014          1880          LHI   DAT,X'3014'        ERROR NUMBER               EXR18710
17DA 4098 0000          1881          STH   DAT,0(TEMP)                                   EXR18720
17DE 9599               1882          EPSR  DAT,DAT                                       EXR18730
17E0 4098 0008          1883          STH   DAT,8(TEMP)        OLD PSW                    EXR18740
17E4 C890 17C8          1884          LHI   DAT,FLTTEST2                                  EXR18750
17E8 4098 000A          1885          STH   DAT,10(TEMP)       OLD LOC                    EXR18760
17EC 41C0 1C0C          1886          BAL   RET3,QUEUECHK                                 EXR18770
                        1887 *                                                            EXR18780
17F0 40A0 0ADA          1888 REGISTER STH   STATE,STATESAV     SAVE STATE REGISTER        EXR18790
17F4 D000 1870          1889          STM   R0,REGSAV          STORE ALL REGISTERS        EXR18800
17F8 D120 1D74          1890          LM    R2,BIT0            LOAD UP DATA PATTERN       EXR18810
17FC D020 1890          1891          STM   R2,REGSAV+32                                  EXR18820
1800 48A0 0ADA          1892          LH    STATE,STATESAV                                EXR18830
1804 0766               1893          XHR   DCBADR,DCBADR                                 EXR18840
1806 2400               1894          LIS   R13,0                                         EXR18850
1808 24E2               1895          LIS   R14,2                                         EXR18860
180A C8F0 0018          1896          LHI   R15,24                                        EXR18870
180E 489D 1D74          1897 REGTST1  LH    DAT,BIT0(R13)                                 EXR18880
1812 459D 1890          1898          CLH   DAT,REGSAV+32(R13)                            EXR18890
1816 4330 1842          1899          BE    REGTST2                                       EXR18900
181A 41C0 1BCE          1900          BAL   RET3,ERRORLOG      GET SPACE ON ERROR QUEUE   EXR18910
181E C890 2860          1901          LHI   DAT,X'2860'        ERROR NUMBER               EXR18920
1822 4098 0000          1902          STH   DAT,0(TEMP)                                   EXR18930
1826 489D 1D74          1903          LH    DAT,BIT0(R13)                                 EXR18940
182A 4098 0004          1904          STH   DAT,4(TEMP)        EXPECTED VALUE             EXR18950
182E 489D 1890          1905          LH    DAT,REGSAV+32(R13)                            EXR18960
1832 4098 0008          1906          STH   DAT,8(TEMP)        ACTUAL VALUE               EXR18970
1836 41C0 1C0C          1907          BAL   RET3,QUEUECHK                                 EXR18980
183A D100 1870          1908          LM    R0,REGSAV                                     EXR18990
```

BACKGROUND TESTING

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183E   C200 14F0          1909            LPSW   DSPCHER                                    EXR19000
1842   C100 180E          1910  REGTST2   BXLE   R13,REGTST1        LOOP FOR ALL REGISTERS  EXR19010
1846   C880 8000          1911            LHI    TEMP,X'8000'       BLINK BIT 8             EXR19020
184A   41C0 1DE8          1912            BAL    RET3,BLINK                                 EXR19030
184E   D100 1870          1913            LM     R0,REGSAV                                  EXR19040
1852   C200 14F0          1914            LPSW   DSPCHER                                    EXR19050
                          1915  *                                                            EXR19060
1858                      1916            ALIGN  8                                          EXR19070
1858   0000 0000          1917  FLP0      DCY    00000000,00000000                          EXR19080
185C   0000 0000
1860   4110 0000          1918  FLP1      DCY    41100000,00000000                          EXR19090
1864   0000 0000
1868   4120 0000          1919  FLP2      DCY    41200000,00000000                          EXR19100
186C   0000 0000
1870                      1920  REGSAV    DS     64                                         EXR19110
```

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                        1922  * ILLEGAL INSTRUCTION TRAP HANDLER                                    EXR19130
                        1923  * IF ILLEGAL IS EXPECTED, RETURN IS TO OLD LOC+4 WITH                 EXR19140
                        1924  * USER MODE RESET, ELSE, MESSAGE IS QUEUER & TESTING IS ABORTED       EXR19150

18B0  D1E0 0030         1926  ILLEGINS LM    R14,X'30'          PICK UP OLD PSW & LOC             EXR19170
18B4  C5F0 1620         1927           CLHI  R15,ILLEGAL        EXPECTED?                         EXR19180
18B8  4330 18EA         1928           BE    ILLOK              SKIP IF YES                       EXR19190
18BC  C5F0 16BE         1929           CLHI  R15,FIXTEST                                          EXR19200
18C0  4330 18EA         1930           BE    ILLOK              MAYBE NO MULTIPLY OR DIVIDE       EXR19210
18C4  C5F0 3E7C         1931           CLHI  R15,MMPPOL2        MEMORY PROTECT DRIVER             EXR19220
18C8  4330 18EA         1932           BE    ILLOK              OK IF YES                         EXR19230
                        1933  * UNEXPECTED ILLEGAL                                                 EXR19240
18CC  0766              1934           XHR   DCBADR,DCBADR      NO DCB FOR BACKGROUND TESTS       EXR19250
18CE  41C0 18CE         1935           BAL   RET3,ERRORLOG       GET SPACE ON ERROR QUEUE          EXR19260
18D2  C890 3004         1936           LHI   DAT,X'3004'        UNEXPECTED ILLEGAL                EXR19270
18D6  4098 0000         1937           STH   DAT,0(TEMP)        ERROR NUMBER 04                   EXR19280
18DA  D0E8 0008         1938           STM   R14,8(TEMP)        OLD PSW & LOC                     EXR19290
18DE  41C0 1C0C         1939           BAL   RET3,QUEUECHK      CHECK THE ERROR QUEUE             EXR19300
18E2  C200 18E6         1940           LPSW  ABORT              STOP TESTING                      EXR19310
                        1941  *                                                                    EXR19320
18E6  0000              1942  ABORT    DC    0,STOPTEST                                           EXR19330
18E8  19B8
                        1943  *                                                                    EXR19340
18EA  C4E0 FEFF         1944  ILLOK    NHI   R14,X'FEFF'        CLEAR PROTECT MODE BIT            EXR19350
18EE  26F4              1945           AIS   R15,4              INCREMENT LOC                     EXR19360
18F0  D0E0 0030         1946           STM   R14,X'30'                                            EXR19370
18F4  C200 0030         1947           LPSW  X'30'              RETURN                            EXR19380


                        1949  * FLOATING POINT FAULT INTERRUPT HANDLER                             EXR19400
                        1950  * IF FAULT IS EXPECTED, RETURN TO OLD LOC +2                         EXR19410
                        1951  * OTHERWISE, MESSAGE IS QUEUED                                       EXR19420

18F8  D1E0 0028         1953  FFAULT   LM    R14,X'28'          PICK UP OLD PSW & LOC             EXR19440
18FC  C5F0 17CC         1954           CLHI  R15,FLTTEST2+4     EXPECTED INTERRUPT?               EXR19450
1900  2136              1955           BNES  FFAULT1                                              EXR19460
1902  26F2              1956  FFAULTX  AIS   R15,2                                                EXR19470
1904  D0E0 0028         1957           STM   R14,X'28'                                            EXR19480
1908  C200 0028         1958           LPSW  X'28'                                                EXR19490
190C  C5F0 174E         1959  FFAULT1  CLHI  R15,DFLTEST2+4     EXPECTED INTERRUPT?               EXR19500
1910  4230 192A         1960           BNE   AFAULT1                                              EXR19510
1914  2209              1961           BS    FFAULTX                                              EXR19520


                        1963  * FIXED POINT ARITHMETIC FAULT                                       EXR19540
                        1964  *                                                                    EXR19550
1916  D1E0 0048         1965  AFAULT   LM    R14,X'48'          PICK UP OLD PSW                   EXR19560
```

INTERRUPT HANDLERS

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191A  C5F0 16C0        1966           CLHI  R15,FIXTEST+2      EXPECTED INTERRUPT?                EXR19570
191E  2136             1967           BNES  AFAULT1                                                 EXR19580
1920  26F2             1968           AIS   R15,2                                                  EXR19590
1922  D0E0 0028        1969           STM   R14,X'28'                                              EXR19600
1926  C200 0028        1970           LPSW  X'28'                                                  EXR19610
                       1971  *                                                                      EXR19620
192A  0766             1972  AFAULT1  XHR   DCBADR,DCBADR      NO DCB FOR BACKGROUND              EXR19630
192C  41C0 1BCE        1973           BAL   RET3,ERRORLOG      GET SPACE ON ERROR QUEUE           EXR19640
1930  C890 3012        1974           LHI   DAT,X'3012'        UNEXPECTED ARITHMETIC FAULT        EXR19650
1934  4098 0000        1975           STH   DAT,0(TEMP)        ERROR NUMBER 12                    EXR19660
1938  D0E8 0008        1976           STM   R14,8(TEMP)        OLD PSW & LOC                      EXR19670
193C  41C0 1C0C        1977           BAL   RET3,QUEUECHK      CHECK THE ERROR QUEUE              EXR19680
1940  C200 18E6        1978           LPSW  ABORT              STOP TESTING                       EXR19690

                       1980  * SUPERVISOR CALL TRAP HANDLER                                         EXR19710
                       1981  * IF SVC IS EXPECTED, RETURN TO OLD LOC+2                              EXR19720
                       1982  * OTHERWISE AN ERROR MESSAGE IS QUEUED                                 EXR19730

1944  D1D0 0094        1984  SVCERR   LM    R13,X'94'          PICK UP ARGUMENT POINTER R13       EXR19750
                       1985  *                                  OLD PSW                  R14       EXR19760
                       1986  *                                  OLD LOC                  R15       EXR19770
1948  C5F0 1696        1987           CLHI  R15,SVCTEST        EXPECTED?                          EXR19780
194C  2139             1988           BNES  SVCERR1            ERROR IF NO                        EXR19790
194E  C5D0 1698        1989           CLHI  R13,SVCTEST+2      CORRECT ADDRESS                    EXR19800
1952  2136             1990           BNES  SVCERR1            BRANCH IF NO                       EXR19810
1954  26F2             1991           AIS   R15,2              INCREMENT OLD LOC                  EXR19820
1956  D0E0 0096        1992           STM   R14,X'96'                                              EXR19830
195A  C200 0096        1993           LPSW  X'96'              RETURN                             EXR19840
                       1994  *                                                                      EXR19850
195E  0766             1995  SVCERR1  XHR   DCBADR,DCBADR      NO DCB FOR BACKGROUND              EXR19860
1960  41C0 1BCE        1996           BAL   RET3,ERRORLOG      GET SPACE ON ERROR QUEUE           EXR19870
1964  C890 3006        1997           LHI   DAT,X'3006'        UNEXPECTED SVC                     EXR19880
1968  4098 0000        1998           STH   DAT,0(TEMP)        ERROR 06                           EXR19890
196C  D0E8 0008        1999           STM   R14,8(TEMP)        OLD PSW & LOC                      EXR19900
1970  41C0 1C0C        2000           BAL   RET3,QUEUECHK      TEST THE QUEUE                     EXR19910
1974  C200 18E6        2001           LPSW  ABORT              ABORT TESTING                      EXR19920

                       2003  * MACHINE MALFUNCTION TRAP HANDLER                                     EXR19940
                       2004  * PLACES ERROR MESSAGE IN QUEUE AND ENTERS WAIT STATE                  EXR19950
                       2005  * ENTERING "RUN" MODE, ERROR MESSAGE IS PRINTED AND                    EXR19960
                       2006  * EXERCISOR IS RESTARTED.                                             EXR19970

1978  95EE             2008  MALFUNCT EPSR  R14,R14            SAVE NEW STATUS                    EXR19990
197A  C3A0 0020        2009           THI   STATE,PARITY       IGNORE FIRST PARITY ERROR          EXR20000
197E  2135             2010           BNZS  PARERR1            REACT TO ALL OTHERS                EXR20010
```

INTERRUPT HANDLERS

```
1980  C6A0 0020          2011             OHI   STATE,PARITY      SET FIRST PARITY ERROR FLAG   EXR20020
1984  C200 0038          2012             LPSW  X'38'             RETURN                        EXR20030
1988  41C0 1BCE          2013  PARERR1    BAL   RET3,ERRORLOG     GET SPACE ON ERROR QUEUE      EXR20040
198C  40E8 0004          2014             STH   R14,4(TEMP)       STORE NEW STATUS              EXR20050
1990  C890 1978          2015             LHI   DAT,MALFUNCT                                    EXR20060
1994  4098 0006          2016             STH   DAT,6(TEMP)       STORE NEW LOC                 EXR20070
1998  C890 3C01          2017             LHI   DAT,X'3C01'       MACHINE MALFUNCTION ERROR     EXR20080
199C  4098 0000          2018             STH   DAT,0(TEMP)                                     EXR20090
19A0  D1E0 0038          2019             LM    R14,X'38'         PICK UP OLD PSW               EXR20100
19A4  D0E8 0008          2020             STM   R14,8(TEMP)       STORE IN ERROR QUEUE          EXR20110
19A8  C200 19AC          2021             LPSW  MALFSTOP                                        EXR20120
                         2022  *                                                                EXR20130
                         2023  *                                                                EXR20140
19AC  8000               2024  MALFSTOP   DC    X'8000',MALFGO                                  EXR20150
19AE  19B0
                         2025  *                                                                EXR20160
19B0  41C0 1C0C          2026  MALFGO     BAL   RET3,QUEUECHK      CHECK THE ERROR QUEUE         EXR20170
19B4  C200 18E6          2027             LPSW  ABORT              ABORT TESTING                 EXR20180
```

TERMINATE TESTING AND PRINT ERRORS

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                        2029  * THIS ROUTINE IS ENTERED AS A RESULT OF A LPSW ABORT                    EXR20200
                        2030  * ANY ERROR MESSAGE CURRENTLY BEING PRINTED IS ALLOWED TO               EXR20210
                        2031  * FINISH.  IF THE QFULL FLAG IS SET, A MESSAGE TO THAT                  EXR20220
                        2032  * AFFECT IS PRINTED.  THEN THE ERROR QUEUE IS EMPTIED AND               EXR20230
                        2033  * THE EXERCISOR IS RESTARTED.                                           EXR20240


19B8  C860 247E         2035  STOPTEST LHI   DCBADR,PTRPDCB       PICK UP READER/PUNCH DCB          EXR20260
19BC  4886 0002         2036           LH    TEMP,PHASE(DCBADR)                                     EXR20270
19C0  2784              2037           SIS   TEMP,TWO             IF PHASE TWO, PUNCH STILL ACTIVE  EXR20280
19C2  4230 19E6         2038           BNE   STOPTST1                                               EXR20290
19C6  4886 0018         2039           LH    TEMP,DVRWRK1(DCBADR) CHECK LEADER REPEAT COUNT         EXR20300
19CA  212E              2040           BPS   STOPTST1             IGNORE IF WORKING ON LEADER       EXR20310
19CC  4886 0016         2041           LH    TEMP,BUF1NEXT(DCBADR)                                  EXR20320
19D0  4846 0006         2042           LH    DEV,DEVADR(DCBADR)                                     EXR20330
19D4  9D45              2043  PTPSTAT  SSR   DEV,STAT              SENSE STATUS                      EXR20340
19D6  2118              2044           BMS   STOPTST1             LEAVE IF DU                       EXR20350
19D8  2082              2045           BCS   PTPSTAT              LOOP ON BUSY                      EXR20360
19DA  DA48 0000         2046           WD    DEV,0(TEMP)          OUTPUT A CHARACTER                EXR20370
19DE  2681              2047           AIS   TEMP,1               INCREMENT ADDRESS                 EXR20380
19E0  4586 0014         2048           CLH   TEMP,BUF1END(DCBADR)                                   EXR20390
19E4  2228              2049           BNPS  PTPSTAT              LOOP                              EXR20400
                        2050  *                                                                      EXR20410
19E6  C860 2290         2051  STOPTST1 LHI   DCBADR,CONDCB        PICK UP CONSOLE DCB               EXR20420
19EA  48E6 0000         2052           LH    R14,FLAGS(DCBADR)                                      EXR20430
19EE  C3E0 0400         2053           THI   R14,DEVCNTL2         TEST ERROR IN PROGRESS FLAG       EXR20440
19F2  233B              2054           BZS   STOP02               BRANCH IF NOT SET                 EXR20450
19F4  48D6 0016         2055           LH    R13,BUF1NEXT(DCBADR)                                   EXR20460
19F8  45D6 0014         2056           CLH   R13,BUF1END(DCBADR) ANYTHING LEFT TO PRINT?            EXR20470
19FC  2386              2057           BNLS  STOP02               BRANCH IF NO                      EXR20480
19FE  27D1              2058           SIS   R13,1                ALLOWING FOR ONE LOST TO BREAK    EXR20490
1A00  40D0 1A06         2059           STH   R13,ERMSGST                                            EXR20500
1A04  E110 0000         2060           SVC   1,0                  FINISH PRINTING                   EXR20510
      0000 1A06         2061  ERMSGST  EQU   *-2                                                    EXR20520
                        2062  *                                                                      EXR20530
1A08  C3A0 0200         2063  STOP02   THI   STATE,QFULL         IS ERROR QUEUE FULL?              EXR20540
1A0C  2333              2064           BZS   STOP03               BRANCH IF NO                      EXR20550
1A0E  E110 0680         2065           SVC   1,ERR8MESS          PRINT QUEUE FULL MESSAGE          EXR20560
                        2066  *                                                                      EXR20570
1A12  4880 084C         2067  STOP03   LH    TEMP,ERRORQ          PICK UP ERROR QUEUE INDEX         EXR20580
1A16  2315              2068           BNMS  STOP04               SHOULDN'T BE EMPTY                EXR20590
1A18  E110 0694         2069           SVC   1,ERR9MESS          PROGRAM ERROR, ABORT HANDLER      EXR20600
1A1C  4300 04C0         2070           B     RESTART              RESTART THE EXERCISOR             EXR20610
                        2071  *                                                                      EXR20620
1A20  C8D8 084E         2072  STOP04   LHI   R13,ERRORQ+2(TEMP)   ADDRESS OF QUEUE ENTRY           EXR20630
1A24  278C              2073           SIS   TEMP,12              DECREMENT INDEX                   EXR20640
1A26  4080 084C         2074           STH   TEMP,ERRORQ                                            EXR20650
1A2A  4130 1A3C         2075           BAL   RET1,FORMAT          FORMAT THE MESSAGE                EXR20660
1A2E  E110 0760         2076           SVC   1,OUTBUF             PRINT IT                          EXR20670
1A32  4880 084C         2077           LH    TEMP,ERRORQ                                            EXR20680
1A36  221B              2078           BNMS  STOP04               LOOP UNTIL QUEUE IS EMPTY         EXR20690
1A38  4300 04C0         2079           B     RESTART              RESTART THE EXERCISOR             EXR20700
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                                2081  *       S U B R O U T I N E   F O R M A T                                EXR20720
                                2082  *                                                                        EXR20730
                                2083  * COPY INFORMATION FROM THE ERROR QUEUE INTO OUTBUF                      EXR20740
                                2084  * R13 CONTAINS THE ERROR QUEUE ENTRY ADDRESS                            EXR20750
                                2085  *                                                                        EXR20760
                                2086  * CALLING SEQUENCE:      BAL  RET1,FORMAT                               EXR20770
                                2087  *                                                                        EXR20780
                                2088  * REGISTERS USED: RET1,R14,TEMP,DAT,R13,R15,RET2                         EXR20790
                                2089  * SUBROUTINES USED: HEXASCII                                             EXR20800

1A3C   C880 0D0A                2091  FORMAT   LHI   TEMP,X'0D0A'                                              EXR20820
1A40   4080 0760                2092           STH   TEMP,OUTBUF          CARRIAGE RETURN, LINE FEED          EXR20830
1A44   4000 0762                2093           STH   ZERO,OUTBUF+2        NULLS                               EXR20840
1A48   C8E0 0764                2094           LHI   R14,OUTBUF+4         OUTBUF INDEX                        EXR20850
1A4C   C880 0020                2095           LHI   TEMP,X'20'           CONSTANT SPACE CHARACTER            EXR20860
1A50   C890 0028                2096           LHI   DAT,40                                                   EXR20870
1A54   D289 0764                2097  FORMAT1  STB   TEMP,OUTBUF+4(DAT)   BLANK OUT OUTBUF                    EXR20880
1A58   2791                     2098           SIS   DAT,1                                                    EXR20890
1A5A   2283                     2099           BNLS  FORMAT1                                                  EXR20900
1A5C   D39D 0001                2100           LB    DAT,1(R13)           PICK UP ERROR NUMBER                EXR20910
1A60   24F2                     2101           LIS   R15,2                TWO DIGITS                          EXR20920
1A62   41B0 0DAA                2102           BAL   RET2,HEXASCII        CONVERT TO HEX                      EXR20930
1A66   D32D 0000                2103           LB    R2,0(R13)            PICK UP ERROR CONTROL BITS          EXR20940
                                2104  *                                                                        EXR20950
                                2105  * ARE DEVICE, STATUS FIELDS SELECTED?                                   EXR20960
                                2106  *                                                                        EXR20970
1A6A   C320 0080                2107           THI   R2,X'80'             TEST FLAG                           EXR20980
1A6E   4330 1A8C                2108           BZ    FORMAT2                                                  EXR20990
1A72   C8E0 0767                2109           LHI   R14,OUTBUF+7                                             EXR21000
1A76   489D 0002                2110           LH    DAT,2(R13)           PICK UP DEVICE NUMBER               EXR21010
1A7A   24F3                     2111           LIS   R15,3                THREE DIGITS                        EXR21020
1A7C   41B0 0DAA                2112           BAL   RET2,HEXASCII        CONVERT TO HEX                      EXR21030
1A80   26E1                     2113           AIS   R14,1                SKIP SPACE                          EXR21040
1A82   489D 0004                2114           LH    DAT,4(R13)           PICK UP DEVICE STATUS               EXR21050
1A86   24F2                     2115           LIS   R15,2                TWO DIGITS                          EXR21060
1A88   41B0 0DAA                2116           BAL   RET2,HEXASCII        CONVERT TO HEX                      EXR21070
                                2117  *                                                                        EXR21080
                                2118  * IS SELCH FIELD SELECTED?                                              EXR21090
                                2119  *                                                                        EXR21100
1A8C   C320 0040                2120  FORMAT2  THI   R2,X'40'             TEST FLAG                           EXR21110
1A90   2338                     2121           BZS   FORMAT3                                                  EXR21120
1A92   C8E0 076E                2122           LHI   R14,OUTBUF+14                                            EXR21130
1A96   489D 0006                2123           LH    DAT,6(R13)           GET SELCH ADDRESS                   EXR21140
1A9A   24F3                     2124           LIS   R15,3                THREE DIGITS                        EXR21150
1A9C   41B0 0DAA                2125           BAL   RET2,HEXASCII        CONVERT TO HEX                      EXR21160
                                2126  *                                                                        EXR21170
                                2127  * EXPECTED VALUE <0:15> (OLD PSW)                                       EXR21180
                                2128  *                                                                        EXR21190
1AA0   C320 0020                2129  FORMAT3  THI   R2,X'20'             TEST FLAG                           EXR21200
1AA4   2338                     2130           BZS   FORMAT4                                                  EXR21210
1AA6   C8E0 0772                2131           LHI   R14,OUTBUF+18                                            EXR21220
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ERROR BUFFER FORMATTING

```
1AAA  489D 0008  2132           LH    DAT,8(R13)          GET EXPECTED VALUE OR OPSW      EXR21230
1AAE  24F4       2133           LIS   R15,4                FOUR DIGITS                     EXR21240
1AB0  41B0 0DAA  2134           BAL   RET2,HEXASCII        CONVERT                         EXR21250
                 2135  *                                                                   EXR21260
                 2136  * EXPECTED VALUE <16:31> (OLD LOC)                                   EXR21270
                 2137  *                                                                   EXR21280
1AB4  C320 0010  2138  FORMAT4  THI   R2,X'10'            TEST FLAG                       EXR21290
1AB8  2338       2139           BZS   FORMAT5                                              EXR21300
1ABA  C8E0 0777  2140           LHI   R14,OUTBUF+23                                        EXR21310
1ABE  489D 000A  2141           LH    DAT,10(R13)         GET EXPECTED VALUE OR OLOC      EXR21320
1AC2  24F4       2142           LIS   R15,4                FOUR DIGITS                     EXR21330
1AC4  41B0 0DAA  2143           BAL   RET2,HEXASCII        CONVERT                         EXR21340
                 2144  *                                                                   EXR21350
                 2145  * ACTUAL VALUE <0:15> (NEW PSW)                                     EXR21360
                 2146  *                                                                   EXR21370
1AC8  C320 0008  2147  FORMAT5  THI   R2,X'08'            TEST FLAG                       EXR21380
1ACC  2338       2148           BZS   FORMAT6                                              EXR21390
1ACE  C8E0 077C  2149           LHI   R14,OUTBUF+28                                        EXR21400
1AD2  489D 0004  2150           LH    DAT,4(R13)          GET ACTUAL VALUE OR NEW PSW     EXR21410
1AD6  24F4       2151           LIS   R15,4                FOUR DIGITS                     EXR21420
1AD8  41B0 0DAA  2152           BAL   RET2,HEXASCII        CONVERT                         EXR21430
                 2153  *                                                                   EXR21440
                 2154  * ACTUAL VALUE <16:31> (NEW LOC)                                    EXR21450
                 2155  *                                                                   EXR21460
      0000 1ADC  2156  FORMAT6  EQU   *                                                    EXR21470
1ADC  C320 0004  2157  FORMAT9  THI   R2,X'04'            TEST FLAG                       EXR21480
1AE0  2338       2158           BZS   FORMAT10                                             EXR21490
1AE2  C8E0 0781  2159           LHI   R14,OUTBUF+33                                        EXR21500
1AE6  489D 0006  2160           LH    DAT,6(R13)          ACTUAL VALUE OR NEW LOC         EXR21510
1AEA  24F4       2161           LIS   R15,4                FOUR DIGITS                     EXR21520
1AEC  41B0 0DAA  2162           BAL   RET2,HEXASCII        CONVERT                         EXR21530
                 2163  *                                                                   EXR21540
                 2164  * OLD LOC IF VALUES WERE PRINTED                                    EXR21550
                 2165  *                                                                   EXR21560
1AF0  C320 0002  2166  FORMAT10 THI   R2,X'02'                                            EXR21570
1AF4  2338       2167           BZS   FORMAT11                                             EXR21580
1AF6  C8E0 0786  2168           LHI   R14,OUTBUF+38                                        EXR21590
1AFA  489D 0002  2169           LH    DAT,2(R13)          OLD LOC                         EXR21600
1AFE  24F4       2170           LIS   R15,4                FOUR DIGITS                     EXR21610
1B00  41B0 0DAA  2171           BAL   RET2,HEXASCII                                        EXR21620
                 2172  *                                 R14 HOLDS LAST ADDRESS          EXR21630
1B04  26E1       2173  FORMAT11 AIS   R14,1                                               EXR21640
1B06  25F1       2174           LCS   R15,1                                                EXR21650
1B08  D2FE 0000  2175           STB   R15,0(R14)          PAD THE MESSAGE                 EXR21660
1B0C  0303       2176           BR    RET1                RETURN                          EXR21670
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DEVICE SERVICE TABLE AND DST SUPPORT ROUTINES

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                         2178  *    D E V I C E   S E R V I C E   T A B L E                    EXR21690
1B0E   0000              2179  DST       DCX   0                                             EXR21700
1B10                     2180            DO    31                  32 SLOTS                  EXR21710
1B10   0000              2181            DCX   0                                             EXR21720
1B12   0000              2181            DCX   0
1B14   0000              2181            DCX   0
1B16   0000              2181            DCX   0
1B18   0000              2181            DCX   0
1B1A   0000              2181            DCX   0
1B1C   0000              2181            DCX   0
1B1E   0000              2181            DCX   0
1B20   0000              2181            DCX   0
1B22   0000              2181            DCX   0
1B24   0000              2181            DCX   0
1B26   0000              2181            DCX   0
1B28   0000              2181            DCX   0
1B2A   0000              2181            DCX   0
1B2C   0000              2181            DCX   0
1B2E   0000              2181            DCX   0
1B30   0000              2181            DCX   0
1B32   0000              2181            DCX   0
1B34   0000              2181            DCX   0
1B36   0000              2181            DCX   0
1B38   0000              2181            DCX   0
1B3A   0000              2181            DCX   0
1B3C   0000              2181            DCX   0
1B3E   0000              2181            DCX   0
1B40   0000              2181            DCX   0
1B42   0000              2181            DCX   0
1B44   0000              2181            DCX   0
1B46   0000              2181            DCX   0
1B48   0000              2181            DCX   0
1B4A   0000              2181            DCX   0
1B4C   0000              2181            DCX   0
       0000 1B4E         2182  DSTEND    EQU   *                                             EXR21730
                         2183  *                                                             EXR21740
                         2184  *                                                             EXR21750
1B4E   1B0C              2185  DSTLAST   DC    DST-2               LAST USED ENTRY, INITIALLY EMPTY  EXR21760
1B50   1B0E              2186  DSTNEXT   DC    DST                 NEXT ENTRY TO DISPATCH    EXR21770
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                                2188  *       S U B R O U T I N E   D S T A D D                        EXR21790
                                2189  *                                                               EXR21800
                                2190  * ADD A DCB ADDRESS TO THE DEVICE SERVICE TABLE                 EXR21810
                                2191  *                                                               EXR21820
                                2192  * REGISTER DCBADR CONTAINS THE ITEM TO BE ADDED                 EXR21830
                                2193  * ON RETURN, A ZERO CONDITION CODE MEANS THAT THE               EXR21840
                                2194  * DCB ADDRESS WAS ADDED SUCCESSFULLY                            EXR21850
                                2195  *                                                               EXR21860
                                2196  * CALLING SEQUENCE:      BAL  RET3,DSTADD                       EXR21870
                                2197  *                                                               EXR21880
                                2198  * REGISTERS USED: RET3,TEMP,DCBADR                              EXR21890
                                2199  * SUBROUTINES USED: NONE                                        EXR21900

1B52   4880 1B4E                2201  DSTADD   LH    TEMP,DSTLAST      ADDRESS OF LAST ENTRY ADDED   EXR21920
1B56   2682                      2202           AIS   TEMP,2            PLUS 2 = ADDRESS OF NEXT SLOT EXR21930
1B58   C580 1B4E                2203           CLHI  TEMP,DSTEND       AT END OF TABLE?              EXR21940
1B5C   2183                      2204           BLS   DSTADD1           BRANCH IF NO                  EXR21950
1B5E   0888                      2205           LHR   TEMP,TEMP         NON-ZERO CONDITION CODE       EXR21960
1B60   030C                      2206           BR    RET3              RETURN TO CALL                EXR21970
                                2207  *                                                               EXR21980
                                2208  *                                                               EXR21990
1B62   4068 0000                2209  DSTADD1  STH   DCBADR,0(TEMP)    PUT DCB ON THE LIST           EXR22000
1B66   4080 1B4E                2210           STH   TEMP,DSTLAST      UPDATE LAST ENTRY ADDRESS     EXR22010
1B6A   4060 12CC                2211           STH   DCBADR,LASTDCB    SAVE ADDRESS FOR MOVE COMMAND EXR22020
1B6E   0700                      2212           XHR   ZERO,ZERO         CLEAR CONDITION CODE          EXR22030
1B70   030C                      2213           BR    RET3              RETURN TO CALL                EXR22040

                                2215  *       S U B R O U T I N E   D S T F I N D                      EXR22060
                                2216  *                                                               EXR22070
                                2217  * FIND A DCB ADDRESS IN THE DEVICE SERVICE TABLE                EXR22080
                                2218  *                                                               EXR22090
                                2219  * REGISTER DCBADR CONTAINS THE ADDRESS OF THE DCB TO FIND       EXR22100
                                2220  * ON RETURN, REGISTER TEMP CONTAINS ZERO OR THE ADDRESS         EXR22110
                                2221  * IN THE DEVICE SERVICE TABLE WHERE THE DCB WAS FOUND           EXR22120
                                2222  *                                                               EXR22130
                                2223  * CALLING SEQUENCE:      BAL  RET3,DSTFIND                      EXR22140
                                2224  *                                                               EXR22150
                                2225  * REGISTERS USED: RET3,TEMP                                     EXR22160
                                2226  * SUBROUTINES USED: NONE                                        EXR22170

1B72   C880 1B0C                2228  DSTFIND  LHI   TEMP,DST-2        TABLE START ADDRESS-2         EXR22190
1B76   2682                      2229  DSTFIND1 AIS   TEMP,2            INCREMENT ENTRY ADDRESS       EXR22200
1B78   4568 0000                2230           CLH   DCBADR,0(TEMP)    IS THIS ENTRY THE ONE WE WANT? EXR22210
1B7C   033C                      2231           BER   RET3              RETURN IF YES                 EXR22220
1B7E   4580 134E                2232           CLH   TEMP,DSTLAST      SEE IF AT END OF TABLE        EXR22230
1B82   2086                      2233           BLS   DSTFIND1          LOOP IF NO                    EXR22240
1B84   2481                      2234           LIS   TEMP,1            DCB NOT FOUND, NON ZERO CC    EXR22250
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1886  030C              2235        BR    RET3          AND RETURN                EXR22260
```

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                        2237  *     S U B R O U T I N E   D S T R E M O V                    EXR22280
                        2238  *                                                              EXR22290
                        2239  * REMOVE A DCB FROM THE DEVICE SERVICE TABLE                   EXR22300
                        2240  *                                                              EXR22310
                        2241  * REGISTER DCBADR CONTAINS THE DCB ADDRESS TO REMOVE           EXR22320
                        2242  * REGISTER TEMP CONTAINS THE ADDRESS IN THE DEVICE SERVICE     EXR22330
                        2243  * TABLE WHERE THE DCB WAS FOUND BY SUBROUTINE DSTFIND.         EXR22340
                        2244  *                                                              EXR22350
                        2245  * CALLING SEQUENCE:      BAL  RET3,DSTREMOV                    EXR22360
                        2246  *                                                              EXR22370
                        2247  * REGISTERS USED: RET3,TEMP,DAT                               EXR22380
                        2248  * SUBROUTINES USED: NONE                                      EXR22390

1B88  4568 0000         2250  DSTREMOV CLH   DCBADR,0(TEMP)      IS THIS THE RIGHT ENTRY   EXR22410
1B8C  023C              2251           BNER  RET3                RETURN IF NO              EXR22420
1B8E  4898 0002         2252  DSTREM1  LH    DAT,2(TEMP)        MOVE NEXT ENTRY DOWN TO THIS SLOT EXR22430
1B92  4098 0000         2253           STH   DAT,0(TEMP)                                   EXR22440
1B96  2682              2254           AIS   TEMP,2                                        EXR22450
1B98  4580 1B4E         2255           CLH   TEMP,DSTLAST                                  EXR22460
1B9C  2087              2256           BLS   DSTREM1                                       EXR22470
1B9E  4880 1B4E         2257           LH    TEMP,DSTLAST                                  EXR22480
1BA2  2782              2258           SIS   TEMP,2               DECREMENT LAST ADDED ADDRESS EXR22490
1BA4  4080 1B4E         2259           STH   TEMP,DSTLAST                                  EXR22500
1BA8  4896 0000         2260           LH    DAT,FLAGS(DCBADR)                             EXR22510
1BAC  C390 0008         2261           THI   DAT,FMD             FLOPPY DISC?              EXR22520
1BB0  033C              2262           BZR   RET3                EXIT IF NO                EXR22530
1BB2  D390 07F3         2263           LB    DAT,MNEMONIC+3      SEE WHICH DRIVE           EXR22540
1BB6  CB90 0031         2264           SHI   DAT,X'31'           0,1,2 OR 3                EXR22550
1BBA  2481              2265           LIS   TEMP,1                                        EXR22560
1BBC  CD89 0000         2266           SLHL  TEMP,0(DAT)         1,2,4 OR 8                EXR22570
1BC0  C780 FFFF         2267           XHI   TEMP,X'FFFF'        ONES COMP MASK            EXR22580
1BC4  4480 07F8         2268           NH    TEMP,FMDRIVE        RESET DRIVE SELECT BIT    EXR22590
1BC8  4080 07F8         2269           STH   TEMP,FMDRIVE                                  EXR22600
1BCC  030C              2270           BR    RET3                RETURN                    EXR22610
```

ERROR QUEUE MANIPULATION ROUTINES

```
                        2272  *     S U B R O U T I N E   E R R O R L O G                    EXR22630
                        2273  *                                                              EXR22640
                        2274  * SUBROUTINE TESTS IF SPACE IS AVAILABLE IN THE ERROR QUEUE.  EXR22650
                        2275  * IF THERE IS ROOM FOR ONE 6-HALFWORD ENTRY, THE QUEUE INDEX   EXR22660
                        2276  * IS UPDATED AND THE ADDRESS OF THE AVAILABLE ENTRY IS RETURNED. EXR22670
                        2277  * IF THIS IS THE LAST AVAILABLE ENTRY, THE QUEUE FULL FLAG IS  EXR22680
                        2278  * SET.  THE PROGRAM REMAINS UNINTERRUPTABLE SO THAT THE TEST   EXR22690
                        2279  * COMES TO AN ORDERLY SHUT-DOWN.                              EXR22700
                        2280  *                                                              EXR22710
                        2281  * CALLING SEQUENCE:      BAL  RET3,ERRORLOG                    EXR22720
                        2282  *                                                              EXR22730
                        2283  * REGISTERS USED: RET3,DAT,ZERO,TEMP                          EXR22740
                        2284  * SUBROUTINES USED: NONE                                      EXR22750

1BCE  9599              2286  ERRORLOG EPSR  DAT,DAT          CAPTURE CURRENT STATUS      EXR22770
1BD0  C490 B7FF         2287           NHI   DAT,X'B7FF'        CLEAR ENABLE BITS           EXR22780
1BD4  9509              2288           EPSR  ZERO,DAT           BECOME UNINTERRUPTABLE      EXR22790
1BD6  4880 084C         2289           LH    TEMP,ERRORQ        PICK UP ERROR QUEUE INDEX   EXR22800
1BDA  268C              2290           AIS   TEMP,12            INCREMENT IT                EXR22810
1BDC  C580 0078         2291           CLHI  TEMP,QUEUESIZ-12   COMPARE TO MAXIMUM SIZE     EXR22820
1BE0  4330 1BF8         2292           BE    ERRLOG01           BRANCH IF THIS IS LAST SLOT EXR22830
1BE4  4280 1BFE         2293           BL    ERRLOG02           BRANCH IF NOT LAST SLOT     EXR22840
                        2294  *                                                             EXR22850
                        2295  * MALFUNCTION IF FALL THROUGH, QUEUE SHOULDN'T BE FULL       EXR22860
                        2296  *                                                             EXR22870
1BE8  D000 056A         2297           STM   R0,REGSAVE         SAVE REGISTERS              EXR22880
1BEC  0700              2298           XHR   ZERO,ZERO                                      EXR22890
1BEE  9580              2299           EPSR  TEMP,ZERO          DISABLE ALL INTERRUPTS      EXR22900
1BF0  E110 0664         2300           SVC   1,ERR7MESS         PROGRAM ERROR, ERRORLOG     EXR22910
1BF4  C200 18E6         2301           LPSW  ABORT              TERMINATE TESTING           EXR22920
                        2302  *                                                             EXR22930
                        2303  *                                                             EXR22940
                        2304  * QUEUE IS FULL NOW, SET FULL FLAG, REMAIN UNINTERRUPTABLE    EXR22950
                        2305  *                                                             EXR22960
1BF8  C6A0 0200         2306  ERRLOG01 OHI   STATE,QFULL       SET QUEUE FULL FLAG         EXR22970
1BFC  2302              2307           BS    ERRLOG03                                       EXR22980
                        2308  *                                                             EXR22990
                        2309  * QUEUE NOT YET FULL                                         EXR23000
                        2310  *                                                             EXR23010
1BFE  9590              2311  ERRLOG02 EPSR  DAT,ZERO          RESTORE PSW                 EXR23020
1C00  4080 084C         2312  ERRLOG03 STH   TEMP,ERRORQ       UPDATE QUEUE POINTER        EXR23030
1C04  CA80 084E         2313           AHI   TEMP,ERRORQ+2     CONVERT TO ENTRY ADDRESS    EXR23040
1C08  0700              2314           XHR   ZERO,ZERO                                      EXR23050
1C0A  030C              2315           BR    RET3               RETURN                      EXR23060
```

ERROR QUEUE MANIPULATION ROUTINES

```
                        2317  *     S U B R O U T I N E   Q U E U E C H K                    EXR23080
                        2318  *                                                              EXR23090
                        2319  * AN ERROR NUMBER HAS BEEN ADDED TO THE ERROR QUEUE.  THE LAST EXR23100
                        2320  * ADDED ERROR NUMBER WILL BE REMOVED IF THE LOG SWITCH IS RESET EXR23110
                        2321  * OR IF THE DEVICE'S BAD STATUS BIT IS ALREADY SET.  OTHERWISE EXR23120
                        2322  * IT IS LEFT ON THE QUEUE.  IN EITHER CASE, THE DEVICE DCB IS EXR23130
                        2323  * UPDATED.  TESTING IS ABORTED IF THE QFULL FLAG IS SET, THE   EXR23140
                        2324  * HALT SWITCH IS ON, OR IF THE ERROR IS ON THE CONSOLE DEVICE. EXR23150
                        2325  *                                                              EXR23160
                        2326  * CALLING SEQUENCE:      BAL  RET3,QUEUECHK                    EXR23170
                        2327  *                                                              EXR23180
                        2328  * REGISTERS USED: RET3,DCBADR,DAT,TEMP                        EXR23190
                        2329  * SUBROUTINES USED: NONE                                      EXR23200

1C0C   0866             2331  QUEUECHK LHR   DCBADR,DCBADR       IS THERE A DCB?          EXR23220
1C0E   4330 1C32        2332           BZ    QUECHK00            SKIP IF NO               EXR23230
1C12   2491             2333           LIS   DAT,1                                        EXR23240
1C14   6196 000E        2334           AHM   DAT,ERRCOUNT(DCBADR) INCREMENT DCB ERROR COUNT EXR23250
1C18   4896 0000        2335           LH    DAT,FLAGS(DCBADR)   PICK UP DCB FLAGS        EXR23260
1C1C   C690 2000        2336           OHI   DAT,NOTCOUNT        SET "NOT COUNTING"       EXR23270
1C20   4096 0000        2337           STH   DAT,FLAGS(DCBADR)                            EXR23280
1C24   C390 1000        2338           THI   DAT,BADSTAT         TEST BAD STATUS          EXR23290
1C28   2138             2339           BNZS  QUECHK01            BRANCH IF ALREADY SET    EXR23300
1C2A   C690 1000        2340           OHI   DAT,BADSTAT         SET "BAD STATUS"         EXR23310
1C2E   4096 0000        2341           STH   DAT,FLAGS(DCBADR)                            EXR23320
1C32   C3A0 2000        2342  QUECHK00 THI   STATE,LOGSWTCH                               EXR23330
1C36   2138             2343           BNZS  QUECHK02            SKIP IF SET              EXR23340
1C38   4880 084C        2344  QUECHK01 LH    TEMP,ERRORQ         REMOVE THE LAST ERROR NUMBER EXR23350
1C3C   278C             2345           SIS   TEMP,12             BY BACKING UP THE QUEUE INDEX EXR23360
1C3E   4080 084C        2346           STH   TEMP,ERRORQ                                  EXR23370
1C42   C4A0 FDFF        2347           NHI   STATE,-1-QFULL                               EXR23380
1C46   C3A0 0200        2348  QUECHK02 THI   STATE,QFULL         TEST FULL FLAG           EXR23390
1C4A   2137             2349           BNZS  QUECHK03            BRANCH TO ABORT IF SET   EXR23400
1C4C   C3A0 4000        2350           THI   STATE,HLTSWTCH      IS HALT SWITCH SET?      EXR23410
1C50   2134             2351           BNZS  QUECHK03            ABORT IF YES             EXR23420
1C52   C560 2290        2352           CLHI  DCBADR,CONDCB       IS ERROR ON THE CONSOLE? EXR23430
1C56   023C             2353           BNER  RET3                NO, RETURN TO CALL       EXR23440
                        2354  *                                                            EXR23450
                        2355  * TERMINATION CONDITION, ABORT TESTING                       EXR23460
                        2356  *                                                            EXR23470
1C58   C200 18E6        2357  QUECHK03 LPSW  ABORT                                        EXR23480
```

FIRST LEVEL INTERRUPT HANDLER

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                          2359  * FOR PROCESSORS WITHOUT IMMEDIATE INTERRUPT                          EXR23500
                          2360  *                                                                     EXR23510
1C5C  D020 1D16           2361  EXTINT   STM   R2,INTSAVE          SAVE REGISTERS                   EXR23520
1C60  9F45                2362           ACKR  DEV,STAT            ACKNOWLEDGE TO GET DEVICE NUMBER EXR23530
1C62  0884                2363           LHR   TEMP,DEV            AND STATUS.                      EXR23540
1C64  0A88                2364           AHR   TEMP,TEMP           2X DEVICE NUMBER FOR INDEX       EXR23550
1C66  D1E0 0040           2365           LM    R14,X'40'           PICK UP OLD PSW                  EXR23560
1C6A  4300 1C7C           2366           B     EXTINT1             TO COMMON HANDLER                EXR23570


                          2368  *                 I N T E R U P T                                   EXR23590
                          2369  *                                                                     EXR23600
                          2370  * EACH ENTRY IN THE INTERRUPT SERVICE POINTER TABLE CONTAINS THE      EXR23610
                          2371  * ADDRESS OF A UNIQUE INTERRUPT SERVICE ROUTINE.  THERE ARE 256      EXR23620
                          2372  * ENTRIES IN THE SERVICE POINTER TABLE SO THERE ARE 256 INTERRUPT    EXR23630
                          2373  * SERVICE ROUTINES.  EACH ROUTINE BEGINS WITH AN OLD PSW SAVE        EXR23640
                          2374  * AREA AND A NEW PSW STATUS FIELD WHICH IS ZERO.  THE ROUTINE IS     EXR23650
                          2375  * NEXT, CONSISTING OF THE THREE INSTRUCTIONS:                        EXR23660
                          2376  *                                                                     EXR23670
                          2377  *         STM   R2,INTSAVE          SAVE REGISTERS                   EXR23680
                          2378  *         LHI   DEV,X'NN'           WHERE NN IS THE DEVICE NUMBER    EXR23690
                          2379  *         BR    R1                  GO TO COMMON INTERRUPT ROUTINE   EXR23700
                          2380  *                                                                     EXR23710
                          2381  * REGISTER R1 CONTAINS THE START ADDRESS OF ROUTINE "INTERUPT".      EXR23720
                          2382  * THUS, ROUTINE "INTERUPT" IS ENTERED AFTER TAKING AN IMMEDIATE      EXR23730
                          2383  * INTERRUPT.  THE INTERRUPT HAS BEEN ACKNOWLEDGED, THE PSW HAS       EXR23740
                          2384  * BEEN SAVED, THE CURRENT PSW IS CLEARED TO DISABLE FURTHER          EXR23750
                          2385  * INTERRUPTS, AND THE DEVICE NUMBER IS IN REGISTER "DEV".            EXR23760


1C6E  9D45                2387  INTERUPT SSR   DEV,STAT            COLLECT THE DEVICE STATUS        EXR23780
1C70  0884                2388           LHR   TEMP,DEV                                             EXR23790
1C72  0A88                2389           AHR   TEMP,TEMP           TWICE THE DEVICE NUMBER          EXR23800
1C74  4898 00D0           2390           LH    DAT,X'D0'(TEMP)     FETCH THE INTERRUPT ROUTINE      EXR23810
1C78  D1E9 0000           2391           LM    R14,0(DAT)          START ADDRESS, THEN COLLECT      EXR23820
1C7C  D0E0 0566           2392  EXTINT1  STM   R14,OPSW            AND SAVE THE OLD PSW AND LOC     EXR23830
1C80  4868 08DA           2393           LH    DCBADR,DCBTAB(TEMP) FETCH A DCB ADDRESS FOR THIS     EXR23840
1C84  4330 1CDA           2394           BZ    INTRUPT2            DEVICE.  ABORT IF NO DCB.        EXR23850
1C88  48E6 0000           2395           LH    R14,FLAGS(DCBADR)   LOOK AT THE DISPATCH FLAGS       EXR23860
1C8C  C3E0 0008           2396           THI   R14,FMD             FLOPPY?                          EXR23870
1C90  4330 1CA4           2397           BZ    EXTINT1A            SKIP IF NO                       EXR23880
1C94  D370 07F8           2398           LB    CHAR,FMDRIVE        PICK UP ACTIVE DRIVE NUMBER      EXR23890
1C98  0A77                2399           AHR   CHAR,CHAR           2X                               EXR23900
1C9A  08E7                2400           LHR   R14,CHAR                                            EXR23910
1C9C  0AEE                2401           AHR   R14,R14            4X                               EXR23920
1C9E  0A7E                2402           AHR   CHAR,R14           6X                               EXR23930
1CA0  4867 0F2A           2403           LH    DCBADR,FMDSEL+4(CHAR) PICK UP REAL DCB               EXR23940
1CA4  48E6 0000           2404  EXTINT1A LH    R14,FLAGS(DCBADR)   LOOK AT THE DISPATCH FLAGS       EXR23950
1CA8  4210 1CE0           2405           BM    INTRUPT3            BRANCH IF IGNORE BIT IS SET      EXR23960
1CAC  C3E0 4000           2406           THI   R14,BUSY            TEST THE BUSY BIT                EXR23970
1CB0  4330 1CE0           2407           BZ    INTRUPT3            BRANCH ALSO IF NOT BUSY          EXR23980
```

FIRST LEVEL INTERRUPT HANDLER

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                         2408  *                                  INTERRUPT NOT EXPECTED                EXR23990
1CB4   D256 0008         2409            STB   STAT,STATUS(DCBADR) SAVE STATUS IN DCB                   EXR24000
1CB8   C3E0 0080         2410            THI   R14,SELCH           IS THIS A SELCH DCB?                  EXR24010
1CBC   2333              2411            BZS   INTRUPT1           SKIP IF NO.  IF THIS IS A             EXR24020
1CBE   4866 000A         2412            LH    DCBADR,DVRENTRY(DCBADR) SELCH DCB, GET THE SELCH        EXR24030
                         2413  *                                  OWNER DCB ADDRESS.                    EXR24040
1CC2   4826 000A         2414  INTRUPT1  LH    R2,DVRENTRY(DCBADR) GET THE DRIVER ENTRY ADDRESS        EXR24050
                         2415  *                                  FALL THROUGH TO DRIVER. NORMAL        EXR24060
                         2416  *                                  RETURN WILL BE TO                     EXR24070
                         2417  *                                  LOAD THE PSW FROM "OPSW".             EXR24080
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                        2419  *      S U B R O U T I N E   D R I V E R                          EXR24100
                        2420  *                                                                 EXR24110
                        2421  * COMMON ENTRY POINT FOR ALL DEVICE DRIVERS                       EXR24120
                        2422  * R2 CONTAINS ACTUAL DRIVER START ADDRESS                        EXR24130
                        2423  *                                                                 EXR24140
                        2424  * CALLING SEQUENCE:      BAL  RET1,DRIVER                        EXR24150
                        2425  *                                                                 EXR24160
                        2426  * REGISTERS USED: RET1,R14,R15,TEMP                              EXR24170
                        2427  * SUBROUTINES USED: NONE,EXIT THROUGH DRIVER                     EXR24180

1CC6   D1E6 0000        2429  DRIVER   LM    R14,0(DCBADR)       PICK UP FLAGS   (R14)        EXR24200
                        2430  *                                 AND PHASE COUNT (R15)        EXR24210
1CCA   4006 000C        2431           STH   ZERO,CURWAIT(DCBADR) CLEAR TIMER                  EXR24220
1CCE   4846 0006        2432           LH    DEV,DEVADR(DCBADR)                               EXR24230
1CD2   0A2F             2433           AHR   R2,R15              DRIVER ADDRESS PLUS PHASE    EXR24240
1CD4   4882 0000        2434           LH    TEMP,0(R2)          GET ADDRESS OF ROUTINE FROM  EXR24250
1CD8   0308             2435           BR    TEMP                TABLE...GO TO PHASE ROUTINE  EXR24260
                        2436  *                                 EXIT FROM DRIVER IS THRU RET1 EXR24270
                        2437  *                                 OR THRU ISRETURN             EXR24280

                        2439  * NO DCB FOR THE DEVICE                                          EXR24300
                        2440  *                                                                 EXR24310
1CDA   C4A0 FBFF        2441  INTRUPT2 NHI   STATE,-1-UTILITY   CLEAR UTILITY FLAG            EXR24320
1CDE   2303             2442           BS    INTRPT23                                         EXR24330
                        2443  *                                                                 EXR24340
                        2444  * DEVICE NOT EXPECTING INTERRUPT                                 EXR24350
                        2445  *                                                                 EXR24360
1CE0   C6A0 0400        2446  INTRUPT3 OHI   STATE,UTILITY      SET UTILITY FLAG             EXR24370
1CE4   41C0 1BCE        2447  INTRPT23 BAL   RET3,ERRORLOG      GET SPACE ON ERROR QUEUE     EXR24380
1CE8   C890 B032        2448           LHI   DAT,X'B032'        UNEXPECTED INTERRUPT         EXR24390
1CEC   4098 0000        2449           STH   DAT,0(TEMP)         ERROR NUMBER 32          **  EXR24400
1CF0   4048 0002        2450           STH   DEV,2(TEMP)         DEVICE ADDRESS               EXR24410
1CF4   4058 0004        2451           STH   STAT,4(TEMP)        DEVICE STATUS                EXR24420
1CF8   D1E0 0566        2452           LM    R14,OPSW                                         EXR24430
1CFC   D0E8 0008        2453           STM   R14,8(TEMP)         OLD PSW AND LOC              EXR24440
1D00   41C0 1C0C        2454           BAL   RET3,QUEUECHK       CHECK THE ERROR QUEUE        EXR24450
1D04   C3A0 0400        2455           THI   STATE,UTILITY       CHECK UTILITY FLAG           EXR24460
1D08   2133             2456           BNZS  ISRETURN            IGNORE INTERRUPT IF NOT EXPECTED EXR24470
1D0A   C200 18E6        2457           LPSW  ABORT               ABORT IF NO DCB FOR THE DEVICE EXR24480
                        2458  *                                                                 EXR24490
1D0E   D120 1D16        2459  ISRETURN LM    R2,INTSAVE          RESTORE REGISTERS            EXR24500
1D12   C200 0566        2460           LPSW  OPSW                GO BACK TO INTERRUPTED PROGRAM EXR24510
                        2461  *                                                                 EXR24520
                        2462  *                                                                 EXR24530
                        2463  *                                                                 EXR24540
1D16                    2464  INTSAVE  DS    28                                               EXR24550
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                                2466  *     S U B R O U T I N E   S T A R T I O                                  EXR24570
                                2467  *                                                                          EXR24580
                                2468  * SUBROUTINE ADJUSTS DCB FLAGS AND ISSUES OUTPUT COMMAND                  EXR24590
                                2469  *                                                                          EXR24600
                                2470  * DCBADR = CURRENT DCB ADDRESS                                            EXR24610
                                2471  * DEV    = DEVICE NUMBER                                                  EXR24620
                                2472  * DAT    = DEVICE COMMAND BYTE                                            EXR24630
                                2473  * R14    = DISPATCH AND DRIVER FLAGS                                      EXR24640
                                2474  * R15    = DRIVER PHASE COUNT                                             EXR24650
                                2475  *                                                                          EXR24660
                                2476  * CALLING SEQUENCE:      BAL  RET3,STARTIO                             EXR24670
                                2477  *                                                                          EXR24680
                                2478  * REGISTERS USED: RET3,R14,DEV,DAT,DCBADR                                 EXR24690
                                2479  * SUBROUTINES USED: NONE                                                  EXR24700
                                2480  *                                                                          EXR24710
                                2481  *                                                                          EXR24720
1D32  C4E0 CFFF                 2482  STARTIO  NHI   R14,-1-BADSTAT-NOTCOUNT RESET BAD STATUS & NOT COUNTING   EXR24730
1D36  C6E0 4000                 2483           OHI   R14,BUSY            *   SET BUSY                          EXR24740
1D3A  D0E6 0000                 2484           STM   R14,0(DCBADR)       STORE FLAGS & PHASE COUNT             EXR24750
1D3E  9E49                      2485           OCR   DEV,DAT             ISSUE OUTPUT COMMAND                  EXR24760
1D40  030C                      2486           BR    RET3                RETURN TO CALL                        EXR24770

                                2488  *     S U B R O U T I N E   B S T A T E R R                                EXR24790
                                2489  *                                                                          EXR24800
                                2490  * CALLING SEQUENCE:      BAL  RET3,BSTATERR                            EXR24810
                                2491  *                                                                          EXR24820
                                2492  * REGISTERS USED: RET3,DAT,TEMP                                           EXR24830
                                2493  * SUBROUTINES USED: ERRORLOG,QUEUECHK                                     EXR24840

1D42  40C0 1D60                 2495  BSTATERR STH   RET3,BSTATX+2                                             EXR24860
1D46  41C0 1BCE                 2496           BAL   RET3,ERRORLOG       GET SPACE ON ERROR QUEUE              EXR24870
1D4A  C890 8020                 2497           LHI   DAT,X'8020'         BAD STATUS ERROR                      EXR24880
1D4E  4098 0000                 2498           STH   DAT,0(TEMP)         STORE ERROR NUMBER                    EXR24890
1D52  4048 0002                 2499           STH   DEV,2(TEMP)         STORE DEVICE NUMBER                   EXR24900
1D56  4058 0004                 2500           STH   STAT,4(TEMP)        STORE DEVICE STATUS                   EXR24910
1D5A  41C0 1C0C                 2501           BAL   RET3,QUEUECHK       QUEUE FOR PRINT                       EXR24920
1D5E  4300 0000                 2502  BSTATX   B     0                   EXIT                                  EXR24930
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                        2504  *     S U B R O U T I N E   I N T R L C K X                    EXR24950
                        2505  *                                                              EXR24960
                        2506  * COMMON SET-UP ROUTINE FOR ACCESSING BITS IN THE INTERLOCK ARRAY EXR24970
                        2507  * REGISTER TEMP CONTAINS ARGUMENT BIT NUMBER                   EXR24980
                        2508  *                                                              EXR24990
                        2509  * CALLING SEQUENCE:      BAL  RET3,INTRLCKX                    EXR25000
                        2510  *                                                              EXR25010
                        2511  * REGISTERS USED: RET3,CHAR,TEMP                              EXR25020
                        2512  * SUBROUTINES USED: NONE                                      EXR25030

1D62  9378              2514  INTRLCKX LBR   CHAR,TEMP                                      EXR25050
1D64  C470 00F0         2515           NHI   CHAR,X'F0'          CHAR = ONLY MS 4 BITS     EXR25060
1D68  0787              2516           XHR   TEMP,CHAR           TEMP = ONLY LS 4 BITS     EXR25070
1D6A  9073              2517           SRLS  CHAR,3              HALFWORD INDEX TO INTERLOCK ARRAY EXR25080
1D6C  0A88              2518           AHR   TEMP,TEMP                                     EXR25090
1D6E  4888 1D74         2519           LH    TEMP,BIT0(TEMP)     PICK UP BIT MASK          EXR25100
1D72  030C              2520           BR    RET3                RETURN...CHAR CONTAINS INDEX TO EXR25110
                        2521  *                                 INTERLOCK ARRAY, TEMP CONTAINS EXR25120
                        2522  *                                 BIT MASK TO USE.          EXR25130
                        2523  *                                                           EXR25140
1D74  8000              2524  BIT0     DCX   8000,4000,2000,1000                          EXR25150
1D76  4000
1D78  2000
1D7A  1000
1D7C  0800              2525           DCX   0800,0400,0200,0100                          EXR25160
1D7E  0400
1D80  0200
1D82  0100
1D84  0080              2526           DCX   0080,0040,0020,0010                          EXR25170
1D86  0040
1D88  0020
1D8A  0010
1D8C  0008              2527           DCX   0008,0004,0002,0001                          EXR25180
1D8E  0004
1D90  0002
1D92  0001

                        2529  * DEVICE INTERLOCK ARRAY                                    EXR25200
                        2530  * ARRAY CONTAINS ONE BIT FOR EVERY DEVICE ADDRESS, ANY DEVICES EXR25210
                        2531  * WHICH CONFLICT HASH TO THE SAME BIT POSITION IN THE ARRAY. IF EXR25220
                        2532  * THAT BIT IS SET, AN I/O OPERATION IS IN PROGRESS ON ONE OF THE EXR25230
                        2533  * DEVICES.  OTHER DEVICES SHOULD NOT BE ADDRESSED.           EXR25240
                        2534  *                                                           EXR25250
1D94                    2535  INTRLOCK DS    32                                          EXR25260
```

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                                2537 *     S U B R O U T I N E   T E S T L O C K                    EXR25280
                                2538 *                                                              EXR25290
                                2539 * TEST THE DEVICE INTERLOCK BIT. IF CLEAR, RETURN WITH A ZERO EXR25300
                                2540 * CONDITION CODE.  IF INTERLOCK IS SET, NOT COUNTING IS SET IN EXR25310
                                2541 * THE CALLER'S DCB.  TEMP CONTAINS THE HASHED DEVICE NUMBER.  EXR25320
                                2542 *                                                              EXR25330
                                2543 * CALLING SEQUENCE:      BAL  RET2,TESTLOCK                   EXR25340
                                2544 *                                                              EXR25350
                                2545 * REGISTERS USED: RET2,RET3,TEMP,CHAR                        EXR25360
                                2546 * SUBROUTINES USED: INTRLCKX                                  EXR25370

1DB4  41C0 1D62                 2548 TESTLOCK BAL   RET3,INTRLCKX       ARRAY INDEX SET-UP         EXR25390
1DB8  4487 1D94                 2549          NH    TEMP,INTRLOCK(CHAR) TEST HALFWORD IN ARRAY     EXR25400
1DBC  033B                      2550          BZR   RET2                EXIT IF BIT RESET          EXR25410
1DBE  C6E0 2000                 2551          OHI   R14,NOTCOUNT                                   EXR25420
1DC2  40E6 0000                 2552          STH   R14,FLAGS(DCBADR)                              EXR25430
1DC6  0303                      2553          BR    RET1                TAKE DRIVER EXIT           EXR25440

                                2555 *      S U B R O U T I N E   S E T L O C K                  EXR25460
                                2556 *                                                              EXR25470
                                2557 * SET THE DEVICE INTERLOCK BIT                                 EXR25480
                                2558 *                                                              EXR25490
                                2559 * CALLING SEQUENCE:      BAL  RET2,SETLOCK                    EXR25500
                                2560 *                                                              EXR25510
                                2561 * REGISTERS USED: RET2,RET3,TEMP,CHAR                        EXR25520
                                2562 * SUBROUTINES USED: INTRLCKX                                  EXR25530

1DC8  41C0 1D62                 2564 SETLOCK  BAL   RET3,INTRLCKX       SET-UP                     EXR25550
1DCC  4687 1D94                 2565          OH    TEMP,INTRLOCK(CHAR) SET INTERLOCK BIT          EXR25560
1DD0  4087 1D94                 2566          STH   TEMP,INTRLOCK(CHAR)                            EXR25570
1DD4  030B                      2567          BR    RET2                                           EXR25580

                                2569 *      S U B R O U T I N E   C L R L O C K                  EXR25600
                                2570 *                                                              EXR25610
                                2571 * CLEAR THE DEVICE INTERLOCK BIT                               EXR25620
                                2572 *                                                              EXR25630
                                2573 * CALLING SEQUENCE:      BAL  RET2,CLRLOCK                    EXR25640
                                2574 *                                                              EXR25650
                                2575 * REGISTERS USED: RET2,RET3,TEMP,CHAR                        EXR25660
                                2576 * SUBROUTINES USED: INTRLCKX                                  EXR25670

1DD6  41C0 1D62                 2578 CLRLOCK  BAL   RET3,INTRLCKX       SET-UP                     EXR25690
1DDA  C780 FFFF                 2579          XHI   TEMP,X'FFFF'        ONE'S COMPLEMENT MASK      EXR25700
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1DDE   4487 1D94          2580          NH    TEMP,INTRLOCK(CHAR) RESET INTERLOCK BIT                EXR25710
1DE2   4087 1D94          2581          STH   TEMP,INTRLOCK(CHAR)                                      EXR25720
1DE6   0308               2582          BR    RET2                                                   EXR25730


                          2584  *       S U B R O U T I N E   B L I N K                              EXR25750
                          2585  *                                                                    EXR25760
                          2586  * COMPLEMENT A BIT ON THE DISPLAY                                     EXR25770
                          2587  * TEMP CONTAINS BIT TO BLINK                                          EXR25780
                          2588  *                                                                    EXR25790
                          2589  * CALLING SEQUENCE:      BAL  RET3,BLINK                             EXR25800
                          2590  *                                                                    EXR25810
                          2591  * REGISTERS USED: RET3,TEMP                                          EXR25820
                          2592  * SUBROUTINES USED: NONE                                             EXR25830


1DE8   4780 07E8          2594  BLINK   XH    TEMP,BLINKY         COMPLEMENT A BIT                   EXR25850
1DEC   4080 07E8          2595          STH   TEMP,BLINKY                                            EXR25860
1DF0   2481               2596          LIS   TEMP,1                                               EXR25870
1DF2   DE80 0D19          2597          OC    TEMP,DSPLYMOD       ADDRESS THE DISPLAY                EXR25880
1DF6   D880 07E8          2598          WH    TEMP,BLINKY         OUTPUT NEW DATA                    EXR25890
1DFA   030C               2599          BR    RET3                RETURN TO CALL                     EXR25900


                          2601  *     S U B R O U T I N E   C O M P A R E                            EXR25920
                          2602  *                                                                    EXR25930
                          2603  * COMPARE ACTUAL AND EXPECTED DATA.  BUFFER 2 = ACTUAL DATA.         EXR25940
                          2604  * BUFFER 1 = EXPECTED DATA.                                          EXR25950
                          2605  *                                                                    EXR25960
                          2606  * CALLING SEQUENCE:      BAL  RET2,COMPARE                           EXR25970
                          2607  *                                                                    EXR25980
                          2608  * REGISTERS USED: RET2,R2,R13,CHAR,STAT,RET3,DAT,DEV,R14             EXR25990
                          2609  * SUBROUTINES USED: ADRSET,ERRORLOG,QUEUECHK                         EXR26000


     0000 1DFC            2611  COMPARE EQU   *                                                     EXR26020
1DFC   4826 0012          2612          LH    R2,BUF1STRT(DCBADR)                                  EXR26030
1E00   48D6 001E          2613          LH    R13,BUF2STRT(DCBADR)                                 EXR26040
1E04   0872               2614  COMPARE1 LHR  CHAR,R2             BUFFER 1 ADDRESS                   EXR26050
1E06   D356 001C          2615          LB    STAT,BUF1EXT(DCBADR) AND ADDRESS EXTENSION             EXR26060
1E0A   41C0 0DE2          2616          BAL   RET3,ADRSET         FORM PROGRAM ADRS & PSW SETTING    EXR26070
1E0E   D397 0000          2617          LB    DAT,0(CHAR)         EXPECTED DATA                      EXR26080
1E12   087D               2618          LHR   CHAR,R13            BUFFER 2 ADDRESS                   EXR26090
1E14   D356 001D          2619          LB    STAT,BUF2EXT(DCBADR) AND ADDRESS EXTENSION             EXR26100
1E18   41C0 0DE2          2620          BAL   RET3,ADRSET         FORM PROGRAM ADDRESS               EXR26110
1E1C   D377 0000          2621          LB    CHAR,0(CHAR)        ACTUAL DATA                        EXR26120
1E20   0597               2622          CLHR  DAT,CHAR            COMPARE                            EXR26130
1E22   4330 1E66          2623          BE    COMPARE2            SKIP IF EQUAL                      EXR26140
1E26   4090 1E80          2624          STH   DAT,EXPECTED                                           EXR26150
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SHARED DRIVER SUBROUTINES

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1E2A 4070 1E82          2625           STH   CHAR,ACTUAL                                    EXR26160
1E2E 9599               2626           EPSR  DAT,DAT              CAPTURE CURRENT PSW     EXR26170
1E30 C490 FF0F          2627           NHI   DAT,X'FF0F'          CLEAR BANK SELECT BITS  EXR26180
1E34 9579               2628           EPSR  CHAR,DAT                                     EXR26190
1E36 4846 0006          2629           LH    DEV,DEVADR(DCBADR)   PICK UP DEVICE NUMBER AND EXR26200
1E3A D356 0008          2630           LB    STAT,STATUS(DCBADR)  STATUS FOR ERROR PRINTOUT EXR26210
1E3E 41C0 1BCE          2631           BAL   RET3,ERRORLOG        GET SPACE ON ERROR QUEUE EXR26220
1E42 C890 B050          2632           LHI   DAT,X'B050'          DATA TRANSFER ERROR     EXR26230
1E46 4098 0000          2633           STH   DAT,0(TEMP)          STORE ERROR NUMBER      EXR26240
1E4A 4048 0002          2634           STH   DEV,2(TEMP)          DEVICE NUMBER           EXR26250
1E4E 4058 0004          2635           STH   STAT,4(TEMP)         DEVICE STATUS           EXR26260
1E52 4890 1E80          2636           LH    DAT,EXPECTED                                 EXR26270
1E56 4098 0008          2637           STH   DAT,8(TEMP)          EXPECTED DATA           EXR26280
1E5A 4870 1E82          2638           LH    CHAR,ACTUAL                                  EXR26290
1E5E 4078 000A          2639           STH   CHAR,10(TEMP)        ACTUAL DATA             EXR26300
1E62 41C0 1C0C          2640           BAL   RET3,QUEUECHK        CHECK THE QUEUE         EXR26310
1E66 2621               2641 COMPARE2  AIS   R2,1                 INCREMENT POINTERS      EXR26320
1E68 26D1               2642           AIS   R13,1                                          EXR26330
1E6A 4926 0014          2643           CH    R2,BUF1END(DCBADR)   DONE YET?               EXR26340
1E6E 4320 1E04          2644           BNP   COMPARE1             LOOP IF NO              EXR26350
1E72 48E6 0000          2645           LH    R14,FLAGS(DCBADR)    CLEAR NOT COUNTING & BAD STATUS EXR26360
1E76 C4E0 CFFF          2646           NHI   R14,-1-NOTCOUNT-BADSTAT                        EXR26370
1E7A 40E6 0000          2647           STH   R14,FLAGS(DCBADR)                            EXR26380
1E7E 030B               2648           BR    RET2                 RETURN                  EXR26390
1E80                    2649 EXPECTED  DS    2                                            EXR26400
1E82                    2650 ACTUAL    DS    2                                            EXR26410


                        2652 *     S U B R O U T I N E   B U F F M O V E                  EXR26430
                        2653 *                                                            EXR26440
                        2654 * IF THE MOVING BUFFER IS ACTIVE, MOVE IT UP 1KB             EXR26450
                        2655 *                                                            EXR26460
                        2656 * CALLING SEQUENCE:      BAL  RET2,BUFFMOVE                  EXR26470
                        2657 *                                                            EXR26480
                        2658 * REGISTERS USED: RET2,TEMP,DAT                            EXR26490
                        2659 * SUBROUTINES USED: NONE                                    EXR26500


1E84 4880 1F58          2661 BUFFMOVE LH    TEMP,MOVENEXT        EXIT IF THIS DEVICE IS NOT EXR26520
1E88 4568 0000          2662          CLH   DCBADR,0(TEMP)       USING THE MOVING BUFFER EXR26530
1E8C 023B               2663          BNER  RET2                                           EXR26540
1E8E C3A0 0001          2664          THI   STATE,MOVEBUSY       TEST IF MOVING BUFFER BEING USED EXR26550
1E92 4230 1EBC          2665          BNZ   BUFFMOV1             SKIP IF YES             EXR26560
1E96 C6A0 0001          2666          OHI   STATE,MOVEBUSY       ELSE SET BUSY           EXR26570
1E9A D386 001D          2667          LB    TEMP,BUF2EXT(DCBADR)                           EXR26580
1E9E 4080 1F5C          2668          STH   TEMP,BUF2SAVE        SAVE ORIGINAL START ADRS EXR26590
1EA2 4886 001E          2669          LH    TEMP,BUF2STRT(DCBADR)                          EXR26600
1EA6 4080 1F5E          2670          STH   TEMP,BUF2SAVE+2                              EXR26610
1EAA 4886 0020          2671          LH    TEMP,BUF2END(DCBADR)                           EXR26620
1EAE 4080 1F60          2672          STH   TEMP,BUF2SAVE+4      SAVE FINAL ADDRESS      EXR26630
1EB2 4880 07DE          2673          LH    TEMP,MEMSTART        TOP OF EXERCISOR        EXR26640
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SHARED DRIVER SUBROUTINES

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1EB6   4890 07E0          2674           LH    DAT,MEMSTART+2                                    EXR26650
1EBA   2305               2675           BS    BUFFMOV2                                          EXR26660
1EBC   4880 07DA          2676  BUFFMOV1 LH    TEMP,MOVER          PICK UP OLD START ADDRESS     EXR26670
1EC0   4890 07DC          2677           LH    DAT,MOVER+2                                       EXR26680
1EC4   C690 03FF          2678  BUFFMOV2 OHI   DAT,X'03FF'          ROUND UP TO NEXT 1K BOUNDARY  EXR26690
1EC8   2691               2679           AIS   DAT,1                                             EXR26700
1ECA   0E80               2680           ACHR  TEMP,ZERO                                         EXR26710
1ECC   4080 07DA          2681           STH   TEMP,MOVER          UPDATE BUFFER START ADDRESS   EXR26720
1ED0   4090 07DC          2682           STH   DAT,MOVER+2                                       EXR26730
1ED4   EC80 000D          2683           SRL   TEMP,13             CONVERT TO 8K SEGMENT NUMBER  EXR26740
1ED8   0A99               2684           AHR   DAT,DAT                                           EXR26750
1EDA   0889               2685           LHR   TEMP,DAT                                          EXR26760
1EDC   C480 001E          2686           NHI   TEMP,X'1E'                                        EXR26770
1EE0   4888 1D74          2687           LH    TEMP,BIT0(TEMP)                                   EXR26780
1EE4   9095               2688           SRLS  DAT,5                                             EXR26790
1EE6   4489 0ADC          2689           NH    TEMP,MEMMAP(DAT)    SEE IF MEMORY AVAILABLE       EXR26800
1EEA   2137               2690           BNZS  BUFFMOV3            SKIP IF YES                   EXR26810
1EEC   C590 0004          2691           CLHI  DAT,4                                             EXR26820
1EF0   4280 1EBC          2692           BL    BUFFMOV1            TRY ANOTHER SEGMENT           EXR26830
1EF4   4300 1F1A          2693           B     BUFRESTR            RESTORE IF OUT OF MEMORY      EXR26840
1EF8   4880 07DA          2694  BUFFMOV3 LH    TEMP,MOVER          PICK UP ADDRESS               EXR26850
1EFC   4890 07DC          2695           LH    DAT,MOVER+2                                       EXR26860
1F00   D286 001D          2696           STB   TEMP,BUF2EXT(DCBADR)                              EXR26870
1F04   4096 001E          2697           STH   DAT,BUF2STRT(DCBADR)                              EXR26880
1F08   4096 0020          2698           STH   DAT,BUF2END(DCBADR)                               EXR26890
1F0C   4890 1F60          2699           LH    DAT,BUF2SAVE+4      OLD FINAL                     EXR26900
1F10   4B90 1F5E          2700           SH    DAT,BUF2SAVE+2      MINUS OLD START = LENGTH      EXR26910
1F14   6196 0020          2701           AHM   DAT,BUF2END(DCBADR) UPDATE NEW FINAL ADDRESS      EXR26920
1F18   030B               2702           BR    RET2                                              EXR26930
1F1A   4000 07DA          2703  BUFRESTR STH   ZERO,MOVER          RESET START ADDRESS           EXR26940
1F1E   4000 07DC          2704           STH   ZERO,MOVER+2                                      EXR26950
1F22   4880 1F5C          2705           LH    TEMP,BUF2SAVE                                     EXR26960
1F26   D286 001D          2706           STB   TEMP,BUF2EXT(DCBADR)                              EXR26970
1F2A   4880 1F5E          2707           LH    TEMP,BUF2SAVE+2     RESTORE ORIGINAL BUFFER ADDRESS EXR26980
1F2E   4086 001E          2708           STH   TEMP,BUF2STRT(DCBADR)                             EXR26990
1F32   4880 1F60          2709           LH    TEMP,BUF2SAVE+4                                   EXR27000
1F36   4086 0020          2710           STH   TEMP,BUF2END(DCBADR) RESTORE ORIGINAL END ADDRESS EXR27010
1F3A   C4A0 FFFE          2711           NHI   STATE,-1-MOVEBUSY   FREE THE MOVING BUFFER        EXR27020
1F3E   030B               2712           BR    RET2                                              EXR27030
                          2713  *                                                                 EXR27040
1F40                      2714  MOVETAB  DS    24                  ROOM FOR 12 ENTRIES           EXR27050
       0000 1F58          2715  MOVEEND  EQU   *                                                 EXR27060
1F58   1F40               2716  MOVENEXT DC    MOVETAB             NEXT ENTRY ADDRESS            EXR27070
1F5A   1F3E               2717  MOVELAST DC    MOVETAB-2           LAST ENTRY ADDRESS            EXR27080
1F5C   0000               2718  BUF2SAVE DC    0,0,0               BUF2EXT,BUF2STRT,BUF2END      EXR27090
1F5E   0000
1F60   0000
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                        2720  *       S U B R O U T I N E   B U F C L E A R                  EXR27110
                        2721  *                                                              EXR27120
                        2722  * CLEAR BUFFER 2, THE READ BUFFER                             EXR27130
                        2723  *                                                              EXR27140
                        2724  * CALLING SEQUENCE:    BAL  RET2,BUFCLEAR                    EXR27150
                        2725  *                                                              EXR27160
                        2726  * REGISTERS USED: RET2,STAT,CHAR,RET3,TEMP                    EXR27170
                        2727  * SUBROUTINES USED: ADRSET                                    EXR27180

1F62  D356 001D         2729  BUFCLEAR LB    STAT,BUF2EXT(DCBADR)                          EXR27200
1F66  4876 001E         2730           LH    CHAR,BUF2STRT(DCBADR) BUFFER 2 START ADRS     EXR27210
1F6A  41C0 0DE2         2731           BAL   RET3,ADRSET          TRANSLATE               EXR27220
1F6E  4886 001E         2732           LH    TEMP,BUF2STRT(DCBADR)                         EXR27230
1F72  4086 0022         2733           STH   TEMP,BUF2NEXT(DCBADR)                         EXR27240
1F76  4007 0000         2734  BFCLRL1  STH   ZERO,0(CHAR)         STORE ZEROS             EXR27250
1F7A  2672              2735           AIS   CHAR,2                                        EXR27260
1F7C  2682              2736           AIS   TEMP,2                                        EXR27270
1F7E  4586 0020         2737           CLH   TEMP,BUF2END(DCBADR) DONE?                    EXR27280
1F82  2086              2738           BLS   BFCLRL1             LOOP                    EXR27290
1F84  9588              2739           EPSR  TEMP,TEMP           CAPTURE CURRENT PSW     EXR27300
1F86  C480 FF0F         2740           NHI   TEMP,X'FF0F'        KILL EXTENDED BITS      EXR27310
1F8A  9578              2741           EPSR  CHAR,TEMP           RESTORE PSW             EXR27320
1F8C  030B              2742           BR    RET2                RETURN TO CALL          EXR27330
1F8E                    2743           IFNZ  MAGTAPE+CASSETTE                            EXR27340
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                        2745  *      S U B R O U T I N E   M A G S T A T                          EXR27360
                        2746  *                                                                   EXR27370
                        2747  * TEST MAG TAPE OR CASSETTE STATUS AFTER INTERRUPT                  EXR27380
                        2748  * TESTS DU, NMTN, ET, ERR IN ORDER                                 EXR27390
                        2749  * RETURN CODE IN REGISTER DAT:                                     EXR27400
                        2750  *                                                                   EXR27410
                        2751  *              DU   NMTN EOT  ERR                                   EXR27420
                        2752  *        0     0    1    0    0    ALL OK                          EXR27430
                        2753  *        1     1    X    X    X    DEVICE UNAVAILABLE              EXR27440
                        2754  *        2     0    0    X    X    MOTION                          EXR27450
                        2755  *        3     0    1    1    X    END OF TAPE                     EXR27460
                        2756  *        4     0    1    0    1    ERROR                           EXR27470
                        2757  *                                                                   EXR27480
                        2758  * CALLING SEQUENCE:      BAL  RET2,MAGSTAT                          EXR27490
                        2759  *                                                                   EXR27500
                        2760  * REGISTERS USED: RET2,STAT,DAT,CHAR,R14,RET3                       EXR27510
                        2761  * SUBROUTINES USED: INTRLCKX,BSTATERR                               EXR27520

1F8E  2492              2763  MAGSTAT  LIS   DAT,2              INITIAL RETURN CODE (MOTION)   EXR27540
1F90  C350 0011         2764           THI   STAT,X'11'         TEST NO MOTION & DU            EXR27550
1F94  033B              2765           BZR   RET2               RETURN IF NO ERROR             EXR27560
1F96  DE40 0D16         2766           OC    DEV,DISARM         INTERRUPT GOT US HERE          EXR27570
1F9A  C4E0 BFFF         2767           NHI   R14,-1-BUSY        NO LONGER EXPECTING            EXR27580
1F9E  40E6 0000         2768           STH   R14,FLAGS(DCBADR)  RESET DRIVER BUSY              EXR27590
1FA2  4886 0018         2769           LH    TEMP,OVRWRK1(DCBADR) NO MOTION, NO MORE INTERRUPTS EXR27600
                        2770  *                                PICK UP DEVICE HASH            EXR27610
1FA6  41C0 1D62         2771           BAL   RET3,INTRLCKX                                     EXR27620
1FAA  C780 FFFF         2772           XHI   TEMP,X'FFFF'       ONE'S COMP MASK                EXR27630
1FAE  4487 1D94         2773           NH    TEMP,INTRLOCK(CHAR)                               EXR27640
1FB2  4087 1D94         2774           STH   TEMP,INTRLOCK(CHAR) RESET INTERLOCK BIT 50         EXR27650
                        2775  *                                ANOTHER DEVICE CAN RUN         EXR27660
1FB6  2490              2776           LIS   DAT,0              RETURN CODE 0...ALL OK         EXR27670
1FB8  C350 00A1         2777           THI   STAT,X'A1'         TEST DU, ET AND ERR            EXR27680
1FBC  033B              2778           BZR   RET2               RETURN, ALL OK                 EXR27690
1FBE  41C0 1D42         2779           BAL   RET3,BSTATERR      LOG BAD STATUS ERROR           EXR27700
1FC2  2491              2780           LIS   DAT,1              RETURN CODE 1...DU             EXR27710
1FC4  C350 0001         2781           THI   STAT,1             CHECK DU                       EXR27720
1FC8  023B              2782           BNZR  RET2               RETURN IF SET                  EXR27730
1FCA  2493              2783           LIS   DAT,3              RETURN CODE 3...EOT            EXR27740
1FCC  C350 0020         2784           THI   STAT,X'20'         CHECK EOT                      EXR27750
1FD0  023B              2785           BNZR  RET2               RETURN IF SET                  EXR27760
1FD2  2494              2786           LIS   DAT,4              CODE 4...ERROR                 EXR27770
1FD4  030B              2787           BR    RET2               RETURN                         EXR27780
                        2788           ENDC                                                    EXR27790
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                                2790  *      S U B R O U T I N E   S L C H S E T                          EXR27810
                                2791  *                                                                  EXR27820
                                2792  * SET UP SELCH AND DCB'S FOR TRANSFER                             EXR27830
                                2793  * DCBADR = OWNER DCB ADDRESS                                      EXR27840
                                2794  * DAT = SELCH ADDRESS                                            EXR27850
                                2795  * STAT = ADRS OF START AND END ADDRESSES                         EXR27860
                                2796  *                                                                  EXR27870
                                2797  * CALLING SEQUENCE:      BAL  RET2,SLCHSET                        EXR27880
                                2798  *                                                                  EXR27890
                                2799  * REGISTERS USED: RET2,TEMP,DAT,CHAR,STAT,RET3                     EXR27900
                                2800  * SUBROUTINES USED: INTRLCKX                                       EXR27910

1FD6   0889                     2802  SLCHSET  LHR   TEMP,DAT                                            EXR27930
1FD8   41C0 1D62                2803           BAL   RET3,INTRLCKX                                       EXR27940
1FDC   4687 1D94                2804           OH    TEMP,INTRLOCK(CHAR) SET SELCH INTERLOCK             EXR27950
1FE0   4087 1D94                2805           STH   TEMP,INTRLOCK(CHAR)                                 EXR27960
1FE4   0889                     2806           LHR   TEMP,DAT                                            EXR27970
1FE6   0A88                     2807           AHR   TEMP,TEMP           INDEX INTO TABLE                EXR27980
1FE8   4888 08DA                2808           LH    TEMP,DCBTAB(TEMP)   GET SELCH DCB                  EXR27990
1FEC   4008 000C                2809           STH   ZERO,CURWAIT(TEMP)  CLEAR WAIT COUNT                EXR28000
1FF0   4878 0000                2810           LH    CHAR,FLAGS(TEMP)                                    EXR28010
1FF4   C470 4FFF                2811           NHI   CHAR,-1-IGNORE-BADSTAT-NOTCOUNT                     EXR28020
1FF8   C670 4000                2812           OHI   CHAR,BUSY                                           EXR28030
1FFC   4078 0000                2813           STH   CHAR,FLAGS(TEMP)                                    EXR28040
2000   4068 000A                2814           STH   DCBADR,DVRENTRY(TEMP) SET OWNER IN DRIVER ENTRY     EXR28050
2004   9588                     2815           EPSR  TEMP,TEMP           COLLECT CURRENT STATUS          EXR28060
2006   C480 37FF                2816           NHI   TEMP,X'37FF'        CLEAR INTERRUPT ENABLE          EXR28070
200A   9578                     2817           EPSR  CHAR,TEMP           UNINTERRUPTABLE                 EXR28080
200C   DE90 0D18                2818           OC    DAT,STOPCMND        STOP SELCH                      EXR28090
2010   D895 0000                2819           WH    DAT,0(STAT)         START ADRS                      EXR28100
2014   D895 0002                2820           WH    DAT,2(STAT)         END ADRS                        EXR28110
2018   030B                     2821           BR    RET2                RETURN                          EXR28120
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                                2823  *      S U B R O U T I N E   S L C H E N D                          EXR28140
                                2824  *                                                                   EXR28150
                                2825  * STOP SELCH AND CHECK ENDING ADDRESS                              EXR28160
                                2826  * REGISTER STAT CONTAINS THE EXPECTED ENDING ADDRESS               EXR28170
                                2827  * TWO ENTRY POINTS PROVIDED:                                      EXR28180
                                2828  *        SLCHENDR FOR READ                                        EXR28190
                                2829  *        SLCHENDW FOR WRITE                                       EXR28200
                                2830  *                                                                 EXR28210
                                2831  * CALLING SEQUENCE:      BAL  RET2,SLCHENDR                        EXR28220
                                2832  *                    OR  BAL  RET2,SLCHENDW                       EXR28230
                                2833  *                                                                 EXR28240
                                2834  * REGISTERS USED: RET2,DAT,TEMP,RET3,CHAR,DCBADR,DEV               EXR28250
                                2835  * SUBROUTINES USED: INTRLCKX,BSTATERR,ERRORLOG,QUEUECHK            EXR28260

201A  C890 F040                 2837  SLCHENDR LHI   DAT,X'F040'          READ ERROR NUMBER            EXR28280
201E  2303                      2838           BS    SLCHEND                                            EXR28290
2020  C890 F041                 2839  SLCHENDW LHI   DAT,X'F041'          WRITE ERROR NUMBER           EXR28300
                                2840  *                                                                  EXR28310
2024  4090 20BE                 2841  SLCHEND  STH   DAT,DATSAVE          SAVE ERROR NUMBER            EXR28320
2028  4050 20C0                 2842           STH   STAT,STATSAVE        SAVE ADDRESS POINTER         EXR28330
202C  4060 07F4                 2843           STH   DCBADR,DCBSAVE       SAVE OWNER DCB               EXR28340
2030  4846 0024                 2844           LH    DEV,SELCHADR(DCBADR) PICK UP SELCH ADDRESS        EXR28350
2034  0884                      2845           LHR   TEMP,DEV             USING SELCH ADDRESS          EXR28360
2036  41C0 1D62                 2846           BAL   RET3,INTRLCKX                                      EXR28370
203A  C780 FFFF                 2847           XHI   TEMP,X'FFFF'                                       EXR28380
203E  4487 1D94                 2848           NH    TEMP,INTRLOCK(CHAR)                                EXR28390
2042  4087 1D94                 2849           STH   TEMP,INTRLOCK(CHAR) CLEAR INTERLOCK BIT            EXR28400
2046  DE40 0D18                 2850           OC    DEV,STOPCMND         STOP COMMAND TO SELCH         EXR28410
204A  0A44                      2851           AHR   DEV,DEV              INDEX INTO TABLE              EXR28420
204C  4864 08DA                 2852           LH    DCBADR,DCBTAB(DEV)   GET SELCH DCB ADDRESS         EXR28430
2050  9041                      2853           SRLS  DEV,1                                              EXR28440
2052  D356 0008                 2854           LB    STAT,STATUS(DCBADR) GET SELCH STATUS FROM SELCH DCB EXR28450
2056  C350 0008                 2855           THI   STAT,8               CHECK BUSY                    EXR28460
205A  2333                      2856           BZS   SLCHEND1             SKIP IF BUSY = 0              EXR28470
205C  41C0 1D42                 2857           BAL   RET3,BSTATERR        LOG BAD STATUS ERROR          EXR28480
2060  48C6 0000                 2858  SLCHEND1 LH    RET3,FLAGS(DCBADR)                                 EXR28490
2064  C6C0 8000                 2859           OHI   RET3,IGNORE          SET IGNORE IN SELCH DCB       EXR28500
2068  40C6 0000                 2860           STH   RET3,FLAGS(DCBADR)                                 EXR28510
206C  9949                      2861           RHR   DEV,DAT              FETCH ENDING ADDRESS          EXR28520
206E  4850 20C0                 2862           LH    STAT,STATSAVE                                      EXR28530
2072  0595                      2863           CLHR  DAT,STAT             COMPARE TO ACTUAL             EXR28540
2074  4330 20B8                 2864           BE    SLCHEND2             SKIP IF ALIKE                 EXR28550
                                2865  *                                                                  EXR28560
                                2866  * SELCH ENDING ADDRESS ERROR                                       EXR28570
                                2867  *                                                                  EXR28580
2078  4050 1E80                 2868           STH   STAT,EXPECTED                                      EXR28590
207C  4090 1E82                 2869           STH   DAT,ACTUAL                                         EXR28600
2080  41C0 1BCE                 2870           BAL   RET3,ERRORLOG        GET SPACE ON ERROR QUEUE      EXR28610
2084  4870 20BE                 2871           LH    CHAR,DATSAVE                                       EXR28620
2088  4078 0000                 2872           STH   CHAR,0(TEMP)         STORE ERROR CODE              EXR28630
208C  4870 07F4                 2873           LH    CHAR,DCBSAVE         PICK UP USER'S DCB            EXR28640
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SHARED DRIVER SUBROUTINES

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2090  48C7 0006          2874            LH    RET3,DEVADR(CHAR)   ADDRESS OF DEVICE USING SELCH      EXR28650
2094  40C8 0002          2875            STH   RET3,2(TEMP)                                           EXR28660
2098  D3C7 0008          2876            LB    RET3,STATUS(CHAR)                                     EXR28670
209C  40C8 0004          2877            STH   RET3,4(TEMP)        DEVICE STATUS                     EXR28680
20A0  4048 0006          2878            STH   DEV,6(TEMP)         SELCH ADDRESS                     EXR28690
20A4  4890 1E82          2879            LH    DAT,ACTUAL                                            EXR28700
20A8  4098 0008          2880            STH   DAT,8(TEMP)         ACTUAL ADDRESS                    EXR28710
20AC  4890 1E80          2881            LH    DAT,EXPECTED                                          EXR28720
20B0  4098 000A          2882            STH   DAT,10(TEMP)        EXPECTED ADDRESS                  EXR28730
20B4  41C0 1C0C          2883            BAL   RET3,QUEUECHK       CHECK THE ERROR QUEUE             EXR28740
20B8  4860 07F4          2884  SLCHEND2  LH    DCBADR,DCBSAVE      PICK UP OWNER DCB                 EXR28750
20BC  030B               2885            BR    RET2                RETURN                            EXR28760
20BE                     2886  DATSAVE   DS    2                                                     EXR28770
20C0                     2887  STATSAVE  DS    2                                                     EXR28780
20C2                     2888            IFNZ  DISCS+DSK40MB                                         EXR28790
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                                2890  *      S U B R O U T I N E   F I L E S E T                          EXR28810
                                2891  *                                                                  EXR28820
                                2892  * CHECK SELCH AND CONTROLLER INTERLOCK, ADJUST DEVICE ADDRESSES     EXR28830
                                2893  * ACCORDING TO TRACK (10 MB ONLY), TEST DU AND WRITE PROTECT        EXR28840
                                2894  * STATUS, SEND CYLINDER AND HEAD TO FILE (40 MB)                   EXR28850
                                2895  * RET1 = DRIVER EXIT RETURN                                        EXR28860
                                2896  * DCBADR = ADDRESS OF DCB FOR FILE                                 EXR28870
                                2897  *                                                                  EXR28880
                                2898  * CALLING SEQUENCE:      BAL  RET2,FILESET                         EXR28890
                                2899  *                                                                  EXR28900
                                2900  * ON RETURN, DEV = DEVICE ADDRESS (ADJUSTED IF 10 MB)               EXR28910
                                2901  * R2 = CONTROLLER ADDRESS                                          EXR28920
                                2902  * R13 = SELCH ADDRESS                                              EXR28930
                                2903  *                                                                  EXR28940
                                2904  * REGISTERS USED: RET2,TEMP,R2,R13,DEV,R14,DAT,STAT                EXR28950
                                2905  * SUBROUTINES USED: TESTLOCK                                       EXR28960

20C2  40B6 001A                 2907  FILESET  STH   RET2,DVRWRK2(DCBADR) SAVE RETURN ADDRESS           EXR28980
20C6  4886 0028                 2908           LH    TEMP,CONTADR(DCBADR)                              EXR28990
20CA  0828                      2909           LHR   R2,TEMP             SAVE CONTROLLER ADDRESS       EXR29000
20CC  41B0 1DB4                 2910           BAL   RET2,TESTLOCK       CHECK CONTROLLER INTERLOCK    EXR29010
20D0  4886 0024                 2911           LH    TEMP,SELCHADR(DCBADR)                             EXR29020
20D4  08D8                      2912           LHR   R13,TEMP            SAVE SELCH ADDRESS            EXR29030
20D6  41B0 1DB4                 2913           BAL   RET2,TESTLOCK       CHECK SELCH INTERLOCK         EXR29040
20DA  4846 0006                 2914           LH    DEV,DEVADR(DCBADR)                                EXR29050
20DE  C3E0 0C00                 2915           THI   R14,DEVCNTL1+DEVCNTL2 40 MB OR MSM?               EXR29060
20E2  2135                      2916           BNZS  FILESET1            SKIP IF YES                   EXR29070
20E4  D396 0038                 2917           LB    DAT,HEADCUR(DCBADR) ADJUST DEVICE ADDRESS         EXR29080
20E8  9091                      2918           SRLS  DAT,1               ACCORDING TO CURRENT TRACK    EXR29090
20EA  0A49                      2919           AHR   DEV,DAT                                           EXR29100
20EC  9D45                      2920  FILESET1 SSR   DEV,STAT                                          EXR29110
20EE  D256 0008                 2921           STB   STAT,STATUS(DCBADR) SAVE STATUS                  EXR29120
20F2  C350 0081                 2922           THI   STAT,X'81'          TEST DU OR WRITE PROTECT      EXR29130
20F6  2335                      2923           BZS   FILESET2            SKIP IF NEITHER               EXR29140
20F8  0700                      2924           XHR   ZERO,ZERO                                          EXR29150
20FA  4006 0002                 2925           STH   ZERO,PHASE(DCBADR)  HANG IN PHASE ZERO            EXR29160
20FE  0303                      2926           BR    RET1                TAKE DRIVER EXIT RETURN       EXR29170
                                2927  *                                                                 EXR29180
2100  C3E0 0C00                 2928  FILESET2 THI   R14,DEVCNTL1+DEVCNTL2 40 MB OR MSM?               EXR29190
2104  2136                      2929           BNZS  FILESET3            SKIP IF YES                   EXR29200
2106  D846 0036                 2930           WH    DEV,CYLCUR(DCBADR)  SEND CYLINDER ADDRESS         EXR29210
210A  48B6 001A                 2931  FILESETX LH    RET2,DVRWRK2(DCBADR)                              EXR29220
210E  030B                      2932           BR    RET2                RETURN                        EXR29230
                                2933  *                                                                 EXR29240
2110  DE40 3CB3                 2934  FILESET3 OC    DEV,D40REATN        RESET ATTENTION               EXR29250
2114  9D25                      2935           SSR   R2,STAT             WAIT FOR CONTROLLER IDLE      EXR29260
2116  2221                      2936           BFBS  2,1                                               EXR29270
2118  D846 0036                 2937           WH    DEV,CYLCUR(DCBADR)  SEND CYLINDER                 EXR29280
211C  DE40 3CB5                 2938           OC    DEV,D40CYL          LOAD CYLINDER TO FILE         EXR29290
2120  9D25                      2939           SSR   R2,STAT             WAIT, CONTROLLER IDLE         EXR29300
2122  2221                      2940           BFBS  2,1                                               EXR29310
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SHARED DRIVER SUBROUTINES

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2124  DE40 3CB4          2941          OC    DEV,D40REHD          RESET HEAD                          EXR29320
2128  9D25               2942          SSR   R2,STAT            WAIT, CONTROLLER IDLE               EXR29330
212A  2221               2943          BFBS  2,1                                                    EXR29340
212C  DA40 07D8          2944          WD    DEV,ZEROS                                              EXR29350
2130  DA46 0038          2945          WD    DEV,HEADCUR(DCBADR) SEN HEAD NUMBER                    EXR29360
2134  DE40 3CB6          2946          OC    DEV,D40HEAD         SET HEAD                           EXR29370
2138  9D25               2947          SSR   R2,STAT                                               EXR29380
213A  2221               2948          BFBS  2,1                 WAIT FOR CONTROLLFR IDLE           EXR29390
213C  4300 210A          2949          B     FILESETX            EXIT                               EXR29400

                         2951  *     S U B R O U T I N E   F I L E S T A T                          EXR29420
                         2952  *                                                                    EXR29430
                         2953  * TEST DISC FILE STATUS AFTER SEEK OR RESTORE                        EXR29440
                         2954  * TESTS DU, ILL ADRS, SEEK INC, WRT CHK, WRT PROT                    EXR29450
                         2955  * RETURN CODE IN REGISTER DAT:                                       EXR29460
                         2956  *         0     ALL OK                                               EXR29470
                         2957  *         1     DISC NOT READY OR WRT PROT                           EXR29480
                         2958  *         2     ILL ADRS OR SEEK INC                                 EXR29490
                         2959  *         3     WRT CHK (NONE OF THE ABOVE)                          EXR29500
                         2960  *                                                                    EXR29510
                         2961  * CALLING SEQUENCE:       BAL  RET2,FILESTAT                       EXR29520
                         2962  *                                                                    EXR29530
                         2963  * REGISTERS USED: RET2,TEMP,DEV,STAT,DAT,RET3                        EXR29540
                         2964  * SUBROUTINES USED: TESTLOCK,BSTATERR                                EXR29550

2140  40B6 001A          2966  FILESTAT STH  RET2,DVRWRK2(DCBADR) SAVE RETURN ADDRESS               EXR29570
2144  4886 0024          2967           LH   TEMP,SELCHADR(DCBADR)                                 EXR29580
2148  41B0 1DB4          2968           BAL  RET2,TESTLOCK        CHECK SELCH INTERLOCK            EXR29590
214C  4886 0028          2969           LH   TEMP,CONTADR(DCBADR)                                  EXR29600
2150  41B0 1DB4          2970           BAL  RET2,TESTLOCK        CHECK CONTROLLER INTERLOCK       EXR29610
2154  4846 0006          2971           LH   DEV,DEVADR(DCBADR)                                    EXR29620
2158  9D45               2972           SSR  DEV,STAT                                              EXR29630
215A  D256 0008          2973           STB  STAT,STATUS(DCBADR) SAVE STATUS                       EXR29640
215E  2490               2974           LIS  DAT,0                RETURN CODE 0...ALL OK           EXR29650
2160  0855               2975           LHR  STAT,STAT            TEST FOR ZERO STATUS             EXR29660
2162  233C               2976           BZS  FILSTATX             EXIT IF ZERO                     EXR29670
2164  41C0 1D42          2977           BAL  RET3,BSTATERR        BAD STATUS ERROR                 EXR29680
2168  2491               2978           LIS  DAT,1                GET READY TO CHECK DU            EXR29690
216A  C350 0081          2979           THI  STAT,X'81'           TEST DU OR WRITE PROTECT         EXR29700
216E  2136               2980           BNZS FILSTATX             EXIT IF SET...CODE 1             EXR29710
2170  2492               2981           LIS  DAT,2                CHECK FOR BAD SEEK ERRORS        EXR29720
2172  C350 0022          2982           THI  STAT,X'22'           SEEK INC. OR ILL ADRS            EXR29730
2176  2132               2983           BNZS FILSTATX             EXIT IF SET...CODE 2             EXR29740
2178  2493               2984           LIS  DAT,3                MUST BE SOME OTHER ERROR         EXR29750
                         2985  *                                 RETURN CODE = 3                  EXR29760
217A  48B6 001A          2986  FILSTATX LH   RET2,DVRWRK2(DCBADR)                                  EXR29770
217E  030B               2987           BR   RET2                                                  EXR29780
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                        2989 *      S U B R O U T I N E   C O N T S E T                    EXR29800
                        2990 *                                                             EXR29810
                        2991 * SET UP CONTROLLER FOR READ/WRITE                           EXR29820
                        2992 * SENDS HEAD, SECTOR, AND CY LINDER (40 MB) TO CONTROLLER    EXR29830
                        2993 * DCBADR: ADDRESS OF DCB FOR FILE                           EXR29840
                        2994 * DAT   : CONTROLLER ADDRESS                                EXR29850
                        2995 *                                                             EXR29860
                        2996 * CALLING SEQUENCE:      BAL  RET2,CONTSET                  EXR29870
                        2997 *                                                             EXR29880
                        2998 * REGISTERS USED: RET2,R14,TEMP,DAT                        EXR29890
                        2999 * SUBROUTINES USED: NONE                                    EXR29900


2180  4896 0028         3001 CONTSET  LH    DAT,CONTADR(DCBADR)                          EXR29920
2184  C3E0 0C00         3002          THI   R14,DEVCNTL1+DEVCNTL2 40 MB OR MSM?          EXR29930
2188  213C              3003          BNZS  CONTSET1            SKIP IF YES              EXR29940
218A  D846 0036         3004          WH    DEV,CYLCUR(DCBADR)  SEN CYLINDER             EXR29950
218E  D386 0038         3005          LB    TEMP,HEADCUR(DCBADR)                         EXR29960
2192  9185              3006          SLLS  TEMP,5              POSITION HEAD NUMBER     EXR29970
2194  4686 0034         3007          OH    TEMP,SCTRCUR(DCBADR) COMBINE HEAD AND SECTOR EXR29980
2198  C480 003F         3008          NHI   TEMP,X'3F'          CLEAR HIGH ORDER BITS    EXR29990
219C  9A98              3009          WDR   DAT,TEMP            SEND HEAD & SECTOR TO CONTROLLER EXR30000
219E  030B              3010          BR    RET2                                         EXR30010
21A0  DE40 3CB3         3011 CONTSET1 OC    DEV,D40REATN        RESET ATTENTION          EXR30020
21A4  9D95              3012          SSR   DAT,STAT                                     EXR30030
21A6  2221              3013          BFBS  2,1                 WAIT FOR CONTROLLER IDLE EXR30040
21A8  D386 0038         3014          LB    TEMP,HEADCUR(DCBADR)                         EXR30050
21AC  918A              3015          SLLS  TEMP,10             POSITION HEAD NUMBER     EXR30060
21AE  4686 0036         3016          OH    TEMP,CYLCUR(DCBADR) COMBINE HEAD AND CYLINDER EXR30070
21B2  C480 7DFF         3017          NHI   TEMP,X'7DFF'         CLEAR UNUSED BITS        EXR30080
21B6  DE40 3CB4         3018          OC    DEV,D40REHD         RESET HEAD               EXR30090
21BA  9D95              3019          SSR   DAT,STAT                                     EXR30100
21BC  2221              3020          BFBS  2,1                 WAIT FOR CONTROLLER IDLE EXR30110
21BE  DA40 07D8         3021          WD    DEV,ZEROS                                    EXR30120
21C2  DA46 0038         3022          WD    DEV,HEADCUR(DCBADR) OUTPUT HEAD NO. TO DRIVE EXR30130
21C6  DE40 3CB6         3023          OC    DEV,D40HEAD         SET HEAD                 EXR30140
21CA  9D95              3024          SSR   DAT,STAT                                     EXR30150
21CC  2221              3025          BFBS  2,1                 WAIT FOR CONTROLLER IDLE EXR30160
21CE  4200 0000         3026          NOP                                                EXR30170
21D2  DA96 0035         3027          WD    DAT,SCTRCUR+1(DCBADR) OUT SECTOR NUMBER      EXR30180
21D6  9898              3028          WHR   DAT,TEMP            SEND HEAD & CYLINDER TO CONTROLLER EXR30190
21D8  C3E0 0400         3029          THI   R14,DEVCNTL2         MSM?                     EXR30200
21DC  033B              3030          BZR   RET2                EXIT IF NO               EXR30210
21DE  DA40 07D8         3031          WD    DEV,ZEROS                                    EXR30220
21E2  DA46 0038         3032          WD    DEV,HEADCUR(DCBADR) SEND HEAD TO CEVICE      EXR30230
21E6  030B              3033          BR    RET2                                         EXR30240


                        3035 *     S U B R O U T I N E   C O N T S T A T               EXR30260
                        3036 *                                                             EXR30270
                        3037 * DISC CONTROLLER INTERRUPT STATUS CHECK                    EXR30280
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SHARED DRIVER SUBROUTINES

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                                3038  * TESTS CONTROLLER IDLE, FILE ADRS INTLK, DATA XFER ERROR, FILE DU        EXR30290
                                3039  *                                                                        EXR30300
                                3040  * RETURN CODE IN REGISTER DAT:                                           EXR30310
                                3041  *        0     ALL OK              CONTINUE TESTING                      EXR30320
                                3042  *        1     FILE DU             WAIT FOR DU TO CLEAR                  EXR30330
                                3043  *        2     CONT NOT IDLE       WAIT FOR CONTROLLER IDLE              EXR30340
                                3044  *        3     EXAMINE             GO ON TO NEXT SECTOR                  EXR30350
                                3045  *        4     DATA XFER ERROR     RETRY READ/WRITE                      EXR30360
                                3046  *                                                                        EXR30370
                                3047  * CALLING SEQUENCE:      BAL  RET2,CONTSTAT                           EXR30380
                                3048  *                                                                        EXR30390
                                3049  * REGISTERS USED: RET2,DEV,STAT,TEMP,DAT,R14,RET3                       EXR30400
                                3050  * SUBROUTINES USED: CLRLOCK,BSTATERR                                    EXR30410

21E8  4846 0028                 3052  CONTSTAT LH    DEV,CONTADR(DCBADR) GET CONTROLLER ADDRESS               EXR30430
21EC  9D45                      3053  CSTAT01  SSR   DEV,STAT           LOOK AT CONTROLLER STATUS             EXR30440
21EE  0700                      3054           XHR   ZERO,ZERO                                                EXR30450
21F0  9D48                      3055           SSR   DEV,TEMP           LOOK AGAIN IN CASE IT CHANGES         EXR30460
21F2  0558                      3056           CLHR  STAT,TEMP                                                EXR30470
21F4  2034                      3057           BNES  CSTAT01            LOOP UNTIL STATUS IS STABLE           EXR30480
21F6  D256 0008                 3058           STB   STAT,STATUS(DCBADR) SAVE STATUS                          EXR30490
21FA  2492                      3059           LIS   DAT,2              RETURN CODE 2, NOT IDLE               EXR30500
21FC  C350 0002                 3060           THI   STAT,2                                                   EXR30510
2200  033B                      3061           BZR   RET2               RETURN IF NOT IDLE                    EXR30520
2202  48E6 0000                 3062           LH    R14,FLAGS(DCBADR)                                        EXR30530
2206  C4E0 BFFF                 3063           NHI   R14,-1-BUSY        RESET BUSY                            EXR30540
220A  40E6 0000                 3064           STH   R14,FLAGS(DCBADR)                                        EXR30550
220E  0884                      3065           LHR   TEMP,DEV                                                 EXR30560
2210  40B6 001A                 3066           STH   RET2,DVRWRK2(DCBADR) SAVE RETURN ADDRESS                 EXR30570
2214  41B0 1DD6                 3067           BAL   RET2,CLRLOCK       CLEAR THE DEVICE INTERLOCK            EXR30580
2218  48B6 001A                 3068           LH    RET2,DVRWRK2(DCBADR)                                     EXR30590
221C  0A44                      3069           AHR   DEV,DEV            INDEX TO LOOK-UP-TABLE                EXR30600
221E  4004 08DA                 3070           STH   ZERO,DCBTAB(DEV)   CLEAR CONTROLLER ENTRY                EXR30610
2222  9041                      3071           SRLS  DEV,1                                                    EXR30620
2224  C3E0 0C00                 3072           THI   R14,DEVCNTL1+DEVCNTL2 40 MB OR MSM?                      EXR30630
2228  2137                      3073           BNZS  CSTAT03            BRANCH IF YES                         EXR30640
222A  4886 0006                 3074           LH    TEMP,DEVADR(DCBADR) GET FILE ADDRESS                     EXR30650
222E  9D89                      3075  CSTAT02  SSR   TEMP,DAT           CHECK FILE STATUS                     EXR30660
2230  C390 0010                 3076           THI   DAT,X'10'          ADRS INTERLOCK SET?                   EXR30670
2234  2033                      3077           BNZS  CSTAT02            LOOP IF YES; WAIT FOR IT TO CLEAR     EXR30680
2236  2490                      3078  CSTAT03  LIS   DAT,0              RETURN CODE ZERO                      EXR30690
2238  C350 00F1                 3079           THI   STAT,X'F1'         ANY ERRORS?                           EXR30700
223C  033B                      3080           BZR   RET2               EXIT IF NO                            EXR30710
223E  41C0 1D42                 3081           BAL   RET3,BSTATERR      BAD STATUS ERROR                      EXR30720
2242  2491                      3082           LIS   DAT,1              CODE 1 IF DU SET                      EXR30730
2244  4886 0006                 3083           LH    TEMP,DEVADR(DCBADR)                                      EXR30740
2248  9D8C                      3084           SSR   TEMP,RET3          CHECK FILE DU                         EXR30750
224A  021B                      3085           BMR   RET2               EXIT IF DU                            EXR30760
224C  2493                      3086           LIS   DAT,3              CODE 3                                EXR30770
224E  C350 00F0                 3087           THI   STAT,X'F0'         ANY DATA ERRORS?                      EXR30780
2252  023B                      3088           BNZR  RET2               EXIT IF YES                           EXR30790
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2254  2494          3089        LIS   DAT,4          CODE 4, DATA XFER ERROR      EXR30800
2256  030B          3090        BR    RET2           EXIT                         EXR30810
```

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                                3092  *     S U B R O U T I N E   W A I T S E E K                    EXR30830
                                3093  *                                                              EXR30840
                                3094  * ALLOW SEEK TO COMPLETE ON ALL DRIVES SERVICED BY A CONTROLLER EXR30850
                                3095  * SO THAT CONTROLLER CAN BE RESET WITHOUT LOSS OF FILE INTERRUPTS. EXR30860
                                3096  * BITS IN INTERLOCK ARRAY INDICATE A DRIVE IS SEEKING.          EXR30870
                                3097  * REGISTER DAT CONTAINS CONTROLLER ADDRESS                      EXR30880
                                3098  *                                                              EXR30890
                                3099  * CALLING SEQUENCE:      BAL  RET2,WAITSEEK                    EXR30900
                                3100  *                                                              EXR30910
                                3101  * REGISTERS USED: RET2,STAT,TEMP,DAT,RET3,CHAR,                EXR30920
                                3102  * SUBROUTINES USED: INTRLCKX                                   EXR30930

2258  C850 0010                 3104  WAITSEEK LHI   STAT,X'10'        2,5 & 10 MB ADDRESS INCREMENT  EXR30950
225C  C3E0 0800                 3105           THI   R14,DEVCNTL1      CHECK 40 MB FLAG               EXR30960
2260  2332                      3106           BZS   WTSEEK1           SKIP IF NOT SET                EXR30970
2262  2451                      3107           LIS   STAT,1            40MB ADDRESS INCREMENT         EXR30980
2264  0889                      3108  WTSEEK1  LHR   TEMP,DAT          CONTROLLER ADDRESS             EXR30990
2266  0A85                      3109           AHR   TEMP,STAT         SELECT DRIVE                   EXR31000
2268  41C0 1D62                 3110           BAL   RET3,INTRLCKX     SET-UP TO TEST INTERLOCK BIT   EXR31010
226C  4487 1D94                 3111           NH    TEMP,INTRLOCK(CHAR) TEST INTERLOCK BIT           EXR31020
2270  2036                      3112           BNZS  WTSEEK1          HANG UNTIL IT RESETS           EXR31030
2272  C3E0 0800                 3113           THI   R14,DEVCNTL1                                     EXR31040
2276  2336                      3114           BZS   WTSEEK2                                        EXR31050
2278  2651                      3115           AIS   STAT,1            INCREMENT ADDRESS              EXR31060
227A  C550 0005                 3116           CLHI  STAT,5                                         EXR31070
227E  208D                      3117           BLS   WTSEEK1           LOOP                           EXR31080
2280  030B                      3118           BR    RET2              RETURN                         EXR31090
                                3119  *                                                              EXR31100
2282  CA50 0010                 3120  WTSEEK2  AHI   STAT,X'10'        INCREMENT ADDRESS              EXR31110
2286  C550 0050                 3121           CLHI  STAT,X'50'                                     EXR31120
228A  4280 2264                 3122           BL    WTSEEK1           LOOP                           EXR31130
228E  030B                      3123           BR    RET2              RETURN                         EXR31140
                                3124           ENDC                                                 EXR31150
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CONSOLE DRIVER

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2290  0000              3126  CONDCB   DCX   0000,0,0800,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS          EXR31170
2292  0000
2294  0800
2296  0000
2298  0000
229A  22B4              3127           DC    CONPTR,0,0,0        OVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR31180
229C  0000
229E  0000
22A0  0000
22A2  0000              3128           DC    0,0,0               BUF1STRT,BUF1END,BUF1NEXT               EXR31190
22A4  0000
22A6  0000
22A8  0000              3129           DCX   0000,0000           OVRWRK1,OVRWRK2                         EXR31200
22AA  0000
22AC  0000              3130           DB    0,0                 BUF1EXT,BUF2EXT                         EXR31210
22AE  0000              3131           DC    0,0,0               BUF2STRT,BUF2END,BUF2NEXT               EXR31220
22B0  0000
22B2  0000

      0000 22B4         3133  CONPTR   EQU   *                                                           EXR31240
22B4  22C2              3134  CONPHTB  DC    CONPH0              PHASE 0 STATUS LOOP READ                EXR31250
22B6  22FA              3135           DC    CONPH1              PHASE 1 START WRITING                   EXR31260
22B8  232E              3136           DC    CONPH2              PHASE 2 WRITE INTERRUPTS                EXR31270
22BA  23D8              3137           DC    CONPH3              PHASE 3 STATUS LOOP WRITE               EXR31280
22BC  23FC              3138           DC    CONPH4              PHASE 4 START READING                   EXR31290
22BE  241A              3139           DC    CONPH5              PHASE 5 READ INTERRUPTS                 EXR31300
22C0  242A              3140           DC    CONPH6              PHASE 6 START WRITE (ECHO)              EXR31310

                        3142  * PHASE 0...CONSOLE SUPPORT STATUS LOOP READ                               EXR31330
                        3143  *                                                                         EXR31340
22C2  4880 02D8         3144  CONPH0   LH    TEMP,CONTYP                                               EXR31350
22C6  DE48 246B         3145           OC    DEV,CONRD(TEMP)     ISSUE READ COMMAND                    EXR31360
22CA  9B47              3146           RDR   DEV,CHAR            DUMMY READ TO FORCE BUSY              EXR31370
22CC  C3A0 000C         3147           THI   STATE,CARSL300+PASLAFLG PASLA?                            EXR31380
22D0  2333              3148           BZS   CONP0L1             SKIP IF NO                            EXR31390
22D2  DE40 2458         3149           OC    DEV,PASRQ2S                                               EXR31400
22D6  DD46 0008         3150  CONP0L1  SS    DEV,STATUS(DCBADR)                                        EXR31410
22DA  2092              3151           BTBS  9,2                 LOOP ON BUSY OR DU                    EXR31420
22DC  9B47              3152           RDR   DEV,CHAR            INPUT ONE CHARACTER                   EXR31430
22DE  C3A0 0010         3153           THI   STATE,MICROBUS      SEE IF MICRO I/O BUS                  EXR31440
22E2  2333              3154           BZS   CONP0L2             SKIP IF NO                            EXR31450
22E4  9A47              3155           WDR   DEV,CHAR            ECHO THE CHARACTER                    EXR31460
22E6  0303              3156           BR    RET1                RETURN                                EXR31470
22E8  C3A0 0008         3157  CONP0L2  THI   STATE,CARSL300      SEE IF COROUSEL 300                   EXR31480
22EC  0333              3158           BZR   RET1                EXIT IF NO                            EXR31490
22EE  2641              3159           AIS   DEV,1               SELECT ODD ADDRESS                    EXR31500
22F0  DD46 0008         3160           SS    DEV,STATUS(DCBADR)                                        EXR31510
22F4  2082              3161           BTBS  8,2                 LOOP ON BUSY                          EXR31520
22F6  9A47              3162           WDR   DEV,CHAR            ECHO THE CHARACTER                    EXR31530
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22F8  0303            3163          BR    RET1              RETURN TO CALL                                  EXR31540


                      3165  * PHASE 1...START WRITING                                                       EXR31560
                      3166  *                                                                               EXR31570
22FA  24F4            3167  CONPH1  LIS   R15,TWO           NEXT PHASE IS 2                                 EXR31580
22FC  C6E0 4400       3168          OHI   R14,DEVCNTL2+BUSY SET ERROR IN PROGRESS FLAG                      EXR31590
2300  D0E6 0000       3169          STM   R14,0(DCBADR)                                                     EXR31600
2304  4886 0012       3170          LH    TEMP,BUF1STRT(DCBADR) COPY BUFFER 1 START ADDRESS                 EXR31610
2308  4086 0016       3171          STH   TEMP,BUF1NEXT(DCBADR) TO CURRENT BUFFER 1 ADDRESS                 EXR31620
230C  4880 02D8       3172          LH    TEMP,CONTYP                                                       EXR31630
2310  C3A0 000C       3173          THI   STATE,CARSL300+PASLAFLG                                           EXR31640
2314  2335            3174          BZS   CONP1L1                                                           EXR31650
2316  C640 0001       3175          OHI   DEV,1             SELECT ODD ADDRESS                              EXR31660
231A  DE48 245F       3176          OC    DEV,CON2ND(TEMP)  ISSUE PASLA FORMAT COMMAND                      EXR31670
231E  DE48 2465       3177  CONP1L1 OC    DEV,CONWRT(TEMP)  DISABLE WRITE                                   EXR31680
2322  9D45            3178          SSR   DEV,STAT                                                         EXR31690
2324  2081            3179          BTBS  8,1               WAIT FOR BUSY                                   EXR31700
2326  DE48 2471       3180          OC    DEV,CONENWT(TEMP) ENABLE WRITE                                    EXR31710
232A  9A40            3181          WDR   DEV,ZERO          OUTPUT A NULL CHARACTER                         EXR31720
232C  0303            3182          BR    RET1              RETURN TO CALL                                  EXR31730


                      3184  * PHASE 2...WRITE INTERRUPTS                                                    EXR31750
                      3185  *                                                                               EXR31760
232E  C350 00A5       3186  CONPH2  THI   STAT,X'A5'        TEST STATUS                                     EXR31770
2332  4330 23A4       3187          BZ    CONP2L3           BRANCH IF OK                                    EXR31780
2336  4880 02D8       3188          LH    TEMP,CONTYP                                                       EXR31790
233A  DE48 2459       3189          OC    DEV,CONDSBL(TEMP) DISABLE THE DEVICE                              EXR31800
233E  24F8            3190          LIS   R15,FOUR          NEXT PHASE IS 4                                 EXR31810
2340  C4E0 BFFF       3191          NHI   R14,-1-BUSY       RESET DRIVER BUSY                               EXR31820
2344  D0E6 0000       3192          STM   R14,0(DCBADR)                                                     EXR31830
2348  41C0 1BCE       3193  TTYERROR BAL  RET3,ERRORLOG     GET SPACE ON ERROR QUEUE                        EXR31840
234C  C890 8021       3194          LHI   DAT,X'8021'       ERROR '21'                                      EXR31850
2350  4098 0000       3195          STH   DAT,0(TEMP)       STORE ERROR NUMBER                              EXR31860
2354  4048 0002       3196          STH   DEV,2(TEMP)       STORE DEVICE NUMBER                             EXR31870
2358  4058 0004       3197          STH   STAT,4(TEMP)      STORE DEVICE STATUS                             EXR31880
                      3198  *                                                                               EXR31890
235C  4880 02D8       3199  CONP2L1 LH    TEMP,CONTYP                                                       EXR31900
2360  4846 0006       3200          LH    DEV,DEVADR(DCBADR)                                                EXR31910
2364  DE48 2468       3201          OC    DEV,CONRD(TEMP)                                                   EXR31920
2368  9D45            3202  CONP2L1D SSR  DEV,STAT                                                          EXR31930
236A  C350 0020       3203          THI   STAT,X'20'        LINE BREAK STATUS?                              EXR31940
236E  4330 239E       3204          BZ    CONP2L2           SKIP IF NO                                      EXR31950
2372  C3A0 0010       3205          THI   STATE,MICROBUS    MICRO I/O BUS?                                  EXR31960
2376  4330 238A       3206          BZ    CONP2L1C          SKIP IF NO                                      EXR31970
237A  9B47            3207  CONP2L1A RDR  DEV,CHAR          READ DATA TO FORCE BUSY                         EXR31980
237C  9D45            3208          SSR   DEV,STAT                                                         EXR31990
237E  2282            3209          BFBS  8,2               LOOP ON READ UNTIL BUSY SETS                    EXR32000
2380  9D45            3210  CONP2L1B SSR  DEV,STAT                                                          EXR32010
2382  C350 0020       3211          THI   STAT,X'20'        LINE BREAK STILL THERE?                         EXR32020
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2386  2036           3212           BNZS  CONP2L1A            LOOP ON IT                          EXR32030
2388  2308           3213           BS    CONP2L2             TAKE BREAK EXIT                     EXR32040
238A  C3A0 000C      3214  CONP2L1C THI   STATE,CARSL300+PASLAFLG                                  EXR32050
238E  4330 2368      3215           BZ    CONP2L1D            IF TTY, LOOP ON LINE BREAK          EXR32060
2392  C350 0008      3216           THI   STAT,8              BUSY SET?                           EXR32070
2396  2134           3217           BNZS  CONP2L2             YES, TAKE BREAK EXIT                EXR32080
2398  9B47           3218           RDR   DEV,CHAR            READ DATA TO FORCE BUSY             EXR32090
239A  9D45           3219           SSR   DEV,STAT                                               EXR32100
239C  2281           3220           BFBS  8,1                 WAIT FOR BUSY TO SET                EXR32110
239E  41C0 1C0C      3221  CONP2L2  BAL   RET3,QUEUECHK       CHECK THE ERROR QUEUE               EXR32120
23A2  2200           3222           BS    *                   WILL NOT RETURN.                    EXR32130
                     3223  *                                                                      EXR32140
23A4  4886 0016      3224  CONP2L3  LH    TEMP,BUF1NEXT(DCBADR) CURRENT BUFFER ADDRESS            EXR32150
23A8  C3E0 0800      3225           THI   R14,DEVCNTL1        ECHO TEST?                          EXR32160
23AC  2336           3226           BZS   CONP2L3A            SKIP IF NO                          EXR32170
23AE  4886 0022      3227           LH    TEMP,BUF2NEXT(DCBADR)                                   EXR32180
23B2  DA48 0000      3228           WD    DEV,0(TEMP)         ECHO LAST CHARACTER                 EXR32190
23B6  230C           3229           BS    CONP2L3B                                                EXR32200
23B8  DA48 0000      3230  CONP2L3A WD    DEV,0(TEMP)         OUTPUT ERROR MESSAGE BYTE           EXR32210
23BC  2681           3231           AIS   TEMP,1              BUMP ADDRESS                        EXR32220
23BE  4086 0016      3232           STH   TEMP,BUF1NEXT(DCBADR)                                   EXR32230
23C2  4586 0014      3233           CLH   TEMP,BUF1END(DCBADR) SEE IF AT END OF BUFFER            EXR32240
23C6  4280 1D0E      3234           BL    ISRETURN                                                EXR32250
23CA  C4E0 FBFF      3235           NHI   R14,-1-DEVCNTL2                                         EXR32260
23CE  24F8           3236  CONP2L3B LIS   R15,FOUR            PHASE 4 NEXT TO START READING       EXR32270
23D0  D0E6 0000      3237           STM   R14,FLAGS(DCBADR)                                       EXR32280
23D4  4300 1D0E      3238           B     ISRETURN            RETURN TO INTERRUPTED PROGRAM       EXR32290


                     3240  * PHASE 3...CONSOLE SUPPORT STATUS LOOP WRITE                          EXR32310
                     3241  *                                                                      EXR32320
23D8  4880 02D8      3242  CONPH3   LH    TEMP,CONTYP                                             EXR32330
23DC  C3A0 000C      3243           THI   STATE,CARSL300+PASLAFLG                                 EXR32340
23E0  2335           3244           BZS   CONP3L1                                                 EXR32350
23E2  C640 0001      3245           OHI   DEV,1               SELECT ODD DEVICE ADDRESS           EXR32360
23E6  DE48 245F      3246           OC    DEV,CON2ND(TEMP)                                        EXR32370
23EA  DE48 2465      3247  CONP3L1  OC    DEV,CONWRT(TEMP)    SELECT WRITE MODE                   EXR32380
23EE  DD46 0008      3248           SS    DEV,STATUS(DCBADR)                                      EXR32390
23F2  2092           3249           BTBS  9,2                 LOOP ON BUSY OR DU                  EXR32400
23F4  9A47           3250           WDR   DEV,CHAR            OUTPUT A CHARACTER                  EXR32410
23F6  9D45           3251           SSR   DEV,STAT                                               EXR32420
23F8  2091           3252           BTBS  9,1                 WAIT FOR NON BUSY                   EXR32430
23FA  0303           3253           BR    RET1                                                    EXR32440


                     3255  * PHASE 4...START READING (ECHO TEST)                                  EXR32460
                     3256  *                                                                      EXR32470
23FC  C4E0 F3FF      3257  CONPH4   NHI   R14,-1-DEVCNTL1-DEVCNTL2 RESET FLAGS                    EXR32480
2400  24FA           3258           LIS   R15,FIVE            NEXT PHASE IS 5                     EXR32490
2402  D0E6 0000      3259           STM   R14,0(DCBADR)                                           EXR32500
2406  4686 001E      3260           LH    TEMP,BUF2STRT(DCBADR) COPY BUFFER 2 START ADDRESS       EXR32510
```

CONSOLE DRIVER

```
240A  4086 0022        3261           STH   TEMP,BUF2NEXT(DCBADR) TO BUFFER 2 CURRENT ADDRESS          EXR32520
240E  4880 02D8        3262           LH    TEMP,CONTYP                                                 EXR32530
2412  DE48 2477        3263           OC    DEV,CONENRD(TEMP)   ENABLE READ                           EXR32540
2416  4300 1D0E        3264           B     ISRETURN            WAIT FOR INTERRUPT                      EXR32550


                       3266  * PHASE 5...READ INTERRUPTS                                                 EXR32570
                       3267  *                                                                           EXR32580
241A  C350 00A5        3268  CONPH5   THI   STAT,X'A5'          TEST STATUS                             EXR32590
241E  4230 2348        3269           BNZ   TTYERROR            LOG ERROR MESSAGE & EXIT                EXR32600
2422  4886 0022        3270  CON5L1   LH    TEMP,BUF2NEXT(DCBADR)                                       EXR32610
2426  DB48 0000        3271           RD    DEV,0(TEMP)                                                 EXR32620
242A  C6E0 0800        3272  CONPH6   OHI   R14,DEVCNTL1        SET ECHO                                EXR32630
242E  24F4             3273           LIS   R15,TWO             NEXT PHASE IS 2 TO ECHO                 EXR32640
2430  D0E6 0000        3274           STM   R14,0(DCBADR)                                               EXR32650
2434  4886 001E        3275           LH    TEMP,BUF2STRT(DCBADR)                                       EXR32660
2438  4086 0022        3276           STH   TEMP,BUF2NEXT(DCBADR)                                       EXR32670
243C  4880 02D8        3277           LH    TEMP,CONTYP                                                 EXR32680
2440  C3A0 000C        3278           THI   STATE,CARSL300+PASLAFLG                                     EXR32690
2444  2333             3279           BZS   CONP6L1                                                     EXR32700
2446  C640 0001        3280           OHI   DEV,1               SELECT TRANSMITTER ADDRESS              EXR32710
244A  DE48 2465        3281  CONP6L1  OC    DEV,CONWRT(TEMP)    DISABLE WRITE                           EXR32720
244E  DE48 2471        3282           OC    DEV,CONENWT(TEMP)   ENABLE WRITE                            EXR32730
2452  9A40             3283           WDR   DEV,ZERO            START WITH NULL                         EXR32740
2454  4300 1D0E        3284           B     ISRETURN            WAIT FOR INTERRUPT                      EXR32750
                       3285  *                                                                           EXR32760
                       3286  *                                                                           EXR32770
2458  33               3287  PASRQ2S  DB    X'33'                                                       EXR32780
2459  E481 E4E4 8192   3288  CONDSBL  DB    X'E4',X'81',X'E4',X'E4',X'81',X'92'                         EXR32790
245F  00F8 0000 F000   3289  CON2ND   DB    X'00',X'F8',X'00',X'00',X'F0',X'00'                         EXR32800
2465  D8AB D8D8 AB02   3290  CONWRT   DB    X'D8',X'AB',X'D8',X'D8',X'AB',X'02'                         EXR32810
246B  E4B9 E4E4 B982   3291  CONRD    DB    X'E4',X'B9',X'E4',X'E4',X'B9',X'82'                         EXR32820
2471  486B 4848 6B22   3292  CONENWT  DB    X'48',X'6B',X'48',X'48',X'6B',X'22'                         EXR32830
2477  5469 5454 6982   3293  CONENRD  DB    X'54',X'69',X'54',X'54',X'69',X'82'                         EXR32840
247D  00               3294           DB    *                                                           EXR32850
```

PAPER TAPE READER/PUNCH DRIVER

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247E                    3296           IFNZ  PAPRTAPE                                                    EXR32870
247E  0002              3297  PTRPDCB  DCX   0002,0,8800,0,0      FLAGS,PHASE,PARM,DEVADR,STATUS         EXR32880
2480  0000
2482  8800
2484  0000
2486  0000
2488  24A2              3298           DC    PTRPPTR,0,0,CKPTRP   DVRENTRY,CURWAIT,FRRCOUNT,PARMCHCK      EXR32890
248A  0000
248C  0000
248E  25FC
2490  3ED6              3299           DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT       EXR32900
2492  3FD5
2494  3ED6
2496  0000              3300           DC    0000,0000            DVRWRK1,DVRWRK2                        EXR32910
2498  0000
249A  0000              3301           DB    0,0                  BUF1EXT,BUF2EXT                        EXR32920
249C  40D6              3302           DC    PTRBUF,PTRBUFE,PTRBUF BUF2STRT,BUF2END,BUF2NEXT             EXR32930
249E  41D5
24A0  40D6
                        3303  *                                                                           EXR32940


      0000 24A2         3305  PTRPPTR  EQU   *                                                           EXR32960
24A2  24B0              3306  PTRPPHTB DC    PTRPPH0              PHASE 0 INITIALIZE, WAIT DU            EXR32970
24A4  24E8              3307           DC    PTRPPH1              PHASE 1 START PUNCH IF SELECTED        EXR32980
24A6  2512              3308           DC    PTRPPH2              PHASE 2 PUNCH INTERRUPTS               EXR32990
24A8  255A              3309           DC    PTRPPH3              PHASE 3 LAST PUNCH INTERRUPT           EXR33000
24AA  2568              3310           DC    PTRPPH4              PHASE 4 START READER IF SELECTED       EXR33010
24AC  2596              3311           DC    PTRPPH5              PHASE 5 READER INTERRUPTS              EXR33020
24AE  25F0              3312           DC    PTRPPH6              PHASE 6 COMPARE                        EXR33030


                        3314  * PHASE 0...INITIALIZATION, WAIT FOR DU STATUS TO CLEAR                     EXR33050
                        3315  *                                                                           EXR33060
24B0  24F2              3316  PTRPPH0  LIS   R15,ONE              NEXT PHASE IS ONE UNLESS ERROR         EXR33070
24B2  40F6 0002         3317           STH   R15,PHASE(DCBADR)                                           EXR33080
24B6  C3E0 0800         3318           THI   R14,DEVCNTL1         TEST IF READER SELECTED                EXR33090
24BA  233A              3319           BZS   PTRP0L1              SKIP IF NOT                            EXR33100
24BC  DE40 262E         3320           OC    DEV,PTRSTOP          ISSUE STOP COMMAND                     EXR33110
24C0  DD46 0008         3321           SS    DEV,STATUS(DCBADR)   COLLECT STATUS FOR USER                EXR33120
24C4  2315              3322           BNMS  PTRP0L1              SKIP IF NOT DU                         EXR33130
24C6  41C0 1D42         3323           BAL   RET3,BSTATERR        LOG BAD STATUS ERROR                   EXR33140
24CA  4006 0002         3324           STH   ZERO,PHASE(DCBADR)   STAY IN PHASE ZERO                     EXR33150
24CE  C3E0 0400         3325  PTRP0L1  THI   R14,DEVCNTL2         TEST IF PUNCH SELECTED                 EXR33160
24D2  0333              3326           BZR   RET1                 EXIT IF NOT SELECTED                   EXR33170
24D4  DE40 262F         3327           OC    DEV,PTPSTOP          ISSUE STOP COMMAND                     EXR33180
24D8  DD46 0008         3328           SS    DEV,STATUS(DCBADR)   COLLECT STATUS FOR USER                EXR33190
24DC  0313              3329           BNMR  RET1                 LEAVE, NO DU                           EXR33200
24DE  41C0 1D42         3330           BAL   RET3,BSTATERR        LOG BAD STATUS ERROR                   EXR33210
24E2  4006 0002         3331           STH   ZERO,PHASE(DCBADR)   STAY IN PHASE ZERO                     EXR33220
24E6  0303              3332           BR    RET1                 RETURN TO DISPATCHER                   EXR33230
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PAPER TAPE READER/PUNCH DRIVER

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                        3334  * PHASE 1...START PUNCH IF SELECTED, ELSE GO TO PHASE 4                EXR33250
                        3335  *                                                                      EXR33260
24E8  C3E0 0400         3336  PTRPPH1  THI   R14,DEVCNTL2          IS PUNCH SELECTED?               EXR33270
24EC  2135              3337           BNZS  PTRP1L1               BRANCH IF YES                    EXR33280
24EE  24F8              3338           LIS   R15,FOUR              PUNCH NOT SELECTED,              EXR33290
24F0  40F6 0002         3339           STH   R15,PHASE(DCBADR)     SET PHASE = 4                    EXR33300
24F4  0303              3340           BR    RET1                  RETURN TO DISPATCHER             EXR33310
                        3341  *                                                                      EXR33320
24F6  4886 0012         3342  PTRP1L1  LH    TEMP,BUF1STRT(DCBADR) COPY BUFFER 1 START ADDRESS      EXR33330
24FA  4086 0016         3343           STH   TEMP,BUF1NEXT(DCBADR) TO CURRENT BUFFER 1 ADDRESS      EXR33340
24FE  C880 001E         3344           LHI   TEMP,30                                                EXR33350
2502  4086 0018         3345           STH   TEMP,DVRWRK1(DCBADR)  LEADER REPEAT COUNT              EXR33360
2506  24F4              3346           LIS   R15,TWO               NEXT PHASE IS 2                  EXR33370
2508  D390 2631         3347           LB    DAT,PTPON             PUNCH ON COMMAND BYTE            EXR33380
250C  41C0 1D32         3348           BAL   RET3,STARTIO          START PUNCH                      EXR33390
2510  0303              3349           BR    RET1                  RETURN TO DISPATCHER             EXR33400


                        3351  * PHASE 2...PUNCH INTERRUPTS                                           EXR33420
                        3352  *                                                                      EXR33430
2512  C350 0001         3353  PTRPPH2  THI   STAT,1               TEST DU                          EXR33440
2516  233A              3354           BZS   PTRP2L1               BRANCH IF OK                     EXR33450
2518  07FF              3355  PTPSTOP1 XHR   R15,R15               RETURNING TO PHASE ZERO IF DU    EXR33460
251A  C4E0 BFFF         3356  PTPSTOP2 NHI   R14,-1-BUSY           CLEAR DRIVER BUSY                EXR33470
251E  00E6 0000         3357           STM   R14,FLAGS(DCBADR)                                      EXR33480
2522  DE40 262F         3358           OC    DEV,PTPSTOP           STOP THE PUNCH                   EXR33490
2526  4300 1D0E         3359           B     ISRETURN              RETURN TO INTERRUPTED PROGRAM    EXR33500
252A  4886 0016         3360  PTRP2L1  LH    TEMP,BUF1NEXT(DCBADR) CURRENT BUFFER ADDRESS           EXR33510
252E  DA48 0000         3361           WD    DEV,0(TEMP)           OUTPUT DATA BYTE                 EXR33520
2532  4896 0018         3362           LH    DAT,DVRWRK1(DCBADR)   CHECK LEADER REPEAT COUNT        EXR33530
2536  212D              3363           BPS   PTRP2L2               SKIP IF POSITIVE                 EXR33540
2538  2681              3364           AIS   TEMP,1                INCREMENT CURRENT ADDRESS        EXR33550
253A  4086 0016         3365           STH   TEMP,BUF1NEXT(DCBADR)                                  EXR33560
253E  4586 0014         3366           CLH   TEMP,BUF1END(DCBADR)  SEE IF AT END OF BUFFER          EXR33570
2542  4320 1D0E         3367           BNP   ISRETURN              EXIT IF NO                       EXR33580
2546  24F6              3368           LIS   R15,THREE             DONE, SET PHASE TO 3             EXR33590
2548  40F6 0002         3369           STH   R15,PHASE(DCBADR)                                      EXR33600
254C  4300 1D0E         3370           B     ISRETURN              RETURN TO INTERRUPTED PROGRAM    EXR33610
                        3371  *                                                                      EXR33620
2550  2791              3372  PTRP2L2  SIS   DAT,1                 DECREMENT LEADER COUNT           EXR33630
2552  4096 0018         3373           STH   DAT,DVRWRK1(DCBADR)                                    EXR33640
2556  4300 1D0E         3374           B     ISRETURN              RETURN TO INTERRUPTED PROGRAM    EXR33650


                        3376  * PHASE 3...LAST PUNCH INTERRUPT                                       EXR33670
                        3377  *                                                                      EXR33680
255A  24F8              3378  PTRPPH3  LIS   R15,FOUR              NEXT PHASE IS 4 IF ALL OK        EXR33690
255C  C350 0001         3379           THI   STAT,1                                                 EXR33700
2560  4330 251A         3380           BZ    PTPSTOP2              OK, STOP PUNCH & EXIT            EXR33710
2564  4300 2518         3381           B     PTPSTOP1              NOT OK, STOP PUNCH, BACK TO PHASE 0 EXR33720
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                        3383  * PHASE 4...START READER IF SELECTED, ELSE GO TO PHASE 1                EXR33740
                        3384  *                                                                       EXR33750
2568  C3E0 0800         3385  PTRPPH4  THI   R14,DEVCNTL1          IS READER SELECTED?               EXR33760
256C  2135              3386           BNZS  PTRP4L1               BRANCH IF YES                     EXR33770
256E  24F2              3387           LIS   R15,ONE               IF NO, SET PHASE TO 1             EXR33780
2570  40F6 0002         3388           STH   R15,PHASE(DCBADR)                                       EXR33790
2574  0303              3389           BR    RET1                  RETURN TO DISPATCHER              EXR33800
                        3390  *                                                                       EXR33810
2576  41B0 1F62         3391  PTRP4L1  BAL   RET2,BUFCLEAR                                           EXR33820
257A  4886 001E         3392           LH    TEMP,BUF2STRT(DCBADR) BUFFER 2 START ADDRESS            EXR33830
257E  2681              3393           AIS   TEMP,1                PLUS 1 IS CURRENT READ BUFFER     EXR33840
2580  4086 0022         3394           STH   TEMP,BUF2NEXT(DCBADR) ADDRESS. FIRST BYTE IS ZERO       EXR33850
2584  2581              3395           LCS   TEMP,1                                                  EXR33860
2586  4086 0018         3396           STH   TEMP,DVRWRK1(DCBADR) SET LEADER FLAG                    EXR33870
258A  24FA              3397           LIS   R15,FIVE              NEXT PHASE IS 5, READER INTERRUPTS EXR33880
258C  D390 2630         3398           LB    DAT,PTRON             COMMAND BYTE TO START READER      EXR33890
2590  41C0 1D32         3399           BAL   RET3,STARTIO          START IT                          EXR33900
2594  0303              3400           BR    RET1                  RETURN TO DISPATCHER              EXR33910


                        3402  * PHASE 5...READER INTERRUPTS                                           EXR33930
                        3403  *                                                                       EXR33940
2596  C350 0001         3404  PTRPPH5  THI   STAT,1               TEST IF DU                        EXR33950
259A  233A              3405           BZS   PTRP5L1               SKIP IF OK                        EXR33960
259C  07FF              3406  PTRSTOP1 XHR   R15,R15               BACK TO PHASE ZERO IF DU          EXR33970
259E  C4E0 BFFF         3407  PTRSTOP2 NHI   R14,-1-BUSY                                            EXR33980
25A2  D0E6 0000         3408           STM   R14,0(DCBADR)                                           EXR33990
25A6  DE40 262E         3409           OC    DEV,PTRSTOP           STOP THE READER                   EXR34000
25AA  4300 1D0E         3410           B     ISRETURN                                                EXR34010
                        3411  *                                                                       EXR34020
25AE  9B47              3412  PTRP5L1  RDR   DEV,CHAR              READ A BYTE                       EXR34030
25B0  4886 0018         3413           LH    TEMP,DVRWRK1(DCBADR) TEST LEADER FLAG                  EXR34040
25B4  2318              3414           BNMS  PTRP5L1A              AT OR PASSED LEADER               EXR34050
25B6  0877              3415           LHR   CHAR,CHAR             WAIT FOR OCCURANCE OF LEADER      EXR34060
25B8  4230 1D0E         3416           BNZ   ISRETURN              IN CASE STOPPED IN MIDDLE OF      EXR34070
25BC  4006 0018         3417           STH   ZERO,DVRWRK1(DCBADR) A RECORD...LEADER FOUND, SET      EXR34080
25C0  4300 1D0E         3418           B     ISRETURN              LEADER FLAG AND RETURN            EXR34090
25C4  2125              3419  PTRP5L1A BPS   PTRP5L2               END OF LEADER, SET LEADER FLAG    EXR34100
25C6  0877              3420           LHR   CHAR,CHAR             SEE IF LEADER                     EXR34110
25C8  2133              3421           BNZS  PTRP5L2               END OF LEADER, SET LEADER FLAG    EXR34120
25CA  4300 1D0E         3422           B     ISRETURN              IGNORE LEADER                     EXR34130
                        3423  *                                                                       EXR34140
25CE  2681              3424  PTRP5L2  AIS   TEMP,1                BUMP LEADER FLAG                  EXR34150
25D0  4086 0018         3425           STH   TEMP,DVRWRK1(DCBADR)                                    EXR34160
25D4  4886 0022         3426           LH    TEMP,BUF2NEXT(DCBADR)                                   EXR34170
25D8  D278 0000         3427           STB   CHAR,0(TEMP)          STORE THIS CHARACTER              EXR34180
25DC  2681              3428           AIS   TEMP,1                INCREMENT CURRENT BUFFER ADRS     EXR34190
25DE  4086 0022         3429           STH   TEMP,BUF2NEXT(DCBADR)                                   EXR34200
25E2  24FC              3430           LIS   R15,SIX               NEXT PHASE = 6 IF DONE            EXR34210
25E4  4586 0020         3431           CLH   TEMP,BUF2END(DCBADR) CHECK FOR BUFFER END               EXR34220
25E8  4220 259E         3432           BP    PTRSTOP2                                                EXR34230
25EC  4300 1D0E         3433           B     ISRETURN              NOT DONE, RETURN                  EXR34240
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PAPER TAPE READER/PUNCH DRIVER

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                        3435  * PHASE 6...COMPARE DATA READ                                                EXR34260
                        3436  *                                                                           EXR34270
25F0   41B0 1DFC        3437  PTRPPH6  BAL   RET2,COMPARE        COMPARE BUFFER 1 & BUFFER 2              EXR34280
25F4   24F2             3438           LIS   R15,ONE            NEXT PHASE = 1                           EXR34290
25F6   40F6 0002        3439           STH   R15,PHASE(DCBADR)                                           EXR34300
25FA   0303             3440           BR    RET1                                                        EXR34310


                        3442  *                                                                  R04      EXR34330
                        3443  *                                                                  R04      EXR34340
25FC   C880 0013        3444  CKPTRP   LHI   TEMP,X'13'        SUPPLY DEFAULT ADDRESS= '13'     R04      EXR34350
2600   48E6 0000        3445  CKPTRP1  LH    R14,FLAGS(DCBADR)                                            EXR34360
2604   C6E0 0C00        3446           OHI   R14,DEVCNTL1+DEVCNTL2 DEFAULT TO READER/PUNCH COMBO          EXR34370
2608   4870 07F2        3447           LH    CHAR,MNEMONIC+2    PICK UP DEVICE MNEMONIC       R04      EXR34380
260C   C570 5020        3448           CLHI  CHAR,C'P '         PUNCH ONLY?                   R04      EXR34390
2610   2134             3449           BNES  CKPTRP2            SKIP IF NO                               EXR34400
2612   C4E0 F7FF        3450           NHI   R14,-1-DEVCNTL1    RESET READER BIT                         EXR34410
2616   2306             3451           BS    CKPTRP3            EXIT                                     EXR34420
2618   C570 5220        3452  CKPTRP2  CLHI  CHAR,C'R '         READER ONLY?                  R04      EXR34430
261C   2135             3453           BNES  CKPTRP4            SKIP IF NO                    R04      EXR34440
261E   C4E0 FBFF        3454           NHI   R14,-1-DEVCNTL2    RESET PUNCH BIT                          EXR34450
2622   C880 0003        3455  CKPTRP3  LHI   TEMP,X'03'         DEFAULT, READER ONLY OR PUNCH ONLY       EXR34460
2626   40E6 0000        3456  CKPTRP4  STH   R14,FLAGS(DCBADR)  SET DRIVER FLAGS              R04      EXR34470
262A   4300 3E9C        3457           B     CKDEV              R04                                      EXR34480
                        3458  *                                                                  R04      EXR34490
                        3459  *                                                                           EXR34500
                        3460  *                                                                           EXR34510
262E   E1               3461  PTRSTOP  DB    X'E1'              STOP, SELECT READER, DISARM              EXR34520
262F   E2               3462  PTPSTOP  DB    X'E2'              STOP, SELECT PUNCH, DISARM               EXR34530
2630   59               3463  PTRON    DB    X'59'              ENABLE, RUN, INCR, READ                  EXR34540
2631   42               3464  PTPON    DB    X'42'              ENABLE, WRITE                            EXR34550
                        3465           ENDC                                                              EXR34560
2632                    3466           IFNZ  CASSETTE                                                    EXR34570
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2632  0002              3468  CASDCB1  DCX   0002,0,8800,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS          EXR34590
2634  0000
2636  8800
2638  0000
263A  0000
263C  26C2              3469           DC    CASPTR,0,0,CKCAS    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR34600
263E  0000
2640  0000
2642  28C6
2644  3ED6              3470           DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT      EXR34610
2646  3FD5
2648  3ED6
264A  0000              3471           DCX   0000,0000           DURWRK1,DVRWRK2                         EXR34620
264C  0000
264E  0000              3472           DB    0,0                 BUF1EXT,BUF2EXT                         EXR34630
2650  41D6              3473           DC    CAS1BUF,CAS1BUFE,CAS1BUF BUF2STRT,BUF2END,BUF2NEXT        EXR34640
2652  42D6
2654  41D6
2656                    3474           IFP   CASSETTE-1                                                EXR34650
2656  0002              3475  CASDCB2  DCX   0002,0,8800,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS          EXR34660
2658  0000
265A  8800
265C  0000
265E  0000
2660  26C2              3476           DC    CASPTR,0,0,CKCAS    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR34670
2662  0000
2664  0000
2666  28C6
2668  3ED6              3477           DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT      EXR34680
266A  3FD5
266C  3ED6
266E  0000              3478           DCX   0000,0000           DURWRK1,DVRWRK2                         EXR34690
2670  0000
2672  0000              3479           DB    0,0                 BUF1EXT,BUF2EXT                         EXR34700
2674  42D6              3480           DC    CAS2BUF,CAS2BUFE,CAS2BUF BUF2STRT,BUF2END,BUF2NEXT        EXR34710
2676  43D6
2678  42D6
267A                    3481           IFP   CASSETTE-2                                                EXR34720
267A  0002              3482  CASDCB3  DCX   0002,0,8800,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS          EXR34730
267C  0000
267E  8800
2680  0000
2682  0000
2684  26C2              3483           DC    CASPTR,0,0,CKCAS    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR34740
2686  0000
2688  0000
268A  28C6
268C  3ED6              3484           DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT      EXR34750
268E  3FD5
2690  3ED6
2692  0000              3485           DCX   0000,0000           DVRWRK1,DVRWRK2                         EXR34760
2694  0000
2696  0000              3486           DB    0,0                 BUF1EXT,BUF2EXT                         EXR34770
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INTERTAPE CASSETTE DRIVER

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2698 43D6            3487          DC   CAS3BUF,CAS3BUFE,CAS3BUF BUF2STRT,BUF2END,BUF2NEXT      EXR34780
269A 44D6
269C 43D6
269E                 3488          IFP  CASSETTE-3                                             EXR34790
269E 0002            3489 CASDCB4  DCX  0002,0,8800,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS     EXR34800
26A0 0000
26A2 8800
26A4 0000
26A6 0000
26A8 26C2            3490          DC   CASPTR,0,0,CKCAS    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK EXR34810
26AA 0000
26AC 0000
26AE 28C6
26B0 3ED6            3491          DC   DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT  EXR34820
26B2 3FD5
26B4 3ED6
26B6 0000            3492          DCX  0000,0000          DVRWRK1,DVRWRK2                    EXR34830
26B8 0000
26BA 0000            3493          DB   0,0                BUF1EXT,BUF2EXT                    EXR34840
26BC 44D6            3494          DC   CAS4BUF,CAS4BUFE,CAS4BUF BUF2STRT,BUF2END,BUF2NEXT     EXR34850
26BE 45D6
26C0 44D6
                     3495          ENDC                                                        EXR34860
                     3496          ENDC                                                        EXR34870
                     3497          ENDC                                                        EXR34880
     0000 26C2       3498 CASPTR   EQU  *                                                      EXR34890
26C2 26DA            3499 CASPHTB  DC   CASPH0             PHASE 0 INITIALIZE, WAIT DU        EXR34900
26C4 2706            3500          DC   CASPH1             PHASE 1 NO MOTION, WRITE FILE MARK EXR34910
26C6 275A            3501          DC   CASPH2             PHASE 2 INTERRUPT AFTER FILE MARK  EXR34920
26C8 2770            3502          DC   CASPH3             PHASE 3 START WRITE                EXR34930
26CA 27A0            3503          DC   CASPH4             PHASE 4 WRITE INTERRUPTS           EXR34940
26CC 27DE            3504          DC   CASPH5             PHASE 5 EOM INTERRUPT AFTER WRITE  EXR34950
26CE 27F4            3505          DC   CASPH6             PHASE 6 BACK SPACE                 EXR34960
26D0 281E            3506          DC   CASPH7             PHASE 7 EOM INTERRUPT AFTER BKSP   EXR34970
26D2 2834            3507          DC   CASPH8             PHASE 8 START READ                 EXR34980
26D4 286A            3508          DC   CASPH9             PHASE 9 READ INTERRUPTS, EOM       EXR34990
26D6 26A2            3509          DC   CASPH10            PHASE 10 COMPARE DATA              EXR35000
26D8 28AE            3510          DC   CASPH11            PHASE 1U CLEAR, DISARM, REWIND     EXR35010


                     3512 * PHASE 0...INITIALIZATION, WAIT FOR DU STATUS TO CLEAR               EXR35030
                     3513 *                                                                     EXR35040
26DA 0884            3514 CASPH0   LHR  TEMP,DEV           DEVICE NUMBER                      EXR35050
26DC C480 03EF       3515          NHI  TEMP,X'3EF'        CLEAR DRIVE SELECT BIT             EXR35060
26E0 4086 0018       3516          STH  TEMP,DVRWRK1(DCBADR) SAVE FOR OTHER PHASES            EXR35070
26E4 41B0 1DB4       3517          BAL  RET2,TESTLOCK      CHECK INTERLOCK                    EXR35080
26E8 DE40 28CE       3518          OC   DEV,CASCLEAR       OTHER DRIVE NOT BUSY, CLEAR THIS   EXR35090
26EC 9D45            3519          SSR  DEV,STAT                                              EXR35100
26EE D256 0008       3520          STB  STAT,STATUS(DCBADR) SAVE STATUS                       EXR35110
26F2 2314            3521          BNMS CASOL1             SKIP IF NOT DU                     EXR35120
26F4 41C0 1D42       3522          BAL  RET3,BSTATERR      BAD STATUS ERROR                   EXR35130
26F8 0303            3523          BR   RE11               RETURN, STAYING IN PHASE 0         EXR35140
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                         3524  *                                                                    EXR35150
26FA   24F2              3525  CASOL1   LIS   R15,ONE              NEXT PHASE = 1                  EXR35160
26FC   C4E0 CFFF         3526           NHI   R14,-1-BADSTAT-NOTCOUNT CLEAR FLAGS                   EXR35170
2700   D0E6 0000         3527           STM   R14,0(DCBADR)                                        EXR35180
2704   0303              3528           BR    RET1               RETURN, NEXT PHASE = 1          EXR35190


                         3530  * PHASE 1...WRITE FILE MARK, CHECK WRITE PROTECT                     EXR35210
                         3531  *                                                                    EXR35220
2706   4886 0018         3532  CASPH1   LH    TEMP,DVRWRK1(DCBADR)                                 EXR35230
270A   41B0 1DB4         3533           BAL   RET2,TESTLOCK       CHECK INTERLOCK                 EXR35240
270E   9D45              3534           SSR   DEV,STAT                                            EXR35250
2710   D256 0008         3535           STB   STAT,STATUS(DCBADR) SAVE STATUS                     EXR35260
2714   C350 0010         3536           THI   STAT,X'10'          MOTION?                         EXR35270
2718   2136              3537           BNZS  CAS1L1              SKIP IF NO MOTION               EXR35280
271A   C6E0 2000         3538           OHI   R14,NOTCOUNT        SET NOT COUNTING                EXR35290
271E   40E6 0000         3539           STH   R14,FLAGS(DCBADR)   STAY IN PHASE 1                 EXR35300
2722   0303              3540           BR    RET1                                               EXR35310
2724   DE40 28CF         3541  CAS1L1   OC    DEV,CASEOF          WRITE EOF & QUEUE INTERRUPT     EXR35320
2728   9D45              3542           SSR   DEV,STAT                                           EXR35330
272A   D256 0008         3543           STB   STAT,STATUS(DCBADR) SAVE STATUS                     EXR35340
272E   2314              3544           BNMS  CAS1L2              SKIP IF NOT DU                  EXR35350
2730   4006 0002         3545           STH   ZERO,PHASE(DCBADR)  IF DU, RESET TO PHASE 0         EXR35360
2734   2306              3546           BS    CAS1L3                                             EXR35370
2736   C350 0010         3547  CAS1L2   THI   STAT,X'10'          MOTION?                         EXR35380
273A   2336              3548           BZS   CAS1L4              SKIP IF YES                     EXR35390
273C   41C0 1D42         3549           BAL   RET3,BSTATERR       BAD STATUS ERROR                EXR35400
2740   DE40 0D16         3550  CAS1L3   OC    DEV,DISARM          NO INTERRUPTS, WAIT GOOD STATUS EXR35410
2744   0303              3551           BR    RET1                                               EXR35420
2746   4886 0018         3552  CAS1L4   LH    TEMP,DVRWRK1(DCBADR)                               EXR35430
274A   41B0 1DC8         3553           BAL   RET2,SETLOCK        SET INTERLOCK                   EXR35440
274E   24F4              3554           LIS   R15,TWO             PHASE 2 IS NEXT                 EXR35450
2750   D390 0D17         3555           LB    DAT,ENABLE          ALLOW EOM INTERRUPT             EXR35460
2754   41C0 1D32         3556           BAL   RET3,STARTIO                                         EXR35470
2758   0303              3557           BR    RET1                                               EXR35480


                         3559  * PHASE 2...EOM & NO MOTION INTERRUPTS AFTER EOF                     EXR35500
                         3560  *                                                                    EXR35510
275A   41B0 1F8E         3561  CASPH2   BAL   RET2,MAGSTAT        CHECK INTERRUPT STATUS          EXR35520
275E   D389 276A         3562           LB    TEMP,CAS2NEXT(DAT)  USE RETURN CODE TO GET NEXT PHASE EXR35530
2762   4086 0002         3563           STH   TEMP,PHASE(DCBADR)  SET NEW PHASE                   EXR35540
2766   4300 1D0E         3564           B     ISRETURN            BACK TO INTERRUPTED PROGRAM     EXR35550
                         3565  *                                                                    EXR35560
276A   06                3566  CAS2NEXT DB    THREE               PHASE 3 NEXT, ALL OK            EXR35570
276B   00                3567           DB    ZERO                PHASE 0 NEXT, DU                EXR35580
276C   04                3568           DB    TWO                 PHASE 2 AGAIN MOTION            EXR35590
276D   16                3569           DB    ELEVEN              PHASE 11 NEXT EOT               EXR35600
276E   06                3570           DB    THREE               PHASE 3 NEXT, ERROR             EXR35610
276F   00                3571           DB    *                                                   EXR35620
```

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                                3573  * PHASE 3...START WRITE                                                    EXR35640
                                3574  *                                                                         EXR35650
2770   4886 0018                3575  CASPH3   LH    TEMP,DVRWRK1(DCBADR)                                       EXR35660
2774   41B0 1DB4                3576           BAL   RET2,TESTLOCK        CHECK INTERLOCK                      EXR35670
2778   DD46 0008                3577           SS    DEV,STATUS(DCBADR)  COLLECT STATUS                       EXR35680
277C   2314                     3578           BNMS  CAS3L1              SKIP IF NOT DU                       EXR35690
277E   4006 0002                3579           STH   ZERO,PHASE(DCBADR)  BACK TO PHASE 0 IF DU                EXR35700
2782   0303                     3580           BR    RET1                RETURN TO PHASE 0                    EXR35710
2784   4886 0012                3581  CAS3L1   LH    TEMP,BUF1STRT(DCBADR)                                      EXR35720
2788   4086 0016                3582           STH   TEMP,BUF1NEXT(DCBADR)                                      EXR35730
278C   4886 0018                3583           LH    TEMP,DVRWRK1(DCBADR)                                       EXR35740
2790   41B0 1DC8                3584           BAL   RET2,SETLOCK        SET INTERLOCK                        EXR35750
2794   24F8                     3585           LIS   R15,FOUR            NEXT NEXT PHASE IS 4 FOR DATA INTERRU  EXR35760
2796   D390 28D0                3586           LB    DAT,CASWRT                                                 EXR35770
279A   41C0 1D32                3587           BAL   RET3,STARTIO                                               EXR35780
279E   0303                     3588           BR    RET1                                                       EXR35790


                                3590  * PHASE 4...WRITE INTERRUPTS                                              EXR35810
                                3591  *                                                                         EXR35820
27A0   C350 00ED                3592  CASPH4   THI   STAT,X'ED'          POSSIBLE ERROR?                      EXR35830
27A4   4230 27C8                3593           BNZ   CAS4L1              BRANCH IF YES                        EXR35840
27A8   4886 0016                3594           LH    TEMP,BUF1NEXT(DCBADR)                                      EXR35850
27AC   DA48 0000                3595           WD    DEV,0(TEMP)         SEND OUT NEXT BYTE                   EXR35860
27B0   2681                     3596           AIS   TEMP,1              BUMP POINTER                         EXR35870
27B2   4086 0016                3597           STH   TEMP,BUF1NEXT(DCBADR)                                      EXR35880
27B6   4586 0014                3598           CLH   TEMP,BUF1END(DCBADR) END OF BUFFER?                       EXR35890
27BA   4320 1D0E                3599           BNP   ISRETURN            RETURN IF NO                         EXR35900
27BE   248A                     3600           LIS   TEMP,FIVE           PHASE 5 FOR EOM & NMTN               EXR35910
27C0   4086 0002                3601           STH   TEMP,PHASE(DCBADR)                                         EXR35920
27C4   4300 1D0E                3602           B     ISRETURN            RETURN                               EXR35930
                                3603  *                                                                         EXR35940
27C8   41B0 1F8E                3604  CAS4L1   BAL   RET2,MAGSTAT        CHECK INTERRUPT STATUS               EXR35950
27CC   D389 27D8                3605           LB    TEMP,CAS4NEXT(DAT)  RETURN CODE SELECTS NEXT PHASE       EXR35960
27D0   4086 0002                3606           STH   TEMP,PHASE(DCBADR)                                         EXR35970
27D4   4300 1D0E                3607           B     ISRETURN            RETURN                               EXR35980
                                3608  *                                                                         EXR35990
27D8   00                       3609  CAS4NEXT DB    ZERO                OK                                   EXR36000
27D9   00                       3610           DB    ZERO                DU                                   EXR36010
27DA   0A                       3611           DB    FIVE                MOTION                               EXR36020
27DB   16                       3612           DB    ELEVEN              EOT                                  EXR36030
27DC   06                       3613           DB    THREE               ERROR                                EXR36040
27DD   00                       3614           DB    *                                                        EXR36050


                                3616  * PHASE 5...EOM AND NO MOTION INTERRUPTS AFTER WRITE                      EXR36070
                                3617  *                                                                         EXR36080
27DE   41B0 1F8E                3618  CASPH5   BAL   RET2,MAGSTAT        CHECK INTERRUPT STATUS               EXR36090
27E2   D389 27EE                3619           LB    TEMP,CAS5NEXT(DAT)  CHOOSE NEXT PHASE                    EXR36100
27E6   4086 0002                3620           STH   TEMP,PHASE(DCBADR)                                         EXR36110
27EA   4300 1D0E                3621           B     ISRETURN            RETURN                               EXR36120
```

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                        3622  *                                                                    EXR36130
27EE  0C                3623  CAS5NEXT DB    SIX                 OK                            EXR36140
27EF  00                3624           DB    ZERO                DU                            EXR36150
27F0  0A                3625           DB    FIVE                MOTION                        EXR36160
27F1  16                3626           DB    ELEVEN              EOT                           EXR36170
27F2  06                3627           DB    THREE               ERROR                         EXR36180
27F3  00                3628           DB    *                                                 EXR36190


                        3630  * PHASE 6...BACK SPACE ONE RECORD                                  EXR36210
                        3631  *                                                                  EXR36220
27F4  4886 0018         3632  CASPH6   LH    TEMP,DVRWRK1(DCBADR)                              EXR36230
27F8  41B0 1DB4         3633           BAL   RET2,TESTLOCK       CHECK INTERLOCK               EXR36240
27FC  DD46 0008         3634           SS    DEV,STATUS(DCBADR)  SAVE STATUS                   EXR36250
2800  2314              3635           BNMS  CAS6L1              SKIP IF NOT DU                EXR36260
2802  4006 0002         3636           STH   ZERO,PHASE(DCBADR)  BACK TO PHASE ZERO            EXR36270
2806  0303              3637           BR    RET1                                              EXR36280
2808  4886 0018         3638  CAS6L1   LH    TEMP,DVRWRK1(DCBADR)                              EXR36290
280C  41B0 1DC8         3639           BAL   RET2,SETLOCK        SET INTERLOCK                 EXR36300
2810  C8F0 000E         3640           LHI   R15,SEVEN           PHASE 7 NEXT                  EXR36310
2814  D390 2801         3641           LB    DAT,CASBKSPC        BACK SPACE COMMAND            EXR36320
2818  41C0 1D32         3642           BAL   RET3,STARTIO                                      EXR36330
281C  0303              3643           BR    RET1                                              EXR36340


                        3645  * PHASE 7...EOM AND NO MOTION INTERRUPTS AFTER BACKSPACE           EXR36360
                        3646  *                                                                  EXR36370
281E  41B0 1F8E         3647  CASPH7   BAL   RET2,MAGSTAT        CHECK INTERRUPT STATUS        EXR36380
2822  D389 282E         3648           LB    TEMP,CAS7NEXT(DAT)  CHOOSE NEXT PHASE             EXR36390
2826  4086 0002         3649           STH   TEMP,PHASE(DCBADR)                                EXR36400
282A  4300 1D0E         3650           B     ISRETURN            RETURN                        EXR36410
                        3651  *                                                                  EXR36420
282E  10                3652  CAS7NEXT DB    EIGHT               OK                            EXR36430
282F  00                3653           DB    ZERO                DU                            EXR36440
2830  0E                3654           DB    SEVEN               MOTION                        EXR36450
2831  16                3655           DB    ELEVEN              EOT                           EXR36460
2832  10                3656           DB    EIGHT               ERROR                         EXR36470
2833  00                3657           DB    *                                                 EXR36480


                        3659  * PHASE 8...START READ                                             EXR36500
                        3660  *                                                                  EXR36510
2834  4886 0018         3661  CASPH8   LH    TEMP,DVRWRK1(DCBADR)                              EXR36520
2838  41B0 1DB4         3662           BAL   RET2,TESTLOCK       CHECK INTERLOCK               EXR36530
283C  DD46 0008         3663           SS    DEV,STATUS(DCBADR)  SAVE STATUS                   EXR36540
2840  2314              3664           BNMS  CAS8L1              SKIP IF NOT DU                EXR36550
2842  4006 0002         3665           STH   ZERO,PHASE(DCBADR)  BACK TO PHASE ZERO            EXR36560
2846  0303              3666           BR    RET1                                              EXR36570
2848  4886 001E         3667  CAS8L1   LH    TEMP,BUF2STRT(DCBADR)                             EXR36580
284C  4086 0022         3668           STH   TEMP,BUF2NEXT(DCBADR)                             EXR36590
```

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2850  41B0 1F62          3669          BAL   RET2,BUFCLEAR       CLEAR BUFFER 2                EXR36600
2854  4886 0018          3670          LH    TEMP,DVRWRK1(DCBADR)                              EXR36610
2858  41B0 1DC8          3671          BAL   RET2,SETLOCK        SET INTERLOCK                 EXR36620
285C  C8F0 0012          3672          LHI   R15,NINE            PHASE 9 NEXT                  EXR36630
2860  D390 28D2          3673          LB    DAT,CASREAD         READ COMMAND                  EXR36640
2864  41C0 1D32          3674          BAL   RET3,STARTIO                                      EXR36650
2868  0303               3675          BR    RET1                                              EXR36660


                         3677  * PHASE 9...READ INTERRUPTS                                     EXR36680
                         3678  *                                                               EXR36690
286A  C350 00ED          3679  CASPH9  THI   STAT,X'ED'          POSSIBLE ERROR?               EXR36700
286E  213F               3680          BNZS  CAS9L1              BRANCH IF YES                 EXR36710
2870  4886 0022          3681          LH    TEMP,BUF2NEXT(DCBADR)                             EXR36720
2874  4986 0020          3682          CH    TEMP,BUF2END(DCBADR)                              EXR36730
2878  212A               3683          BPS   CAS9L1              SKIP IF END OF BUFFER         EXR36740
287A  DB48 0000          3684          RD    DEV,0(TEMP)         READ DATA                     EXR36750
287E  2691               3685          AIS   TEMP,1              INCREMENT INDEX               EXR36760
2880  4086 0022          3686          STH   TEMP,BUF2NEXT(DCBADR)                             EXR36770
2884  4006 000C          3687          STH   ZERO,CURWAIT(DCBADR)                              EXR36780
2888  4300 1D0E          3688          B     ISRETURN            RETURN                        EXR36790
288C  41B0 1F8E          3689  CAS9L1  BAL   RET2,MAGSTAT        CHECK INTERRUPT STATUS        EXR36800
2890  D389 289C          3690          LB    TEMP,CAS9NEXT(DAT)  CHOOSE NEXT PHASE             EXR36810
2894  4086 0002          3691          STH   TEMP,PHASE(DCBADR)                                EXR36820
2898  4300 1D0E          3692          B     ISRETURN            RETURN                        EXR36830
                         3693  *                                                               EXR36840
289C  14                 3694  CAS9NEXT DB   TEN                 OK                            EXR36850
289D  00                 3695          DB    ZERO                DU                            EXR36860
289E  12                 3696          DB    NINE                MOTION                        EXR36870
289F  16                 3697          DB    ELEVEN              EOT                           EXR36880
28A0  06                 3698          DB    THREE               ERROR                         EXR36890
28A1  00                 3699          DB    *                                                 EXR36900


                         3701  * PHASE 10...COMPARE DATA                                       EXR36920
                         3702  *                                                               EXR36930
28A2  41B0 1DFC          3703  CASPH10 BAL   RET2,COMPARE        COMPARE BUFFER 1 & BUFFER 2   EXR36940
28A6  2486               3704          LIS   TEMP,THREE          PHASE 3 NEXT                  EXR36950
28A8  4086 0002          3705          STH   TEMP,PHASE(DCBADR)                                EXR36960
28AC  0303               3706          BR    RET1                                              EXR36970


                         3708  * PHASE 11...EOT HANDLER                                        EXR36990
                         3709  *                                                               EXR37000
28AE  4886 0018          3710  CASPH11 LH    TEMP,DVRWRK1(DCBADR)                              EXR37010
28B2  41B0 1DB4          3711          BAL   RET2,TESTLOCK       CHECK INTERLOCK               EXR37020
28B6  DE40 28CE          3712          OC    DEV,CASCLEAR        CLEAR INTERFACE               EXR37030
28BA  2482               3713          LIS   TEMP,ONE            PHASE 1 NEXT, WAIT NO MOTION  EXR37040
28BC  4086 0002          3714          STH   TEMP,PHASE(DCBADR)                                EXR37050
28C0  DE40 28D3          3715          OC    DEV,CASREWND        DISARM, REWIND                EXR37060
```

INTERTAPE CASSETTE DRIVER

```
28C4   0303              3716          BR    RET1                                                    EXR37070


28C6   C880 0045         3718  CKCAS   LHI   TEMP,X'45'       DEFAULT DEVICE ADDRESS       R04   EXR37090
28CA   4300 3E9C         3719          B     CKDEV                                                   EXR37100
                         3720  *                                                                     EXR37110
                         3721  *                                                                     EXR37120
28CE   E0                3722  CASCLEAR DB   X'E0'           DISARM, CLEAR                          EXR37130
28CF   B0                3723  CASEOF  DB    X'B0'           DISABLE, WRITE EOF                     EXR37140
28D0   62                3724  CASWRT  DB    X'62'           ENABLE, WRITE                          EXR37150
28D1   51                3725  CASBKSPC DB   X'51'           ENABLE, BACKSPACE                      EXR37160
28D2   61                3726  CASREAD DB    X'61'           ENABLE, READ                           EXR37170
28D3   F8                3727  CASREWND DB   X'F8'           DISARM, REWIND                         EXR37180
                         3728          ENDC                                                          EXR37190
28D4                     3729          IFNZ  FLOPPY                                                  EXR37200
```

FLOPPY MEDIA DISC DRIVER

```
28D4  000A              3731  FMDDCB1  DCX   000A,0,8C00,0,0      FLAGS,PHASE,PARM,DEVADR,STATUS          EXR37220
28D6  0000
28D8  8C00
28DA  0000
28DC  0000
28DE  298C              3732           DC    FMDPTR,0,0,CKFMD     DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR37230
28E0  0000
28E2  0000
28E4  2B4A
28E6  3ED6              3733           DC    DATAPTRN,DATAPTRN+127 BUF1STRT,BUF1END                       EXR37240
28E8  3F55
28EA  3ED6              3734           DC    DATAPTRN             BUF1NEXT                                EXR37250
28EC  0080              3735           DCX   0080,0000            DVRWRK1,DVRWRK2                         EXR37260
28EE  0000
28F0  0000              3736           DB    0,0                  BUF1EXT,BUF2EXT                         EXR37270
28F2  45D6              3737           DC    FMD1BUF,FMD1BUFE,FMD1BUF BUF2STRT,BUF2END,BUF2NEXT           EXR37280
28F4  4655
28F6  45D6
28F8  0000              3738           DCX   0000,0000                                                    EXR37290
28FA  0000
28FC  0000              3739           DC    0,0,0                LRNCUR,LRNLOW,LRNHIGH                   EXR37300
28FE  0000
2900  0000
2902                    3740           IFP   FLOPPY-1                                                     EXR37310
2902  000A              3741  FMDDCB2  DCX   000A,0,8C00,0,0      FLAGS,PHASE,PARM,DEVADR,STATUS          EXR37320
2904  0000
2906  8C00
2908  0000
290A  0000
290C  298C              3742           DC    FMDPTR,0,0,CKFMD     DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR37330
290E  0000
2910  0000
2912  2B4A
2914  3ED6              3743           DC    DATAPTRN,DATAPTRN+127 BUF1STRT,BUF1END                       EXR37340
2916  3F55
2918  3ED6              3744           DC    DATAPTRN             BUF1NEXT                                EXR37350
291A  0040              3745           DCX   0040,0001            DVRWRK1,DVRWRK2                         EXR37360
291C  0001
291E  0000              3746           DB    0,0                  BUF1EXT,BUF2EXT                         EXR37370
2920  4656              3747           DC    FMD2BUF,FMD2BUFE,FMD2BUF BUF2STRT,BUF2END,BUF2NEXT           EXR37380
2922  46D5
2924  4656
2926  0000              3748           DCX   0000,0000                                                    EXR37390
2928  0000
292A  0000              3749           DC    0,0,0                LRNCUR,LRNLOW,LRNHIGH                   EXR37400
292C  0000
292E  0000
2930                    3750           IFP   FLOPPY-2                                                     EXR37410
2930  000A              3751  FMDDCB3  DCX   000A,0,8C00,0,0      FLAGS,PHASE,PARM,DEVADR,STATUS          EXR37420
2932  0000
2934  8C00
2936  0000
2938  0000
```

FLOPPY MEDIA DISC DRIVER

```
293A  298C          3752          DC    FMDPTR,0,0,CKFMD     DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK     EXR37430
293C  0000
293E  0000
2940  2B4A
2942  3ED6          3753          DC    DATAPTRN,DATAPTRN+127 BUF1STRT,BUF1END                       EXR37440
2944  3F55
2946  3ED6          3754          DC    DATAPTRN              BUF1NEXT                               EXR37450
2948  0020          3755          DCX   0020,0002             DVRWRK1,DVRWRK2                        EXR37460
294A  0002
294C  0000          3756          DB    0,0                   BUF1EXT,BUF2EXT                        EXR37470
294E  46D6          3757          DC    FMD3BUF,FMD3BUFE,FMD3BUF BUF2STRT,BUF2END,BUF2NEXT           EXR37480
2950  4755
2952  46D6
2954  0000          3758          DCX   0000,0000                                                    EXR37490
2956  0000
2958  0000          3759          DC    0,0,0                 LRNCUR,LRNLOW,LRNHIGH                  EXR37500
295A  0000
295C  0000
295E                3760          IFP   FLOPPY-3                                                     EXR37510
295E  000A          3761  FMDDCB4 DCX   000A,0,8C00,0,0       FLAGS,PHASE,PARM,DEVADR,STATUS         EXR37520
2960  0000
2962  8C00
2964  0000
2966  0000
2968  298C          3762          DC    FMDPTR,0,0,CKFMD     DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK     EXR37530
296A  0000
296C  0000
296E  2B4A
2970  3ED6          3763          DC    DATAPTRN,DATAPTRN+127 BUF1STRT,BUF1END                       EXR37540
2972  3F55
2974  3ED6          3764          DC    DATAPTRN              BUF1NEXT                               EXR37550
2976  0010          3765          DCX   0010,0003             DVRWRK1,DVRWRK2                        EXR37560
2978  0003
297A  0000          3766          DB    0,0                   BUF1EXT,BUF2EXT                        EXR37570
297C  4756          3767          DC    FMD4BUF,FMD4BUFE,FMD4BUF BUF2STRT,BUF2END,BUF2NEXT           EXR37580
297E  47D5
2980  4756
2982  0000          3768          DCX   0000,0000                                                    EXR37590
2984  0000
2986  0000          3769          DC    0,0,0                 LRNCUR,LRNLOW,LRNHIGH                  EXR37600
2988  0000
298A  0000
                    3770          ENDC                                                               EXR37610
                    3771          ENDC                                                               EXR37620
                    3772          ENDC                                                               EXR37630
```

FLOPPY MEDIA DISC DRIVER

```
                0000 298C          3774  FMDPTR   EQU   *                                                    EXR37650
298C            299C               3775  FMDPHT8  DC    FMDPH0             PHASE 0 INITIALIZE, WAIT DU       EXR37660
298E            29D0               3776             DC    FMDPH1             PHASE 1 COMPUTE NEXT LRN          EXR37670
2990            29F4               3777             DC    FMDPH2             PHASE 2 OUTPUT DATA               EXR37680
2992            2A54               3778             DC    FMDPH3             PHASE 3 CONTROLLER IDLE AFTER WRITE EXR37690
2994            2AAE               3779             DC    FMDPH4             PHASE 4 START READ                EXR37700
2996            2ABA               3780             DC    FMDPH5             PHASE 5 READ DATA                 EXR37710
2998            2AEA               3781             DC    FMDPH6             PHASE 6 READ DATA                 EXR37720
299A            2B20               3782             DC    FMDPH7             PHASE 7 COMPARE DATA              EXR37730

                                   3784  * PHASE 0...INITIALIZE, WAIT ON DU OR WRITE PROTECT                  EXR37750
                                   3785  *                                                                    EXR37760
299C            0884               3786  FMDPH0   LHR   TEMP,DEV            DEVICE NUMBER                     EXR37770
299E            41B0 1DB4          3787             BAL   RET2,TESTLOCK      CHECK INTERLOCK                   EXR37780
29A2            4886 001A          3788             LH    TEMP,DVRWRK2(DCBADR) PICK UP DRIVE SELECT BITS       EXR37790
29A6            DE48 2B9A          3789             OC    DEV,FMDRESET(TEMP) DRIVE RESET                     EXR37800
29AA            9D45               3790             SSR   DEV,STAT                                           EXR37810
29AC            D256 0008          3791             STB   STAT,STATUS(DCBADR)                               EXR37820
29B0            C350 0081          3792             THI   STAT,X'81'         TEST IF DU OR WRITE PROTECT       EXR37830
29B4            2334               3793             BZS   FMD0L1             SKIP IF NO                        EXR37840
29B6            41C0 1D42          3794             BAL   RET3,BSTATERR      BAD STATUS ERROR                  EXR37850
29BA            0303               3795             BR    RET1               RETURN HANG IN PHASE 0            EXR37860
                                   3796  *                                                                    EXR37870
29BC            24F4               3797  FMD0L1   LIS   R15,TWO             NEXT PHASE IS 2                   EXR37880
29BE            C4E0 CFFF          3798             NHI   R14,-1-BADSTAT-NOTCOUNT                            EXR37890
29C2            D0E6 0000          3799             STM   R14,0(DCBADR)                                      EXR37900
29C6            4886 002A          3800             LH    TEMP,LRNLOW(DCBADR) INITIAL LOGICAL RECORD NUMBER  EXR37910
29CA            4086 0028          3801             STH   TEMP,LRNCUR(DCBADR)                                EXR37920
29CE            0303               3802             BR    RET1               RETURN TO DISPATCHER              EXR37930

                                   3804  * PHASE 1...COMPUTE NEXT LOGICAL RECORD NUMBER                       EXR37950
                                   3805  *                                                                    EXR37960
29D0            4876 0028          3806  FMDPH1   LH    CHAR,LRNCUR(DCBADR)                                 EXR37970
29D4            2671               3807             AIS   CHAR,1              INCREMENT LOGICAL RECORD NUMBER   EXR37980
29D6            4576 002C          3808             CLH   CHAR,LRNHIGH(DCBADR) COMPARE TO HIGH LIMIT       EXR37990
29DA            2323               3809             BNPS  FMDP1L1            SKIP IF NOT OVER                  EXR38000
29DC            4876 002A          3810             LH    CHAR,LRNLOW(DCBADR) RESET TO LOW LIMIT             EXR38010
29E0            4076 0028          3811  FMDP1L1  STH   CHAR,LRNCUR(DCBADR) NEW LRN                         EXR38020
29E4            4886 0018          3812             LH    TEMP,DVRWRK1(DCBADR)                                EXR38030
29E8            41C0 1DE8          3813             BAL   RET3,BLINK                                         EXR38040
29EC            24F4               3814             LIS   R15,TWO            PHASE 2 NEXT                      EXR38050
29EE            40F6 0002          3815             STH   R15,PHASE(DCBADR)                                  EXR38060
29F2            0303               3816             BR    RET1               RETURN TO DISPATCHER              EXR38070

                                   3818  * PHASE 2...START WRITE                                              EXR38090
                                   3819  *                                                                    EXR38100
29F4            0884               3820  FMDPH2   LHR   TEMP,DEV            DEVICE NUMBER                     EXR38110
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FLOPPY MEDIA DISC DRIVER

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29F6  41B0 1DB4        3821          BAL   RET2,TESTLOCK        CHECK INTERLOCK                          EXR38120
29FA  C8B0 1000        3822          LHI   RET2,X'1000'         DELAY COUNTER                  R04     EXR38130
29FE  9D45             3823  FMDP2L0 SSR   DEV,STAT             CHECK DEVICE STATUS                      EXR38140
2A00  27B1             3824          SIS   RET2,1               DECREMENT COUNTER              R04     EXR38150
2A02  2336             3825          BZS   FMDP2L0A            TIME-OUT                       R04     EXR38160
2A04  D256 0008        3826          STB   STAT,STATUS(DCBADR)  SAVE FOR USER                           EXR38170
2A08  C350 0081        3827          THI   STAT,X'81'          CHECK DU OR WRITE PROTECT                EXR38180
2A0C  2336             3828          BZS   FMDP2L1                                                      EXR38190
2A0E  41C0 1D42        3829  FMDP2L0A BAL  RET3,BSTATERR        LOG BAD STATUS MESSAGE         R04     EXR38200
2A12  4006 0002        3830          STH   ZERO,PHASE(DCBADR)   HANG IN PHASE 0                         EXR38210
2A16  0303             3831          BR    RET1                                                         EXR38220
2A18  C350 0002        3832  FMDP2L1 THI   STAT,2              IDLE?                                    EXR38230
2A1C  223F             3833          BZS   FMDP2L0            NO, WAIT FOR IT                          EXR38240
2A1E  0884             3834          LHR   TEMP,DEV                                                     EXR38250
2A20  41B0 1DC8        3835          BAL   RET2,SETLOCK        SET DEVICE INTERLOCK                     EXR38260
2A24  D846 0028        3836          WH    DEV,LRNCUR(DCBADR)  OUTPUT LOGICAL RECORD NUMBER             EXR38270
2A28  4886 001A        3837          LH    TEMP,DVRWRK2(DCBADR) DRIVE SELECT INDEX                      EXR38280
2A2C  DE48 2B9E        3838          OC    DEV,FMDWRT(TEMP)    DISARM, WRITE                            EXR38290
2A30  9D45             3839          SSR   DEV,STAT                                                     EXR38300
2A32  2081             3840          BTBS  8,1                                                          EXR38310
2A34  4886 0012        3841          LH    TEMP,BUF1STRT(DCBADR) BUFFER 1 START ADDRESS                 EXR38320
2A38  D848 0000        3842  FMDP2L2 WH    DEV,0(TEMP)         WRITE HALFWORDS TO FLOPPY                EXR38330
2A3C  2682             3843          AIS   TEMP,2              INCREMENT ADDRESS                        EXR38340
2A3E  4586 0014        3844          CLH   TEMP,BUF1END(DCBADR)                                         EXR38350
2A42  2085             3845          BLS   FMDP2L2             LOOP                                     EXR38360
2A44  4886 001A        3846          LH    TEMP,DVRWRK2(DCBADR) DRIVE SELECT INDEX                      EXR38370
2A48  24F6             3847          LIS   R15,THREE           PHASE 3 NEXT                             EXR38380
2A4A  C39B 2BA2        3848          LB    DAT,FMDSTOP(TEMP)   ENABLE,STOP                              EXR38390
2A4E  41C0 1D32        3849          BAL   RET3,STARTIO        ENABLE INTERRUPTS                        EXR38400
2A52  0303             3850          BR    RET1                RETURN, WAIT FOR INTERRUPT               EXR38410

                       3852  * PHASE 3...INTERRUPT ON IDLE AFTER WRITE                                   EXR38430
                       3853  *                                                                          EXR38440
2A54  4886 001A        3854  FMDPH3  LH    TEMP,DVRWRK2(DCBADR)                                         EXR38450
2A58  D398 2BA2        3855          LB    DAT,FMDSTOP(TEMP)                                            EXR38460
2A5C  C690 00C0        3856          OHI   DAT,X'C0'                                                    EXR38470
2A60  9E49             3857          OCR   DEV,DAT             DISARM, STOP                             EXR38480
2A62  C350 0085        3858  FMDPH3A THI   STAT,X'85'          SEE IF ERROR                             EXR38490
2A66  4330 2A8C        3859          BZ    FMDP3L2             SKIP IF NO                               EXR38500
2A6A  41C0 1D42        3860          BAL   RET3,BSTATERR       LOG BAD STATUS ERROR MESSAGE             EXR38510
2A6E  D356 0008        3861          LB    STAT,STATUS(DCBADR)                                          EXR38520
2A72  C350 0081        3862          THI   STAT,X'81'          DU OR WRITE PROTECT?                     EXR38530
2A76  2336             3863          BZS   FMDP3L1             SKIP IF NO                               EXR38540
2A78  07FF             3864          XHR   R15,R15                                                      EXR38550
2A7A  40F6 0002        3865  FMDP3L0 STH   R15,PHASE(DCBADR)   SET NEXT PHASE                           EXR38560
2A7E  4300 1D0E        3866          B     ISRETURN                                                     EXR38570
2A82  C350 0040        3867  FMDP3L1 THI   STAT,X'40'          DEF TRACK?                               EXR38580
2A86  2333             3868          BZS   FMDP3L2             SKIP IF NO                               EXR38590
2A88  24F2             3869          LIS   R15,ONE             IF YES, PHASE 1 NEXT                     EXR38600
2A8A  2208             3870          BS    FMDP3L0                                                      EXR38610
2A8C  9D45             3871  FMDP3L2 SSR   DEV,STAT            CHECK STATUS                             EXR38620
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2A8E  D256 0008  3872          STB   STAT,STATUS(DCBADR)                                  EXR38630
2A92  4320 2A62  3873          BFC   2,FMDPH3A           LOOP IF NOT IDLE                EXR38640
                 3874  *                                                                  EXR38650
2A96  D846 0028  3875          WH    DEV,LRNCUR(DCBADR)  OUTPUT LOGICAL RECORD NUMBER    EXR38660
2A9A  0884       3876          LHR   TEMP,DEV                                            EXR38670
2A9C  41B0 1DC6  3877          BAL   RET2,SETLOCK        SET DEVICE INTERLOCK            EXR38680
2AA0  C4E0 BFFF  3878          NHI   R14,-1-BUSY         CLEAR DRIVER BUSY               EXR38690
2AA4  24F8       3879          LIS   R15,FOUR            PHASE 4 NEXT                    EXR38700
2AA6  D0E6 0000  3880          STM   R14,0(DCBADR)                                       EXR38710
2AAA  4300 1DGE  3881          B     ISRETURN                                            EXR38720


                 3883  * PHASE 4...CLEAR READ BUFFER, START READ                         EXR38740
                 3884  *                                                                  EXR38750
2AAE  41B0 1F62  3885  FMDPH4  BAL   RET2,BUFCLEAR       CLEAR BUFFER 2                  EXR38760
2AB2  24FA       3886          LIS   R15,FIVE            PHASE 5 NEXT                    EXR38770
2AB4  40F6 0002  3887          STH   R15,PHASE(DCBADR)   *                         R04    EXR38780
2AB8  0303       3888          BR    RET1                                                EXR38790


                 3890  * PHASE 5...READ DATA                                       R04    EXR38810
                 3891  *                                                                  EXR38820
2ABA  4886 001A  3892  FMDPH5  LH    TEMP,DVRWRK2(DCBADR) PICK UP DRIVE SELECT BITS  R04    EXR38830
2ABE  DE48 2BA6  3893          OC    DEV,FMDREAD(TEMP)   DISABLE READ               R04    EXR38840
2AC2  9D45       3894          SSR   DEV,STAT            SENSE STATUS                R04    EXR38850
2AC4  2081       3895          BTBS  8,1                 WAIT FOR NON BUSY           R04    EXR38860
2AC6  4896 0022  3896          LH    DAT,BUF2NEXT(DCBADR) BUFFER 2 WORKING ADDRESS   R04    EXR38870
2ACA  4086 0022  3897          STH   TEMP,BUF2NEXT(DCBADR) PRESET                    R04    EXR38880
2ACE  D949 0000  3898  FMDP5L1 RH    DEV,0(DAT)          READ HALFWORDS              R04    EXR38890
2AD2  2692       3899          AIS   DAT,2               INCREMENT BUFFER-2 ADDRESS  R04    EXR38900
2AD4  4096 0022  3900          STH   DAT,BUF2NEXT(DCBADR) UPDATE                     R04    EXR38910
2AD8  4596 0020  3901          CLH   DAT,BUF2END(DCBADR) DONE?                       R04    EXR38920
2ADC  2087       3902          BLS   FMDP5L1             LOOP IF NO                  R04    EXR38930
2ADE  D398 2BA2  3903          LB    DAT,FMDSTOP(TEMP)                                     EXR38940
2AE2  24FC       3904          LIS   R15,SIX             PHASE SIX IS NEXT           R04    EXR38950
2AE4  41C0 1D32  3905          BAL   RET3,STARTIO                                        EXR38960
2AE8  0303       3906          BR    RET1                                                EXR38970


                 3908  * PHASE 6...INTERRUPT ON READ COMPLETION                    R04    EXR38990
                 3909  *                                                                  EXR39000
2AEA  9D45       3910  FMDPH6  SSR   DEV,STAT            SENSE STATUS                R04    EXR39010
2AEC  C350 0081  3911          THI   STAT,X'81'          DU OR PROTECT?                    EXR39020
2AF0  2135       3912          BNZS  FMDP6L1             BRANCH IF YES               R04    EXR39030
2AF2  C350 0002  3913          THI   STAT,2              IDLE?                       R04    EXR39040
2AF6  2236       3914          BZS   FMDPH6             LOOP UNTIL YES              R04    EXR39050
2AF8  2303       3915          BS    FMDP6L2             SKIP ERROR MESSAGE          R04    EXR39060
2AFA  41C0 1D42  3916  FMDP6L1 BAL   RET3,BSTATERR       LOG ERROR MESSAGE           R04    EXR39070
2AFE  4886 001A  3917  FMDP6L2 LH    TEMP,DVRWRK2(DCBADR) PICK UP DRIVE SELECT BITS  R04    EXR39080
2B02  D398 2BA2  3918          LB    DAT,FMDSTOP(TEMP)   STOP COMMAND              R04    EXR39090
```

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2B06  C690 0080        3919          OHI   DAT,X'80'          DISARM                                  EXR39100
2B0A  9E49             3920          OCR   DEV,DAT                                                    EXR39110
2B0C  0884             3921          LHR   TEMP,DEV                                                   EXR39120
2B0E  4180 1DD6        3922          BAL   RET2,CLRLOCK       CLEAR DEVICE INTERLOCK                  EXR39130
2B12  C4E0 BFFF        3923          NHI   R14,-1-BUSY        CLEAR DRIVER BISY                       EXR39140
2B16  24FE             3924          LIS   R15,SEVEN          PHASE 7 NEXT                            EXR39150
2B18  00E6 0000        3925          STM   R14,0(DCBADR)                                               EXR39160
2B1C  4300 1D0E        3926          B     ISRETURN                                                    EXR39170


                       3928  * PHASE 7...COMPARE DATA                                                  EXR39190
                       3929  *                                                                         EXR39200
2B20  4180 1DFC        3930  FMDPH7  BAL   RET2,COMPARE        COMPARE BUFFER1 & BUFFER 2              EXR39210
2B24  24F2             3931          LIS   R15,ONE            PHASE 1 NEXT                            EXR39220
2B26  40F6 0002        3932          STH   R15,PHASE(DCBADR)                                           EXR39230
2B2A  D370 07F8        3933  FMDP7L1 LB    CHAR,FMDRIVE                                                EXR39240
2B2E  2671             3934          AIS   CHAR,1             SELECT NEXT DRIVE                       EXR39250
2B30  C570 0004        3935          CLHI  CHAR,4             LIMIT 4                                 EXR39260
2B34  2182             3936          BLS   FMDP7L2                                                     EXR39270
2B36  0777             3937          XHR   CHAR,CHAR          RESET TO ZERO                           EXR39280
2B38  D270 07F8        3938  FMDP7L2 STB   CHAR,FMDRIVE       STORE NEW CHOICE                        EXR39290
2B3C  2481             3939  FMDSELCT LIS  TEMP,1                                                      EXR39300
2B3E  CD87 0000        3940          SLHL  TEMP,0(CHAR)       FORM BIT MASK                           EXR39310
2B42  4480 07F8        3941          NH    TEMP,FMDRIVE       SEE IF SELECTED                         EXR39320
2B46  223E             3942          BZS   FMDP7L1            LOOP IF NO                              EXR39330
2B48  0303             3943          BR    RET1                                                        EXR39340


2B4A  D370 07F3        3945  CKFMD   LB    CHAR,MNEMONIC+3    PICK UP DRIVE IDENTIFER                 EXR39360
2B4E  CB70 0031        3946          SHI   CHAR,X'31'                                                  EXR39370
2B52  2481             3947          LIS   TEMP,1                                                      EXR39380
2B54  CD87 0000        3948          SLHL  TEMP,0(CHAR)       FORM BIT MASK                           EXR39390
2B58  4680 07F8        3949          OH    TEMP,FMDRIVE       SET SELECT BIT                          EXR39400
2B5C  4080 07F8        3950          STH   TEMP,FMDRIVE                                                EXR39410
2B60  4886 002A        3951          LH    TEMP,LRNLOW(DCBADR)                                         EXR39420
2B64  2134             3952          BNZS  CKFMD1A                                                     EXR39430
2B66  2481             3953          LIS   TEMP,1             ZERO IS INVALID LRN                     EXR39440
2B68  4086 002A        3954          STH   TEMP,LRNLOW(DCBADR) DEFAULT LOW LIMIT TO 1                  EXR39450
2B6C  4586 002C        3955  CKFMD1A CLH   TEMP,LRNHIGH(DCBADR) COMPARE TO HIGH              R04     EXR39460
2B70  2183             3956          BLS   CKFMD1B            OK IF LESS THAN             R04     EXR39470
2B72  4086 002C        3957          STH   TEMP,LRNHIGH(DCBADR) FORCE LOW = HIGH           R04     EXR39480
2B76  4886 002C        3958  CKFMD1B LH    TEMP,LRNHIGH(DCBADR) HIGH LIMIT                 R04     EXR39490
2B7A  C580 07D2        3959          CLHI  TEMP,X'07D2'       COMPARE TO MAX LIMIT                    EXR39500
2B7E  2325             3960          BNPS  CKFMD3             OK IF LESS OR EQUAL                     EXR39510
2B80  C880 07D2        3961  CKFMD2  LHI   TEMP,X'07D2'       FORCE DOWN TO MAX                       EXR39520
2B84  4086 002C        3962          STH   TEMP,LRNHIGH(DCBADR)                                        EXR39530
2B68  4586 002A        3963  CKFMD3  CLH   TEMP,LRNLOW(DCBADR) COMPARE TO SPECIFIED LOW LIMIT         EXR39540
2B8C  2383             3964          BNLS  CKFMD1                                                      EXR39550
2B8E  4086 002A        3965          STH   TEMP,LRNLOW(DCBADR) DEFAULT, LOW = HIGH                     EXR39560
2B92  C880 00C1        3966  CKFMD1  LHI   TEMP,X'C1'         DEFAULT DEVICE ADDRESS                  EXR39570
2B96  4300 3E9C        3967          B     CKDEV                                                       EXR39580
```

FLOPPY MEDIA DISC DRIVER

```
2B9A  C8D8              3969  FMDRESET DCX   C8D8,E8F8                          EXR39600
2B9C  E8F8
2B9E  0212              3970  FMDWRT   DCX   0212,2232                          EXR39610
2BA0  2232
2BA2  4757              3971  FMDSTOP  DCX   4757,6777                          EXR39620
2BA4  6777
2BA6  C1D1              3972  FMDREAD  DCX   C1D1,E1F1          *          R04   EXR39630
2BA8  E1F1
                        3973           ENDC                                     EXR39640
2BAA                    3974           IFNZ  CARDRDR                            EXR39650
```

```
2BAA  0001              3976  CRDDCB  DCX   0001,0,9800,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS          EXR39670
2BAC  0000
2BAE  9800
2BB0  0000
2BB2  0000
2BB4  2C6E              3977          DC    CRDPTR,0,0,CKCRD    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR39680
2BB6  0000
2BB8  0000
2BBA  2D20
2BBC  2BCE              3978          DC    CRDDATA,CRDDATAE,CRDDATA BUF1STRT,BUF1END,BUF1NEXT        EXR39690
2BBE  2C6D
2BC0  2BCE
2BC2  0000              3979          DCX   0000,0000           DURWRK1,DURWRK2                         EXR39700
2BC4  0000
2BC6  0000              3980          DB    0,0                 BUF1EXT,BUF2EXT                         EXR39710
2BC8  47D6              3981          DC    CRDBUF,CRDBUFE,CRDBUF BUF2STRT,BUF2END,BUF2NEXT           EXR39720
2BCA  4876
2BCC  47D6
                        3982  *                                                                         EXR39730
      0000 2BCE         3983  CRDDATA EQU   *                                                           EXR39740
2BCE  2000              3984          DCX   2000,1000,0800,0400 & - 0 1                               EXR39750
2BD0  1000
2BD2  0800
2BD4  0400
2BD6  0200              3985          DCX   0200,0100,0020,0010 2 3 4 5                               EXR39760
2BD8  0100
2BDA  0020
2BDC  0010
2BDE  0008              3986          DCX   0008,0004,0002,0001 6 7 8 9                               EXR39770
2BE0  0004
2BE2  0002
2BE4  0001
2BE6  2400              3987          DCX   2400,2200,2100,2020 A B C D                               EXR39780
2BE8  2200
2BEA  2100
2BEC  2020
2BEE  2010              3988          DCX   2010,2008,2004,2002 E F G H                               EXR39790
2BF0  2008
2BF2  2004
2BF4  2002
2BF6  2001              3989          DCX   2001,1400,1200,1100 I J K L                               EXR39800
2BF8  1400
2BFA  1200
2BFC  1100
2BFE  1020              3990          DCX   1020,1010,1008,1004 M N O P                               EXR39810
2C00  1010
2C02  1008
2C04  1004
2C06  1002              3991          DCX   1002,1001,0C00,0A00 Q R / S                               EXR39820
2C08  1001
2C0A  0C00
2C0C  0A00
2C0E  0900              3992          DCX   0900,0820,0810,0808 T U V W                               EXR39830
```

CARD READER DRIVER

```
2C10  0820
2C12  0810
2C14  0808
2C16  0804                3993          DCX   0804,0802,0801,0202 X Y Z :                    EXR39840
2C18  0802
2C1A  0801
2C1C  0202
2C1E  0102                3994          DCX   0102,0022,0012,000A # @ ' =                    EXR39850
2C20  0022
2C22  0012
2C24  000A
2C26  0006                3995          DCX   0006,2202,2102,2022 " [ . <                    EXR39860
2C28  2202
2C2A  2102
2C2C  2022
2C2E  2012                3996          DCX   2012,200A,2006,1202 ( + ! ]                    EXR39870
2C30  200A
2C32  2006
2C34  1202
2C36  1102                3997          DCX   1102,1022,1012,100A $*);                       EXR39880
2C38  1022
2C3A  1012
2C3C  100A
2C3E  1006                3998          DCX   1006,0A02,0902,0822 ,%                         EXR39890
2C40  0A02
2C42  0902
2C44  0822
2C46  0812                3999          DCX   0812,080A,0806,0000 ->?                        EXR39900
2C48  080A
2C4A  0806
2C4C  0000
2C4E  3F3F                4000          DCX   3F3F,0000,3F3F,0000                            EXR39910
2C50  0000
2C52  3F3F
2C54  0000
2C56  3F3F                4001          DCX   3F3F,0000,3F3F,0000                            EXR39920
2C58  0000
2C5A  3F3F
2C5C  0000
2C5E  2A2A                4002          DCX   2A2A,1515,2A2A,1515                            EXR39930
2C60  1515
2C62  2A2A
2C64  1515
2C66  2A2A                4003          DCX   2A2A,1515,2A2A,1515                            EXR39940
2C68  1515
2C6A  2A2A
2C6C  1515
      0000 2C6D           4004  CRDDATAE EQU  *-1                                           EXR39950

      0000 2C6E           4006  CRDPTR   EQU  *                                             EXR39970
2C6E  2C74                4007  CRDPHTB  DC   CRDPH0          PHASE 0 CLEAR,STATUS WAIT, START EXR39980
```

CARD READER DRIVER

```
2C70   2CA8             4008          DC    CRDPH1              PHASE 1 READ 80 COLUMNS                 EXR39990
2C72   2D14             4009          DC    CRDPH2              PHASE 2 COMPARE DATA                    EXR40000


                        4011  * PHASE 0...CLEAR, WAIT HE,TBL,DU RESET; NMTN SET; START READ             EXR40020
                        4012  *                                                                         EXR40030
2C74   DE40 2D28        4013  CRDPH0  OC    DEV,CRDCLEAR        DISARM,CLEAR                          EXR40040
2C78   9D45             4014          SSR   DEV,STAT                                                    EXR40050
2C7A   D256 0008        4015          STB   STAT,STATUS(DCBADR) SAVE STATUS                           EXR40060
2C7E   C350 0061        4016          THI   STAT,X'61'          DU, TBL OR HE?                        EXR40070
2C82   2134             4017          BNZS  CRDP0L1                                                     EXR40080
2C84   C350 0010        4018          THI   STAT,X'10'          MOTION?                               EXR40090
2C88   2134             4019          BNZS  CRDP0L2             SKIP IF NO                            EXR40100
2C8A   41C0 1D42        4020  CRDP0L1 BAL   RET3,BSTATERR       LOG BAD STATUS MESSAGE                EXR40110
2C8E   0303             4021          BR    RET1                RETURN                                EXR40120
2C90   4886 001E        4022  CRDP0L2 LH    TEMP,BUF2STRT(DCBADR)                                     EXR40130
2C94   4086 0022        4023          STH   TEMP,BUF2NEXT(DCBADR) RESET BUFFER 2 ADDRESS              EXR40140
2C98   4180 1F62        4024  CRDP0L3 BAL   RET2,BUFCLEAR       CLEAR BUFFER 2                        EXR40150
2C9C   24F2             4025          LIS   R15,ONE             NEXT PHASE IS 1                       EXR40160
2C9E   D390 2D29        4026          LB    DAT,CRDFEED         FEED COMMAND                          EXR40170
2CA2   41C0 1D32        4027          BAL   RET3,STARTIO        SET-UP                                EXR40180
2CA6   0303             4028          BR    RET1                RETURN                                EXR40190


                        4030  * PHASE 1...CARD READER DATA INTERRUPTS                                   EXR40210
                        4031  *                                                                         EXR40220
2CA8   0655             4032  CRDPH1  LHR   STAT,STAT           TEST STATUS                           EXR40230
2CAA   4230 2CF2        4033          BNZ   CRD1L2              SKIP IF STATUS NOT ZERO               EXR40240
2CAE   4886 0022        4034          LH    TEMP,BUF2NEXT(DCBADR)                                     EXR40250
2CB2   4586 0020        4035          CLH   TEMP,BUF2END(DCBADR)                                      EXR40260
2CB6   2388             4036          BNLS  CRD1L1              BRANCH IF END OF BUFFER               EXR40270
2CB8   D948 0000        4037          RH    DEV,0(TEMP)         READ A COLUMN                         EXR40280
2CBC   2682             4038          AIS   TEMP,2              INCREMENT ADDRESS                     EXR40290
2CBE   4086 0022        4039          STH   TEMP,BUF2NEXT(DCBADR)                                     EXR40300
2CC2   4300 1D0E        4040          B     ISRETURN            RETURN TO INTERRUPTED PROGRAM         EXR40310
2CC6   41C0 1BCE        4041  CRD1L1  BAL   RET3,ERRORLOG       GET SPACE ON THE ERROR QUEUE          EXR40320
2CCA   C890 B032        4042          LHI   DAT,X'B032'         UNEXPECTED INTERRUPT                  EXR40330
2CCE   4098 0000        4043          STH   DAT,0(TEMP)         STORE ERROR CODE & NUMBER             EXR40340
2CD2   4048 0002        4044          STH   DEV,2(TEMP)         STORE DEVICE NUMBER                   EXR40350
2CD6   4058 0004        4045          STH   STAT,4(TEMP)        STORE STATUS                          EXR40360
2CDA   4890 0566        4046          LH    DAT,OPSW                                                  EXR40370
2CDE   4098 0008        4047          STH   DAT,8(TEMP)         OLD PSW                               EXR40380
2CE2   4890 0568        4048          LH    DAT,OPSW+2                                                EXR40390
2CE6   4098 000A        4049          STH   DAT,10(TEMP)        OLD LOC                               EXR40400
2CEA   41C0 084C        4050          BAL   RET3,ERRORQ         CHECK THE QUEUE                       EXR40410
2CEE   4300 1D0E        4051          B     ISRETURN            RETURN                                EXR40420
                        4052  *                                                                         EXR40430
2CF2   DE40 0D16        4053  CRD1L2  OC    DEV,DISARM          NO MORE INTERRUPTS                    EXR40440
2CF6   C4E0 BFFF        4054          NHI   R14,-1-BUSY         CLEAR DRIVER BUSY                     EXR40450
2CFA   24F4             4055          LIS   R15,TWO             NEXT PHASE IS 2 IF EOM                EXR40460
2CFC   40E6 0000        4056          STH   R14,0(DCBADR)                                             EXR40470
```

CARD READER DRIVER

```
2D00  C350 0002        4057           THI   STAT,2                                  EXR40480
2D04  2134             4058           BNZS  CRD1L3          BRANCH IF EOM             EXR40490
2D06  07FF             4059           XHR   R15,R15         PHASE ZERO NEXT           EXR40500
2D08  41D0 1D42        4060           BAL   R13,BSTATERR    LOG BAD STATUS ERROR      EXR40510
2D0C  40F6 0002        4061  CRD1L3   STH   R15,PHASE(DCBADR)                        EXR40520
2D10  4300 1D0E        4062           B     ISRETURN                                  EXR40530


                       4064  * PHASE 2...COMPARE DATA                                EXR40550
                       4065  *                                                       EXR40560
2D14  41B0 1DFC        4066  CRDPH2   BAL   RET2,COMPARE  COMPARE BUFFER 1 & BUFFER 2 EXR40570
2D18  07FF             4067           XHR   R15,R15                                 EXR40580
2D1A  40F6 0002        4068           STH   R15,PHASE(DCBADR) NEXT PHASE IS ZERO    EXR40590
2D1E  0303             4069           BR    RET1            RETURN                  EXR40600


2D20  C880 0004        4071  CKCRD    LHI   TEMP,X'04'      DEFAULT DEVICE ADDRESS  EXR40620
2D24  4300 3E9C        4072           B     CKDEV                                     EXR40630
                       4073  *                                                       EXR40640
                       4074  *                                                       EXR40650
                       4075  *                                                       EXR40660
2D28  C8               4076  CRDCLEAR DB    X'C8'           DISARM,CLEAR            EXR40670
2D29  60               4077  CRDFEED  DB    X'60'           ENABLE,FEED             EXR40680
                       4078           ENDC                                      EXR40690
2D2A                   4079           IFNZ  PRINTERS                            EXR40700
```

LINE PRINTER DRIVER

```
2D2A  0001                4081  LNPDCB1  DCX   0001,0,8800,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS          EXR40720
2D2C  0000
2D2E  8800
2D30  0000
2D32  0000
2D34  2DC2                4082           DC    LNPPTR,0,0,CKLNP    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR40730
2D36  0000
2D38  0000
2D3A  2E36
2D3C  2D46                4083           DC    LNPDATA,LNPDATAE,LNPDATA BUF1STRT,BUF1END,BUF1NEXT          EXR40740
2D3E  2D8D
2D40  2D46
2D42  0000                4084           DCX   0000,0000           DVRWRK1,DVRWRK2                         EXR40750
2D44  0000
      0000 2D46           4085  LNPDATA  EQU   *                                                           EXR40760
2D46  20                  4086           DB    X'20'               SPACE                                   EXR40770
2D48  5B22 2325 2620      4087           DC    C'["#%&'                                                    EXR40780
2D4E  0027                4088           DC    X'27',X'28',X'29'   '   (   )                           EXR40790
2D50  0028
2D52  0029
2D54  2A2B 2C2D 2E31 3031 4089           DC    C'*+,-.101234567'                                           EXR40800
2D5C  3233 3435 3637
2D62  3839 3A3B 3C3D 3E3F 4090           DC    C'89:;<=>?@ABCDE'                                           EXR40810
2D6A  4041 4243 4445
2D70  4647 4849 4A4B 4C4D 4091           DC    C'FGHIJKLMNOPQRS'                                           EXR40820
2D78  4E4F 5051 5253
2D7E  5455 5657 5859 5A28 4092           DC    C'TUVWXYZ(/)'                                               EXR40830
2D86  2F29
2D86  5E5F                4093           DB    X'5E',X'5F'                                                 EXR40840
2D8A  0D01                4094  LOWLNPD  DCX   0D01,2020           CR 1 LF,SPACE                           EXR40850
2D8C  2020
                          4095  * CHANGE TO DCX 2020,2020 FOR LOWER CASE                                    EXR40860
      0000 2D8D           4096  LNPDATAE EQU   *-1                                                         EXR40870
2D8E  2061                4097           DCX   2061,6263,6465,6667 SPACE A B C D E F G                     EXR40880
2D90  6263
2D92  6465
2D94  6667
2D96  7071                4098           DCX   7071,7273,7475,7677 P Q R S T U V W                         EXR40890
2D98  7273
2D9A  7475
2D9C  7677
2D9E  7879                4099           DCX   7879,7A20           X Y Z SPACE                             EXR40900
2DA0  7A20
2DA2  0D01                4100           DCX   0D01,2000           CR LF SPACE NULL                        EXR40910
2DA4  2000
      0000 2DA5           4101  LOWLNPDE EQU   *-1                                                         EXR40920
2DA6                      4102           IFP   PRINTERS-1                                                  EXR40930
2DA6  0001                4103  LNPDCB2  DCX   0001,0,8800,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS          EXR40940
2DA8  0000
2DAA  8800
2DAC  0000
2DAE  0000
2DB0  2DC2                4104           DC    LNPPTR,0,0,CKLNP    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR40950
```

LINE PRINTER DRIVER

```
2DB2  0000
2DB4  0000
2DB6  2E36
2DB8  2D46                4105          DC    LNPDATA,LNPDATAE,LNPDATA BUF1STRT,BUF1END,BUF1NEXT      EXR40960
2DBA  2D8D
2DBC  2D46
2DBE  0000                4106          DCX   0000,0000          DVRWRK1,DVRWRK2                     EXR40970
2DC0  0000
                          4107          ENDC                                                          EXR40980
                          4108  *                                                                     EXR40990
                          4109  *                                                                     EXR41000
      0000 2DC2           4110  LNPPTR  EQU   *                                                       EXR41010
2DC2  2DC8                4111  LNPPHTB DC    LNPPH0              PHASE 0 STATUS CHECK,WAIT DU        EXR41020
2DC4  2DF0                4112          DC    LNPPH1              PHASE 1 DATA INTERRUPTS             EXR41030
2DC6  2E24                4113          DC    LNPPH2              PHASE 2 LAST CHARACTER INTERRUPTS   EXR41040


                          4115  * PHASE 0...STATUS CHECK, WAIT DU, START WRITE                        EXR41060
                          4116  *                                                                     EXR41070
2DC8  9D45                4117  LNPPH0  SSR   DEV,STAT                                              EXR41080
2DCA  D256 0008           4118          STB   STAT,STATUS(DCBADR) SAVE STATUS                       EXR41090
2DCE  C350 0055           4119          THI   STAT,X'55'          ANY ERRORS?                       EXR41100
2DD2  2334                4120          BZS   LNP0L1              SKIP IF NO                        EXR41110
2DD4  41C0 1D42           4121          BAL   RET3,BSTATERR       LOG BAD STATUS ERROR              EXR41120
2DD8  0303                4122          BR    RET1                RETURN, STAY IN PHASE0            EXR41130
2DDA  4886 0012           4123  LNP0L1  LH    TEMP,BUF1STRT(DCBADR)                               EXR41140
2DDE  4086 0016           4124          STH   TEMP,BUF1NEXT(DCBADR) RESET BUFFER 1 ADDRESS        EXR41150
2DE2  24F2                4125          LIS   R15,ONE             NEXT PHASE IS 1                   EXR41160
2DE4  D390 0D17           4126          LB    DAT,ENABLE          COMMAND BYTE TO ENABLE INTS.      EXR41170
2DE8  41C0 1D32           4127          BAL   RET3,STARTIO        SET-UP.                           EXR41180
2DEC  9A40                4128          WDR   DEV,ZERO            OUTPUT ONE NULL                   EXR41190
2DEE  0303                4129          BR    RET1                WAIT FOR INTERRUPTS               EXR41200


                          4131  * PHASE 1...DATA INTERRUPTS                                           EXR41220
                          4132  *                                                                     EXR41230
2DF0  C350 0055           4133  LNPPH1  THI   STAT,X'55'          ANY ERRORS?                       EXR41240
2DF4  213D                4134          BNZS  LNP1L1              BRANCH IF YES                     EXR41250
2DF6  4886 0016           4135          LH    TEMP,BUF1NEXT(DCBADR)                               EXR41260
2DFA  DA48 0000           4136          WD    DEV,0(TEMP)         OUTPUT NEXT CHARACTER             EXR41270
2DFE  2681                4137          AIS   TEMP,1              INCREMENT ADDRESS                 EXR41280
2E00  4086 0016           4138          STH   TEMP,BUF1NEXT(DCBADR)                               EXR41290
2E04  4586 0014           4139          CLH   TEMP,BUF1END(DCBADR) END OF BUFFER?                 EXR41300
2E08  4280 1D0E           4140          BL    ISRETURN            RETURN IF NO                      EXR41310
2E0C  2307                4141          BS    LNP1L2                                                EXR41320
2E0E  DE40 0D16           4142  LNP1L1  OC    DEV,DISARM          NO MORE INTERRUPTS                EXR41330
2E12  C4E0 BFFF           4143          NHI   R14,-1-BUSY         CLEAR BUSY                        EXR41340
2E16  07FF                4144          XHR   R15,R15             PRESET NEXT PHASE = ZERO          EXR41350
2E18  2302                4145          BS    LNP1L3                                                EXR41360
2E1A  24F4                4146  LNP1L2  LIS   R15,TWO             NEXT PHASE = 2                    EXR41370
2E1C  D0E6 0000           4147  LNP1L3  STM   R14,0(DCBADR)                                         EXR41380
```

```
2E20  4300 1D0E          4148          B     ISRETURN                                    EXR41390


                         4150  * PHASE 2...LAST DATA INTERRUPT                           EXR41410
                         4151  *                                                         EXR41420
2E24  C4E0 BFFF          4152  LNPPH2  NHI   R14,-1-BUSY       CLEAR DRIVER BUSY         EXR41430
2E28  07FF               4153          XHR   R15,R15           NEXT PHASE = 0            EXR41440
2E2A  DE40 0D16          4154          OC    DEV,DISARM        DISARM INTERRUPTS         EXR41450
2E2E  D0E6 0000          4155          STM   R14,0(DCBADR)                               EXR41460
2E32  4300 1D0E          4156          B     ISRETURN                                    EXR41470


2E36  C880 0062          4158  CKLNP   LHI   TEMP,X'62'      DEFAULT DEVICE ADDRESS    EXR41490
2E3A  4300 3E9C          4159          B     CKDEV                                       EXR41500
                         4160          ENDC                                              EXR41510
2E3E                     4161          IFNZ  CLOCK                                       EXR41520
```

AC LINE FREQUENCY CLOCK DRIVER

```
2E3E  0000              4163  ACLDCB   DCX   0000,0,8800,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS        EXR41540
2E40  0000
2E42  8800
2E44  0000
2E46  0000
2E48  2E5A              4164           DC    ACLPTR,0,0,CKACL    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK    EXR41550
2E4A  0000
2E4C  0000
2E4E  2E9A
2E50  0000              4165           DC    0,0,0               BUF1STRT,BUF1END,BUF1NEXT             EXR41560
2E52  0000
2E54  0000
2E56  0000              4166           DCX   0000,0000           DVRWRK1,DVRWRK2                       EXR41570
2E58  0000


      0000 2E5A         4168  ACLPTR   EQU   *                                                        EXR41590
2E5A  2E5E              4169  ACLPHTB  DC    ACLPH0              PHASE 0 START CLOCK, BLINK DISPLAY    EXR41600
2E5C  2E7A              4170           DC    ACLPH1              PHASE 1 COUNT 60, STOP CLOCK          EXR41610


                        4172  * PHASE 0...START CLOCK, BLINK DISPLAY                                  EXR41630
                        4173  *                                                                       EXR41640
2E5E  C880 003C         4174  ACLPH0   LHI   TEMP,60                                                 EXR41650
2E62  4086 0018         4175           STH   TEMP,DVRWRK1(DCBADR) SET 60 COUNT                       EXR41660
2E66  C880 0400         4176           LHI   TEMP,X'0400'        BLINK BIT 13                        EXR41670
2E6A  41C0 1DE8         4177           BAL   RET3,BLINK                                              EXR41680
2E6E  24F2              4178           LIS   R15,ONE             NEXT PHASE IS 1                     EXR41690
2E70  D390 0D17         4179           LB    DAT,ENABLE                                              EXR41700
2E74  41C0 1D32         4180           BAL   RET3,STARTIO        SET-UP                              EXR41710
2E78  0303              4181           BR    RET1                RETURN                              EXR41720


                        4183  * PHASE 1...CLOCK INTERRUPTS                                            EXR41740
                        4184  *                                                                       EXR41750
2E7A  4886 0018         4185  ACLPH1   LH    TEMP,DVRWRK1(DCBADR)                                    EXR41760
2E7E  2781              4186           SIS   TEMP,1               DECREMENT COUNT                     EXR41770
2E80  4086 0018         4187           STH   TEMP,DVRWRK1(DCBADR)                                    EXR41780
2E84  4220 1D0E         4188           BP    ISRETURN            RETURN IF NOT DONE                  EXR41790
2E88  C4E0 BFFF         4189  ACL1L1   NHI   R14,-1-BUSY         CLEAR BUSY                          EXR41800
2E8C  07FF              4190           XHR   R15,R15             NEXT PHASE IS ZERO                  EXR41810
2E8E  D0E6 0000         4191           STM   R14,0(DCBADR)                                           EXR41820
2E92  DE40 0D16         4192           OC    DEV,DISARM                                              EXR41830
2E96  4300 1D0E         4193           B     ISRETURN                                                EXR41840


2E9A  C880 006D         4195  CKACL    LHI   TEMP,X'6D'          DEFAULT DEVICE ADDRESS              EXR41860
2E9E  4300 3E9C         4196           B     CKDEV                                                   EXR41870
```

PRECISION INTERVAL CLOCK DRIVER

```
2EA2  0001                4198  PICDCB   DCX   0001,0,8800,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS          EXR41890
2EA4  0000
2EA6  8800
2EA8  0000
2EAA  0000
2EAC  2EC6                4199           DC    PICPTR,0,0,CKPIC    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR41900
2EAE  0000
2EB0  0000
2EB2  2F20
2EB4  2EBE                4200           DC    PICBUF,PICBUFE,PICBUF BUF1STRT,BUF1END,BUF1NEXT               EXR41910
2EB6  2EC6
2EB8  2EBE
2EBA  0000                4201           DCX   0000,0000           DVRWRK1,DVRWRK2                         EXR41920
2EBC  0000
                          4202  *                                                                            EXR41930
2EBE  2F3C                4203  PICBUF   DCX   2F3C               39 MS                                   EXR41940
2EC0  8134                4204           DCX   8134               308 MS                                  EXR41950
2EC2  43FF                4205           DCX   43FF               102.3 MS                                EXR41960
2EC4  1400                4206           DCX   1400               1.024 MS                                EXR41970
      0000 2EC6           4207  PICBUFE  EQU   *                                                          EXR41980


      0000 2EC6           4209  PICPTR   EQU   *                                                          EXR42000
2EC6  2ECC                4210  PICPHTB  DC    PICPH0             PHASE 0 INITIALIZE, BLINK DISPLAY       EXR42010
2EC8  2EE4                4211           DC    PICPH1             PHASE 1 SET RESOLUTION, INTERVAL        EXR42020
2ECA  2F02                4212           DC    PICPH2             PHASE 2 CLOCK INTERRUPT, STOP           EXR42030


                          4214  * PHASE 0...INITIALIZE, BLINK DISPLAY                                       EXR42050
                          4215  *                                                                           EXR42060
2ECC  24F2                4216  PICPH0   LIS   R15,ONE            NEXT PHASE IS 1                         EXR42070
2ECE  40F6 0002           4217           STH   R15,PHASE(DCBADR)                                          EXR42080
2ED2  C880 0800           4218           LHI   TEMP,X'0800'                                               EXR42090
2ED6  41C0 1DE8           4219           BAL   RET3,BLINK          BLINK BIT 12                            EXR42100
2EDA  4886 0012           4220           LH    TEMP,BUF1STRT(DCBADR)                                      EXR42110
2EDE  4086 0016           4221           STH   TEMP,BUF1NEXT(DCBADR) SET RESOLUTION & INTERVAL             EXR42120
2EE2  0303                4222           BR    RET1                                                       EXR42130


                          4224  * PHASE 1...SET RESOLUTION AND INTERVAL                                     EXR42150
                          4225  *                                                                           EXR42160
2EE4  4886 0016           4226  PICPH1   LH    TEMP,BUF1NEXT(DCBADR)                                      EXR42170
2EE8  D848 0000           4227           WH    DEV,0(TEMP)         OUTPUT PREC. & INTERVAL                EXR42180
2EEC  2682                4228           AIS   TEMP,2                                                     EXR42190
2EEE  4086 0016           4229           STH   TEMP,BUF1NEXT(DCBADR)                                      EXR42200
2EF2  24F4                4230           LIS   R15,TWO             NEXT PHASE IS 2                         EXR42210
2EF4  D390 2F28           4231           LB    DAT,PICSTART        START COMMAND                           EXR42220
2EF8  41C0 1D32           4232           BAL   RET3,STARTIO        SET-UP                                  EXR42230
2EFC  DE40 0D17           4233           OC    DEV,ENABLE          ENABLE INTERRUPTS                       EXR42240
2F00  0303                4234           BR    RET1                                                       EXR42250
```

PRECISION INTERVAL CLOCK DRIVER

```
                          4236  * PHASE 2...PIC INTERRUPT HANDLER, STOP CLOCK                                EXR42270
                          4237  *                                                                            EXR42280
2F02   DE40 0D16          4238  PICPH2    OC    DEV,DISARM                                                   EXR42290
2F06   24F2               4239            LIS   R15,ONE              NEXT PHASE = 1 UNLESS BUFFER END     EXR42300
2F08   4886 0016          4240            LH    TEMP,BUF1NEXT(DCBADR)                                      EXR42310
2F0C   4586 0014          4241            CLH   TEMP,BUF1END(DCBADR)                                       EXR42320
2F10   2182               4242            BLS   PICP2L1              SKIP IF NOT BUFFER END               EXR42330
2F12   07FF               4243            XHR   R15,R15              PHASE 0 NEXT                         EXR42340
2F14   C4E0 BFFF          4244  PICP2L1   NHI   R14,-1-BUSY          CLEAR DRIVER BUSY                    EXR42350
2F18   D0E6 0000          4245            STM   R14,0(DCBADR)                                              EXR42360
2F1C   4300 1D0E          4246            B     ISRETURN                                                   EXR42370


2F20   C880 006C          4248  CKPIC     LHI   TEMP,X'6C'           DEFAULT DEVICE ADDRESS               EXR42390
2F24   4300 3E9C          4249            B     CKDEV                                                      EXR42400
2F28   E0                4250  PICSTART  DB    X'E0'                DISARM,START                         EXR42410
2F29   00                 4251            DB    *                                                          EXR42420
```

MODEL 5/16 EXTERNAL CLOCK DRIVER

```
2F2A  0000                4253  CLKDCB   DCX   0000,0,8800,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS          EXR42440
2F2C  0000
2F2E  8800
2F30  0000
2F32  0000
2F34  2F3E                4254           DC    CLKPTR,0,0,CKCLK    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR42450
2F36  0000
2F38  0000
2F3A  2F9E
2F3C  0000                4255           DC    0                   BUF1STRT                                EXR42460


      0000 2F3E           4257  CLKPTR   EQU   *                                                           EXR42480
2F3E  2F42                4258  CLKPHTB  DC    CLKPH0              PHASE 0 SET UP SPT, BLINK DISPLAY       EXR42490
2F40  2F82                4259           DC    CLKPH1              PHASE 1 CLOCK INTERRUPTS                EXR42500


                          4261  * PHASE 0...SET UP SERVICE POINTER TABLE, BLINK DISPLAY                     EXR42520
                          4262  *                                                                           EXR42530
2F42  C880 2F6A           4263  CLKPH0   LHI   TEMP,CLKISR                                                EXR42540
2F46  4080 00DE           4264           STH   TEMP,X'DE'          SET SERVICE POINTER TABLE               EXR42550
2F4A  C880 003C           4265           LHI   TEMP,60                                                     EXR42560
2F4E  4086 0012           4266           STH   TEMP,BUF1STRT(DCBADR) SET UP TO COUNT 60 INTERRUPTS        EXR42570
2F52  C4E0 CFFF           4267           NHI   R14,-1-BADSTAT-NOTCOUNT                                     EXR42580
2F56  C6E0 4000           4268           OHI   R14,BUSY                                                    EXR42590
2F5A  24F2                4269           LIS   R15,ONE                                                     EXR42600
2F5C  D0E6 0000           4270           STM   R14,FLAGS(DCBADR)   PHASE 1 NEXT                          EXR42610
2F60  C880 0200           4271           LHI   TEMP,X'0200'        BLINK BIT 14                            EXR42620
2F64  41C0 1DE8           4272           BAL   RET3,BLINK                                                  EXR42630
2F68  0303                4273           BR    RET1                                                        EXR42640
                          4274  *                                                                           EXR42650
                          4275  * CLOCK INTERRUPT                                                          EXR42660
                          4276  *                                                                           EXR42670
2F6A  0000                4277  CLKISR   DCX   0000,0000           OLD PSW AND LOC                         EXR42680
2F6C  0000
2F6E  0000                4278           DCX   0000                NEW PSW                                 EXR42690
2F70  D020 1D16           4279           STM   R2,INTSAVE                                                  EXR42700
2F74  2447                4280           LIS   DEV,X'07'           DEVICE NUMBER '07'                      EXR42710
2F76  2450                4281           LIS   STAT,0                                                      EXR42720
2F78  D1E0 2F6A           4282           LM    R14,CLKISR                                                  EXR42730
2F7C  248E                4283           LIS   TEMP,X'0E'          2X DEVICE NUMBER                        EXR42740
2F7E  4300 1C7C           4284           B     EXTINT1             COMMON OVERHEAD                         EXR42750
                          4285  *                                 COMES BACK TO CLKPH1                    EXR42760
                          4286  * PHASE 1...CLOCK INTERRUPTS                                               EXR42770
                          4287  *                                                                           EXR42780
2F82  4886 0012           4288  CLKPH1   LH    TEMP,BUF1STRT(DCBADR)                                       EXR42790
2F86  2781                4289           SIS   TEMP,1              DECREMENT COUNTER                       EXR42800
2F88  4086 0012           4290           STH   TEMP,BUF1STRT(DCBADR)                                       EXR42810
2F8C  4220 1D0E           4291           BP    ISRETURN            RETURN IF NOT ZERO                      EXR42820
2F90  C4E0 BFFF           4292           NHI   R14,-1-BUSY         CLEAR BUSY                              EXR42830
2F94  07FF                4293           XHR   R15,R15             NEXT PHASE IS ZERO                      EXR42840
```

MODEL 5/16 EXTERNAL CLOCK DRIVER

```
2F96   D0E6 0000          4294           STM   R14,0(DCBADR)                          EXR42850
2F9A   4300 1D0E          4295           B     ISRETURN                               EXR42860


2F9E   2447               4297  CKCLK    LIS   DEV,7              ALWAYS DEFAULT      EXR42880
2FA0   4046 0006          4298           STH   DEV,DEVADR(DCBADR)                     EXR42890
2FA4   0303               4299           BR    RET1                                   EXR42900
                          4300           ENDC                                         EXR42910
2FA6                      4301           IFNZ  EIGHTINT                               EXR42920
```

EIGHT LINE INTERRUPT MODULE DRIVER

```
2FA6  0000              4303  INT8DCB  DCX   0000,0,8000,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS          EXR42940
2FA8  0000
2FAA  8000
2FAC  0000
2FAE  0000
2FB0  2FC2              4304           DC    INT8PTR,0,0         DVRENTRY,CURWAIT,ERRCOUNT               EXR42950
2FB2  0000
2FB4  0000
2FB6  3034              4305           DC    CKINT8,0,0          PARMCHCK,BUF1STRT,BUF1END               EXR42960
2FB8  0000
2FBA  0000
2FBC  0000              4306           DC    0,0,0               BUF1NEXT,DVRWRK1,DVRWRK2                EXR42970
2FBE  0000
2FC0  0000


2FC2  2FC8              4308  INT8PTR  DC    INT8PH0             PHASE 0 INITIALIZE.                     EXR42990
2FC4  2FD8              4309           DC    INT8PH1             PHASE 1 SET UP FOR INTERRUPTS           EXR43000
2FC6  3008              4310           DC    INT8PH2             PHASE 2 INTERRUPT RECEIVED              EXR43010
                        4311  * PHASE 0...INITIALIZE DCB                                                  EXR43020
                        4312  *                                                                           EXR43030
2FC8  4006 0018         4313  INT8PH0  STH   ZERO,DVRWRK1(DCBADR) CLEAR CURRENT LINE NUMBER              EXR43040
2FCC  4006 001A         4314           STH   ZERO,DVRWRK2(DCBADR) CLEAR CURRENT MASK VALUE               EXR43050
2FD0  24F2              4315           LIS   R15,ONE             PHASE 1 NEXT                            EXR43060
2FD2  40F6 0002         4316           STH   R15,PHASE(DCBADR)                                           EXR43070
2FD6  0303              4317           BR    RET1                                                        EXR43080


                        4319  * PHASE 1...SET UP FOR INTERRUPTS                                           EXR43100
                        4320  *                                                                           EXR43110
2FD8  4886 0018         4321  INT8PH1  LH    TEMP,DVRWRK1(DCBADR) GET LINE NUMBER                        EXR43120
2FDC  C480 0007         4322           NHI   TEMP,7                                                      EXR43130
2FE0  4086 0018         4323           STH   TEMP,DVRWRK1(DCBADR)                                        EXR43140
2FE4  C870 0080         4324           LHI   CHAR,X'80'                                                  EXR43150
2FE8  CC78 0000         4325           SRHL  CHAR,0(TEMP)        FORM MASK VALUE                         EXR43160
2FEC  4076 001A         4326           STH   CHAR,DVRWRK2(DCBADR)                                        EXR43170
2FF0  DE40 303C         4327           OC    DEV,INT8DSBL        DISABLE,LOAD MASK                       EXR43180
2FF4  9A47              4328           WDR   DEV,CHAR            OUTPUT MASK VALUE                       EXR43190
2FF6  DE40 303D         4329           OC    DEV,INT8CLR         CLEAR                                   EXR43200
2FFA  24F4              4330           LIS   R15,TWO             PHASE 2 NEXT                            EXR43210
2FFC  C890 0050         4331           LHI   DAT,X'50'           IMMEDIATE INTERRUPT MODE                EXR43220
3000  41C0 1D32         4332           BAL   RET3,STARTIO                                                EXR43230
3004  9A47              4333           WDR   DEV,CHAR                                                    EXR43240
3006  0303              4334           BR    RET1                WAIT FOR INTERRUPT                      EXR43250


                        4336  * PHASE 2...INTERRUPT RECEIVED                                              EXR43270
                        4337  *                                                                           EXR43280
3008  4886 0018         4338  INT8PH2  LH    TEMP,DVRWRK1(DCBADR) GET EXPECTED LINE NUMBER               EXR43290
300C  0894              4339           LHR   DAT,DEV             DEVICE NUMBER IDENTIFIES                EXR43300
```

EIGHT LINE INTERRUPT MODULE DRIVER

```
300E  C490 0007          4340           NHI   DAT,7               INTERRUPTING LINE                          EXR43310
3012  0598               4341           CLHR  DAT,TEMP            EQUALS EXPECTED LINE?                      EXR43320
3014  4230 1CE0          4342           BNE   INTRUPT3            IF NO, LOG UN-EXPECTED INTERRUPT           EXR43330
3016  DE40 303E          4343           OC    DEV,INT8REST        ISSUE RESET COMMAND                        EXR43340
301C  DA46 001B          4344           WD    DEV,DVRWRK2+1(DCBADR) CLEAR INTERRUPTS ON THIS LINE            EXR43350
3020  2681               4345           AIS   TEMP,1             SELECT NEXT LINE                           EXR43360
3022  4086 0018          4346           STH   TEMP,DVRWRK1(DCBADR)                                           EXR43370
3026  C4E0 BFFF          4347           NHI   R14,-1-BUSY                                                    EXR43375
302A  24F2               4348           LIS   R15,ONE             PHASE 1 NEXT                               EXR43380
302C  D0E6 0000          4349           STM   R14,0(DCBADR)                                                  EXR43390
3030  4300 1D0E          4350           B     ISRETURN            RETURN                                     EXR43400


3034  C880 0020          4352  CKINT8   LHI   TEMP,X'20'         DEFAULT DEVICE ADDRESS                     EXR43420
3038  4300 3E9C          4353           B     CKDEV                                                          EXR43430
                         4354  *                                                                            EXR43440
                         4355  *                                                                            EXR43450
303C  80                 4356  INT8DSBL DB    X'80'                                                        EXR43460
303D  08                 4357  INT8CLR  DB    X'08'                                                        EXR43470
303E  20                 4358  INT8REST DB    X'20'                                                        EXR43480
303F  00                 4359           DB    *                                                            EXR43490
                         4360           ENDC                                                               EXR43500
3040                     4361           IFNZ  ULI                                                          EXR43510
```

UNIVERSAL LOGIC INTERFACE DRIVER

```
3040  0000                4363  ULIDCB   DCX   0000,0,8000,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS      EXR43530
3042  0000
3044  8000
3046  0000
3048  0000
304A  305C                4364           DC    ULIPTR,0,0          DVRENTRY,CURWAIT,ERRCOUNT           EXR43540
304C  0000
304E  0000
3050  311E                4365           DC    CKULI               PARMCHCK                            EXR43550
3052  0000                4366           DC    0,0,0               BUF1STRT,BUF1END,BUF1NEXT           EXR43560
3054  0000
3056  0000
3058  0000                4367           DC    0,0                 DVRWRK1,DVRWRK2                     EXR43570
305A  0000


305C  3064                4369  ULIPTR   DC    ULIPH0              PHASE 0 INITIALIZE                  EXR43590
305E  307A                4370           DC    ULIPH1              PHASE 1 START HALFWORD TEST         EXR43600
3060  308C                4371           DC    ULIPH2              PHASE 2 WRITE & READ HALFWORDS      EXR43610
3062  30DA                4372           DC    ULIPH3              PHASE 3 WRITE & READ BYTES          EXR43620


                          4374  * PHASE 0 INITIALIZE                                                  EXR43640
                          4375  *                                                                     EXR43650
3064  4006 0018           4376  ULIPH0   STH   ZERO,DVRWRK1(DCBADR) CLEAR WORK REGISTERS            EXR43660
3068  4006 001A           4377           STH   ZERO,DVRWRK2(DCBADR)                                  EXR43670
306C  9E40                4378           OCR   DEV,ZERO            OUTPUT COMMAND ZERO               EXR43680
306E  24F2                4379           LIS   R15,ONE             PHASE 1 NEXT                      EXR43690
3070  D390 3126           4380           LB    DAT,ULIEBL          ENABLE INTERRUPTS                 EXR43700
3074  41C0 1D32           4381           BAL   RET3,STARTIO                                          EXR43710
3078  0303                4382           BR    RET1                WAIT FOR IT                       EXR43720


                          4384  * PHASE 1...START HALFWORD EXERCISE                                   EXR43740
                          4385  *                                                                     EXR43750
307A  C4E0 BFFF           4386  ULIPH1   NHI   R14,-1-BUSY         CLEAR DRIVER BUSY                 EXR43760
307E  DE40 3127           4387           OC    DEV,ULIHW           SELECT HALFWORD MODE              EXR43770
3082  24F4                4388           LIS   R15,TWO             PHASE 2 NEXT                      EXR43780
3084  D0E6 0000           4389           STM   R14,0(DCBADR)                                         EXR43790
3088  4300 1D0E           4390           B     ISRETURN                                              EXR43800


                          4392  * PHASE 2...WRITE AND READ HALFWORDS                                  EXR43820
                          4393  *                                                                     EXR43830
308C  D846 0018           4394  ULIPH2   WH    DEV,DVRWRK1(DCBADR) OUTPUT DATE PATTERN               EXR43840
3090  9949                4395           RHR   DEV,DAT             READ IT BACK                      EXR43850
3092  4596 0018           4396           CLH   DAT,DVRWRK1(DCBADR) TEST                              EXR43860
3096  4330 30BE           4397           BE    ULIP2L1             SKIP IF MATCH                     EXR43870
309A  41C0 1BCE           4398           BAL   RET3,ERRORLOG        GET SPACE ON ERROR QUEUE          EXR43880
```

UNIVERSAL LOGIC INTERFACE DRIVER

```
309E  4048 0002        4399          STH   DEV,2(TEMP)          STORE DEVICE NUMBER                    EXR43890
30A2  4058 0004        4400          STH   STAT,4(TEMP)         STORE DEVICE STATUS                    EXR43900
30A6  4098 000A        4401          STH   DAT,10(TEMP)         STORE ACTUAL DATA                      EXR43910
30AA  4896 0018        4402          LH    DAT,DVRWRK1(DCBADR)                                          EXR43920
30AE  4098 0008        4403          STH   DAT,8(TEMP)          STORE EXPECTED DATA                    EXR43930
30B2  C890 B050        4404          LHI   DAT,X'B050'                                                  EXR43940
30B6  4098 0000        4405          STH   DAT,0(TEMP)          STORE ERROR NUMBER                     EXR43950
30BA  41C0 1C0C        4406          BAL   RET3,QUEUECHK        CHECK THE QUEUE                        EXR43960
30BE  4886 0018        4407  ULIP2L1 LH    TEMP,DVRWRK1(DCBADR)                                         EXR43970
30C2  0A88             4408          AHR   TEMP,TEMP            SHIFT PATTERN                          EXR43980
30C4  2681             4409          AIS   TEMP,1               AND ADD ONE                            EXR43990
30C6  4086 0018        4410          STH   TEMP,DVRWRK1(DCBADR)                                         EXR44000
30CA  2681             4411          AIS   TEMP,1               TEST IF X'FFFF'                        EXR44010
30CC  0233             4412          BNZR  RET1                 LOOP IF NO                             EXR44020
30CE  DE40 3128        4413          OC    DEV,ULIB             YES, SELECT BYTE MODE                  EXR44030
30D2  24F6             4414          LIS   R15,THREE            PHASE 3 NEXT                           EXR44040
30D4  40F6 0002        4415          STH   R15,PHASE(DCBADR)                                            EXR44050
30D8  0303             4416          BR    RET1                                                         EXR44060

                       4418  * PHASE 3...WRITE AND READ BYTES                                           EXR44080
                       4419  *                                                                          EXR44090
30DA  DA46 001A        4420  ULIPH3  WD    DEV,DVRWRK2(DCBADR)  WRITE A BYTE                          EXR44100
30DE  9B49             4421          RDR   DEV,DAT              READ IT BACK                           EXR44110
30E0  D496 001A        4422          CLB   DAT,DVRWRK2(DCBADR)  SEE IF EQUAL                           EXR44120
30E4  4330 310C        4423          BE    ULIP3L1              SKIP IF YES                            EXR44130
30E8  41C0 1BCE        4424          BAL   RET3,ERRORLOG        ELSE, GET SPACE ON ERROR QUEUE         EXR44140
30EC  4048 0002        4425          STH   DEV,2(TEMP)          STORE DEVICE NUMBER                    EXR44150
30F0  4058 0004        4426          STH   STAT,4(TEMP)         STORE DEVICE STATUS                    EXR44160
30F4  4098 000A        4427          STH   DAT,10(TEMP)         STORE ACTUAL DATA                      EXR44170
30F8  4896 001A        4428          LH    DAT,DVRWRK2(DCBADR)                                          EXR44180
30FC  4098 0008        4429          STH   DAT,8(TEMP)          STORE DATA EXPECTED                    EXR44190
3100  C890 B050        4430          LHI   DAT,X'B050'                                                  EXR44200
3104  4098 0000        4431          STH   DAT,0(TEMP)          STORE ERROR NUMBER                     EXR44210
3108  41C0 1C0C        4432          BAL   RET3,QUEUECHK        CHECK THE ERROR QUEUE                  EXR44220
310C  C880 0100        4433  ULIP3L1 LHI   TEMP,X'0100'                                                 EXR44230
3110  6186 001A        4434          AHM   TEMP,DVRWRK2(DCBADR) INCREMENT DATA PATTERN                  EXR44240
3114  0383             4435          BNCR  RET1                 LOOP                                   EXR44250
3116  24F0             4436          LIS   R15,0                PHASE 0 NEXT                           EXR44260
3118  40F6 0002        4437          STH   R15,PHASE(DCBADR)                                            EXR44270
311C  0303             4438          BR    RET1                                                         EXR44280

311E  C880 008B        4440  CKULI   LHI   TEMP,X'8B'          DEFAULT ADDRESS                        EXR44300
3122  4300 3E9C        4441          B     CKDEV                                                        EXR44310
                       4442  *                                                                          EXR44320
3126  48               4443  ULIEBL  DB    X'48'                ENABLE                                 EXR44330
3127  E0               4444  ULIHW   DB    X'E0'                HALFWORD MODE                          EXR44340
3128  C0               4445  ULIB    DB    X'C0'                BYTE MODE                              EXR44350
3129  00               4446          DB    *                                                           EXR44360
                       4447          ENDC                                                              EXR44370
```

UNIVERSAL LOGIC INTERFACE DRIVER

```
312A                    4448        IFNZ  DIGTLMPX                    EXR44380
```

DIGITAL MULTIPLEXOR DRIVER

```
312A  0000                4450  DMUXDCB  DCX   0000,0,8000,0,0      FLAGS,PHASE,PARM,DEVADR,STATUS          EXR44400
312C  0000
312E  8000
3130  0000
3132  0000
3134  3146                4451           DC    DMUXPTR,0,0          DVRENTRY,CURWAIT,ERRCOUNT               EXR44410
3136  0000
3138  0000
313A  323A                4452           DC    CKDMUX               PARMCHCK                                EXR44420
313C  0000                4453           DCX   0000,0000,0000       BUF1STRT,BUF1END,BUF1NEXT               EXR44430
313E  0000
3140  0000
3142  0000                4454           DCX   0000,0000            DVRWRK1,DVRWRK2                         EXR44440
3144  0000
                          4455  *                                                                            EXR44450
                          4456  * SYSTEM MUST INCLUDE ONE CONTROLLER & ONE OR MORE INPUT MODULES,           EXR44460
                          4457  * ONE OR MORE OUTPUT MODULES AND TEST FIXTURE SK-523.                       EXR44470


3146  314C                4459  DMUXPTR  DC    DMUXPH0              PHASE 0 INITIALIZE, START OUTPUT        EXR44490
3148  317A                4460           DC    DMUXPH1              PHASE 1 WRITE INTERRUPTS                EXR44500
314A  31AA                4461           DC    DMUXPH2              PHASE 2 READ INTERRUPTS                 EXR44510


                          4463  * PHASE 0...INITIALIZE, START OUTPUT                                         EXR44530
                          4464  *                                                                            EXR44540
314C  4006 0018           4465  DMUXPH0  STH   ZERO,DVRWRK1(DCBADR) CLEAR DATA PATTERN & SEGMENT           EXR44550
3150  4006 001A           4466           STH   ZERO,DVRWRK2(DCBADR) INITIALIZE COUNTER                      EXR44560
3154  C880 0100           4467           LHI   TEMP,X'0100'                                                 EXR44570
3158  41C0 1DE8           4468           BAL   RET3,BLINK           BLINK BIT 15                            EXR44580
315C  DE40 3242           4469  DMUXP0L1 OC    DEV,DMUXSQW          SEQUENTIAL WRITE                        EXR44590
3160  DA46 0019           4470           WD    DEV,DVRWRK1+1(DCBADR) OUTPUT SEGMENT NUMBER                  EXR44600
3164  DD46 0008           4471           SS    DEV,STATUS(DCBADR)   CHECK STATUS                            EXR44610
3168  0213                4472           BMR   RET1               RETURN IF OU, STAY IN PHASE 0           EXR44620
316A  24F2                4473           LIS   R15,ONE              PHASE ONE NEXT                          EXR44630
316C  C890 0040           4474           LHI   DAT,X'40'            ENABLE                                  EXR44640
3170  41C0 1D32           4475           BAL   RET3,STARTIO                                                 EXR44650
3174  DA46 0018           4476           WD    DEV,DVRWRK1(DCBADR) OUTPUT FIRST BYTE                        EXR44660
3178  0303                4477           BR    RET1                 GO WAIT FOR INTERRUPT                   EXR44670


                          4479  * PHASE 1...WRITE INTERRUPTS, START READ                                     EXR44690
                          4480  *                                                                            EXR44700
317A  DA46 0018           4481  DMUXPH1  WD    DEV,DVRWRK1(DCBADR) OUTPUT DATA BYTE                         EXR44710
317E  4886 001A           4482           LH    TEMP,DVRWRK2(DCBADR)                                         EXR44720
3182  2681                4483           AIS   TEMP,1                INCREMENT SEGMENT                       EXR44730
3184  4086 001A           4484           STH   TEMP,DVRWRK2(DCBADR)                                         EXR44740
3188  C580 0010           4485           CLHI  TEMP,16              16 WRITE DATA'S YET?                    EXR44750
318C  4280 1D0E           4486           BL    ISRETURN             NO, WAIT FOR MORE                       EXR44760
3190  4006 001A           4487           STH   ZERO,DVRWRK2(DCBADR)                                         EXR44770
```

DIGITAL MULTIPLEXOR DRIVER

```
3194  DE40 3243          4488          OC    DEV,DMUXSQR           SEQUENTIAL READ                          EXR44780
3198  24F4               4489          LIS   R15,TWO              PHASE 2 NEXT                             EXR44790
319A  C890 0040          4490          LHI   DAT,X'40'             ENABLE INTERRUPTS                        EXR44800
319E  41C0 1D32          4491          BAL   RET3,STARTIO                                                   EXR44810
31A2  DA46 0019          4492          WD    DEV,DVRWRK1+1(DCBADR) INITIAL STARTING ADDRESS                 EXR44820
31A6  4300 1D0E          4493          B     ISRETURN                                                       EXR44830


                         4495  * PHASE 2...READ INTERRUPTS                                                  EXR44850
                         4496  *                                                                            EXR44860
31AA  9B49               4497  DMUXPH2 RDR   DEV,DAT               READ DATA                              EXR44870
31AC  D496 0018          4498          CLB   DAT,DVRWRK1(DCBADR) EQUALS THAT EXPECTED?                     EXR44880
31B0  4330 31E8          4499          BE    DMUXP2L1              SKIP IF YES                              EXR44890
31B4  4090 1E82          4500          STH   DAT,ACTUAL            SAVE DATA READ                           EXR44900
31B8  D396 0018          4501          LB    DAT,DVRWRK1(DCBADR)                                            EXR44910
31BC  4090 1E80          4502          STH   DAT,EXPECTED          SAVE DATA EXPECTED                       EXR44920
31C0  41C0 1BCE          4503          BAL   RET3,ERRORLOG         GET SPACE ON ERROR QUEUE                 EXR44930
31C4  C890 B050          4504          LHI   DAT,X'B050'           DATA TRANSFER ERROR                      EXR44940
31C8  4098 0000          4505          STH   DAT,0(TEMP)           STORE ERROR NUMBER                       EXR44950
31CC  4048 0002          4506          STH   DEV,2(TEMP)           STORE DEVICE NUMBER                      EXR44960
31D0  4058 0004          4507          STH   STAT,4(TEMP)          STORE STATUS                             EXR44970
31D4  4890 1E80          4508          LH    DAT,EXPECTED                                                   EXR44980
31D8  4098 0008          4509          STH   DAT,8(TEMP)           EXPECTED DATA                            EXR44990
31DC  4890 1E82          4510          LH    DAT,ACTUAL                                                     EXR45000
31E0  4098 000A          4511          STH   DAT,10(TEMP)          ACTUAL DATA                              EXR45010
31E4  41C0 1C0C          4512          BAL   RET3,QUEUECHK         CHECK THE QUEUE                          EXR45020
31E8  4886 001A          4513  DMUXP2L1 LH   TEMP,DVRWRK2(DCBADR)                                           EXR45030
31EC  2681               4514          AIS   TEMP,1                INCREMENT COUNT                          EXR45040
31EE  4086 001A          4515          STH   TEMP,DVRWRK2(DCBADR)                                           EXR45050
31F2  C580 0010          4516          CLHI  TEMP,16               16 READS YET?                            EXR45060
31F6  4280 1D0E          4517          BL    ISRETURN              WAIT IF NO                               EXR45070
31FA  4006 001A          4518          STH   ZERO,DVRWRK2(DCBADR) CLEAR COUNT                              EXR45080
31FE  D386 0018          4519          LB    TEMP,DVRWRK1(DCBADR)                                           EXR45090
3202  2681               4520          AIS   TEMP,1                INCREMENT DATA PATTERN                   EXR45100
3204  D286 0018          4521          STB   TEMP,DVRWRK1(DCBADR)                                           EXR45110
3208  C580 0100          4522          CLHI  TEMP,X'100'           LIMIT                                    EXR45120
320C  238E               4523          BNLS  DMUXP2L2              SKIP IF DONE                             EXR45130
320E  DE40 3242          4524          OC    DEV,DMUXSQW           SEQUENTIAL WRITE                         EXR45140
3212  24F2               4525          LIS   R15,ONE               PHASE 1 NEXT                             EXR45150
3214  C890 0040          4526          LHI   DAT,X'40'                                                      EXR45160
3218  41C0 1D32          4527          BAL   RET3,STARTIO                                                   EXR45170
321C  DA46 0019          4528          WD    DEV,DVRWRK1+1(DCBADR) OUTPUT START ADDRESS                     EXR45180
3220  DA46 0018          4529          WD    DEV,DVRWRK1(DCBADR) OUTPUT FIRST DATA BYTE                     EXR45190
3224  4300 1D0E          4530          B     ISRETURN                                                       EXR45200
3228  24F0               4531  DMUXP2L2 LIS  R15,0                 PHASE ZERO NEXT                          EXR45210
322A  C4E0 BFFF          4532          NHI   R14,-1-BUSY           CLEAR DRIVER BUSY                        EXR45220
322E  DE40 3243          4533          OC    DEV,DMUXSQR           DISABLE INTERRUPTS                       EXR45230
3232  D0E6 0000          4534          STM   R14,0(DCBADR)                                                  EXR45240
3236  4300 1D0E          4535          B     ISRETURN                                                       EXR45250
```

DIGITAL MULTIPLEXOR DRIVER

```
323A  C880 004B          4537  CKDMUX   LHI   TEMP,X'4B'        DEFAULT ADDRESS          EXR45270
323E  4300 3E9C          4538           B     CKDEV                                      EXR45280
                         4539  *                                                        EXR45290
                         4540  *                                                        EXR45300
3242  86                 4541  DMUXSQW  DB    X'86'                                      EXR45310
3243  85                 4542  DMUXSQR  DB    X'85'                                      EXR45320
                         4543           ENDC                                           EXR45330
```

SELCH DCBS

```
3244  0080              4545  SLCH1DCB DCX   0080,0,0000,0,0    FLAGS,PHASE,PARM,DEVADR,STATUS      EXR45350
3246  0000
3248  0000
324A  0000
324C  0000
324E  0000              4546           DC    0,0,0              DVRENTRY,CURWAIT,ERRCOUNT           EXR45360
3250  0000
3252  0000
3254                    4547           IFP   SELCHS-1                                            EXR45370
3254  0090              4548  SLCH2DCB DCX   0080,0,0000,0,0    FLAGS,PHASE,PARM,DEVADR,STATUS      EXR45380
3256  0000
3258  0000
325A  0000
325C  0000
325E  0000              4549           DC    0,0,0              DVRENTRY,CURWAIT,ERRCOUNT           EXR45390
3260  0000
3262  0000
3264                    4550           IFP   SELCHS-2                                            EXR45400
3264  0080              4551  SLCH3DCB DCX   0080,0,0000,0,0    FLAGS,PHASE,PARM,DEVADR,STATUS      EXR45410
3266  0000
3268  0000
326A  0000
326C  0000
326E  0000              4552           DC    0,0,0              DVRENTRY,CURWAIT,ERRCOUNT           EXR45420
3270  0000
3272  0000
3274                    4553           IFP   SELCHS-3                                            EXR45430
3274  0080              4554  SLCH4DCB DCX   0080,0,0000,0,0    FLAGS,PHASE,PARM,DEVADR,STATUS      EXR45440
3276  0000
3278  0000
327A  0000
327C  0000
327E  0000              4555           DC    0,0,0              DVRENTRY,CURWAIT,ERRCOUNT           EXR45450
3280  0000
3282  0000
                        4556           ENDC                                                      EXR45460
                        4557           ENDC                                                      EXR45470
                        4558           ENDC                                                      EXR45480
3284                    4559           IFNZ  SLCHTSTR                                            EXR45490
```

SELCH TESTER DRIVER

```
3284  0022          4561  SLCHTDCB DCX   0022,0,A840,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS          EXR45510
3286  0000
3288  A840
328A  0000
328C  0000
328E  32AC          4562        DC     SLCHPTR,0,0,CKSLCH  DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK    EXR45520
3290  0000
3292  0000
3294  3304
3296  3FD6          4563        DC     SLCHPAT,SLCHPATE,SLCHPAT BUF1STRT,BUF1END,BUF1NEXT          EXR45530
3298  4005
329A  3FD6
329C  0000          4564        DCX    0000,0000           DVRWRK1,DVRWRK2                         EXR45540
329E  0000
32A0  0000          4565        DB     0,0                 BUF1EXT,BUF2EXT                         EXR45550
32A2  4876          4566        DC     SLCHBUF,SLCHBUFE,SLCHBUF BUF2STRT,BUF2END,BUF2STRT          EXR45560
32A4  4975
32A6  4876
32A8  0000          4567        DCX    0000                SELCHADR                                EXR45570
32AA  0000          4568        DB     0,0                 SLCHGOR,SLCHGOW                         EXR45580
```

```
                0000 32AC          4570  SLCHPTR  EQU   *                                                    EXR45600
32AC            32B6               4571  SLCHPHTB DC    SLCHPH0            PHASE 0 INIT,CLEAR              EXR45610
32AE            32F2               4572           DC    SLCHPH1            PHASE 1 START WRITE             EXR45620
32B0            334E               4573           DC    SLCHPH2            PHASE 2 SELCH INTERRUPT         EXR45630
32B2            3360               4574           DC    SLCHPH3            PHASE 3 START READ              EXR45640
32B4            33BE               4575           DC    SLCHPH4            PHASE 4 SELCH INTERRUPT         EXR45650

                                   4577  * PHASE 0...INITIALIZATION, CLEAR                                    EXR45670
                                   4578  *                                                                    EXR45680
32B6    0884                       4579  SLCHPH0  LHR   TEMP,DEV                                             EXR45690
32B8    4086 0018                  4580           STH   TEMP,DVRWRK1(DCBADR) SAVE FOR OTHER PHASES           EXR45700
32BC    41B0 1DB4                  4581           BAL   RET2,TESTLOCK       CHECK INTERLOCK                 EXR45710
32C0    0799                       4582           XHR   DAT,DAT                                              EXR45720
32C2    0788                       4583           XHR   TEMP,TEMP                                            EXR45730
32C4    4089 3FD6                  4584  SLCHP0L2 STH   TEMP,SLCHPAT(DAT)                                   EXR45740
32C8    2692                       4585           AIS   DAT,2                                               EXR45750
32CA    CA80 0101                  4586           AHI   TEMP,X'0101'                                        EXR45760
32CE    2285                       4587           BNCS  SLCHP0L2                                           EXR45770
32D0    4886 0024                  4588           LH    TEMP,SELCHADR(DCBADR)                              EXR45780
32D4    41B0 1DB4                  4589           BAL   RET2,TESTLOCK       TEST SELCH INTERLOCK            EXR45790
32D8    9D45                       4590           SSR   DEV,STAT                                           EXR45800
32DA    D256 0008                  4591           STB   STAT,STATUS(DCBADR)                                 EXR45810
32DE    2314                       4592           BNMS  SLCH0L1            SKIP IF NOT DU                  EXR45820
32E0    41C0 1D42                  4593           BAL   RET3,BSTATERR       LOG BAD STATUS ERROR            EXR45830
32E4    0303                       4594           BR    RET1                                               EXR45840
32E6    24F2                       4595  SLCH0L1  LIS   R15,ONE            PHASE 1 NEXT                    EXR45850
32E8    C4E0 CFFF                  4596           NHI   R14,-1-BADSTAT-NOTCOUNT                            EXR45860
32EC    D0E6 0000                  4597           STM   R14,0(DCBADR)                                      EXR45870
32F0    0303                       4598           BR    RET1                                               EXR45880

                                   4600  * PHASE 1...START WRITE                                              EXR45900
                                   4601  *                                                                    EXR45910
32F2    D386 001C                  4602  SLCHPH1  LB    TEMP,BUF1EXT(DCBADR)                               EXR45920
32F6    C680 0010                  4603           OHI   TEMP,SELCHGOW                                      EXR45930
32FA    D286 0027                  4604           STB   TEMP,SLCHGOW(DCBADR)                               EXR45940
32FE    C880 0100                  4605           LHI   TEMP,X'0100'         BLINK BIT 15                  EXR45950
3302    41C0 1DE8                  4606           BAL   RET3,BLINK                                         EXR45960
3306    4886 0018                  4607           LH    TEMP,DVRWRK1(DCBADR)                               EXR45970
330A    41B0 1DB4                  4608           BAL   RET2,TESTLOCK       CHECK INTERLOCK                 EXR45980
330E    4686 0024                  4609           LH    TEMP,SELCHADR(DCBADR)                              EXR45990
3312    41B0 1DB4                  4610           BAL   RET2,TESTLOCK       CHECK SELCH INTERLOCK           EXR46000
3316    DD46 0008                  4611           SS    DEV,STATUS(DCBADR)                                 EXR46010
331A    2315                       4612           BNMS  SLCH1L1            SKIP IF NOT DU                  EXR46020
331C    07FF                       4613  SLCHTOP0 XHR   R15,R15                                           EXR46030
331E    40F6 0002                  4614  SLCHTOPX STH   R15,PHASE(DCBADR)   BACK TO PHASE 0 IF DU           EXR46040
3322    0303                       4615           BR    RET1               RETURN                          EXR46050
3324    4886 0018                  4616  SLCH1L1  LH    TEMP,DVRWRK1(DCBADR)                               EXR46060
3328    41B0 1DC8                  4617           BAL   RET2,SETLOCK        SET SELCH TESTER INTERLOCK      EXR46070
332C    4896 0024                  4618           LH    DAT,SELCHADR(DCBADR) PICK UP SELCH ADDRESS           EXR46080
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3330  C856 0012          4619          LHI   STAT,BUF1STRT(DCBADR) POINT TO START&END ADDRESSES      EXR46090
3334  41B0 1FD6          4620          BAL   RET2,SLCHSET        SET UP SELCH FOR TRANSFER          EXR46100
3338  24F4               4621          LIS   R15,TWO             PHASE 2 NEXT FOR SELCH INTERRUPT   EXR46110
333A  D390 33EB          4622          LB    DAT,SLCHINCR                                           EXR46120
333E  41C0 1D32          4623          BAL   RET3,STARTIO        SET-UP                             EXR46130
3342  4886 0024          4624          LH    TEMP,SELCHADR(DCBADR)                                  EXR46140
3346  DE86 0027          4625          OC    TEMP,SLCHGOW(DCBADR) START SELCH                       EXR46150
334A  9587               4626          EPSR  TEMP,CHAR           RESTORE PSW                        EXR46160
334C  0303               4627          BR    RET1                                                   EXR46170

                         4629  * PHASE 2...SELCH INTERRUPT AFTER WRITE                              EXR46190
                         4630  *                                                                    EXR46200
334E  4856 0014          4631  SLCHPH2 LH    STAT,BUF1END(DCBADR) EXPECTED END ADDRESS              EXR46210
3352  41B0 2020          4632          BAL   RET2,SLCHENDW       STOP SELCH, CHECK END ADRS         EXR46220
3356  24F6               4633          LIS   R15,THREE           PHASE 3 NEXT                       EXR46230
3358  40F6 0002          4634          STH   R15,PHASE(DCBADR)                                      EXR46240
335C  4300 1D0E          4635          B     ISRETURN                                               EXR46250

                         4637  * PHASE 3...START READ                                               EXR46270
                         4638  *                                                                    EXR46280
3360  DE40 33EA          4639  SLCHPH3 OC    DEV,SLCHCLR         CLEAR TESTER                       EXR46290
3364  D840 07D8          4640          WH    DEV,ZEROS                                              EXR46300
3368  D386 001D          4641          LB    TEMP,BUF2EXT(DCBADR)                                   EXR46310
336C  C680 0030          4642          OHI   TEMP,SELCHGOR                                          EXR46320
3370  D286 0026          4643          STB   TEMP,SLCHGOR(DCBADR)                                   EXR46330
3374  4886 0018          4644          LH    TEMP,DVRWRK1(DCBADR)                                   EXR46340
3378  41B0 1DB4          4645          BAL   RET2,TESTLOCK       CHECK DEVICE INTERLOCK             EXR46350
337C  4886 0024          4646          LH    TEMP,SELCHADR(DCBADR)                                  EXR46360
3380  41B0 1DB4          4647          BAL   RET2,TESTLOCK       TEST SELCH INTERLOCK               EXR46370
3384  4846 0006          4648          LH    DEV,DEVADR(DCBADR)                                     EXR46380
3388  DD46 0008          4649          SS    DEV,STATUS(DCBADR)  SAVE DEVICE STATUS                 EXR46390
338C  4210 331C          4650          BTC   1,SLCHTOP0          PHASE 0 NEXT IF DU                 EXR46400
3390  41B0 1F62          4651          BAL   RET2,BUFCLEAR       CLEAR BUFFER 2                     EXR46410
3394  4886 0018          4652          LH    TEMP,DVRWRK1(DCBADR)                                   EXR46420
3398  41B0 1DC8          4653          BAL   RET2,SETLOCK        SET DEVICE INTERLOCK               EXR46430
339C  4896 0024          4654          LH    DAT,SELCHADR(DCBADR)                                   EXR46440
33A0  C856 001E          4655          LHI   STAT,BUF2STRT(DCBADR)                                  EXR46450
33A4  41B0 1FD6          4656          BAL   RET2,SLCHSET        SET UP THE SELCH                   EXR46460
33A8  24F8               4657          LIS   R15,FOUR            PHASE 4 NEXT                       EXR46470
33AA  D390 33EB          4658          LB    DAT,SLCHINCR                                           EXR46480
33AE  41C0 1D32          4659          BAL   RET3,STARTIO        SET-UP THE DEVICE                  EXR46490
33B2  4886 0024          4660          LH    TEMP,SELCHADR(DCBADR)                                  EXR46500
33B6  DE86 0026          4661          OC    TEMP,SLCHGOR(DCBADR) START THE SELCH                   EXR46510
33BA  9587               4662          EPSR  TEMP,CHAR           RESTORE PSW                        EXR46520
33BC  0303               4663          BR    RET1                RETURN TO DISPATCHER               EXR46530

                         4665  * PHASE 4...SELCH INTERRUPT                                          EXR46550
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                        4666  *                                                                    EXR46560
33BE   4856 0020        4667  SLCHPH4  LH     STAT,BUF2END(DCBADR)                                 EXR46570
33C2   41B0 201A        4668           BAL    RET2,SLCHENDR       STOP SELCH, CHECK END ADDRESS    EXR46580
33C6   41B0 1DFC        4669           BAL    RET2,COMPARE                                         EXR46590
33CA   41B0 1E84        4670           BAL    RET2,BUFFMOVE                                        EXR46600
33CE   24F2             4671           LIS    R15,ONE             PHASE 1 NEXT                     EXR46610
33D0   4300 331E        4672           B      SLCHTOPX                                             EXR46620


33D4   4886 0024        4674  CKSLCH   LH     TEMP,SELCHADR(DCBADR) SELCH ADDRESS GIVEN?           EXR46640
33D8   2135             4675           BNZS   CKSLCH1              SKIP IF YES                     EXR46650
33DA   C880 00F0        4676           LHI    TEMP,X'F0'          DEFAULT                          EXR46660
33DE   4086 0024        4677           STH    TEMP,SELCHADR(DCBADR)                                EXR46670
33E2   C880 00D0        4678  CKSLCH1  LHI    TEMP,X'D0'          DEFAULT DEVICE ADDRESS           EXR46680
33E6   4300 3E9C        4679           B      CKDEV                                                EXR46690
                        4680  *                                                                    EXR46700
                        4681  *                                                                    EXR46710
                        4682  *                                                                    EXR46720
33EA   02               4683  SLCHCLR  DB     X'02'                                                EXR46730
33EB   04               4684  SLCHINCR DB     X'04'                                                EXR46740
33EC                    4685           DB     *                                                    EXR46750
                        4686           ENDC                                                        EXR46760
33EC                    4687           IFNZ   MAGTAPE                                              EXR46770
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33EC  0022              4689  MAGDCB1  DCX   0022,0,A840,0,0      FLAGS,PHASE,PARM,DEVADR,STATUS          EXR46790
33EE  0000
33F0  A840
33F2  0000
33F4  0000
33F6  348C              4690           DC    MAGPTR,0,0,CKMAG     DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR46800
33F8  0000
33FA  0000
33FC  36BA
33FE  3ED6              4691           DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT          EXR46810
3400  3FD5
3402  3ED6
3404  0000              4692           DCX   0000,0000            DVRWRK1,DVRWRK2                         EXR46820
3406  0000
3408  0000              4693           DC    0                    BUF1EXT,BUF2EXT                         EXR46830
340A  4976              4694           DC    MAG1BUF              BUF2STRT (READ)                         EXR46840
340C  4A75              4695           DC    MAG1BUFE             BUF2END                                 EXR46850
340E  4976              4696           DC    MAG1BUF              BUF2NEXT                                EXR46860
3410  0000              4697           DCX   0000                 SELCHADR                                EXR46870
3412  0000              4698           DC    0                    SLCHGOR,SLCHGOW                         EXR46880
3414                    4699           IFP   MAGTAPE-1                                                    EXR46890
3414  0022              4700  MAGDCB2  DCX   0022,0,A840,0,0      FLAGS,PHASE,PARM,DEVADR,STATUS          EXR46900
3416  0000
3418  A840
341A  0000
341C  0000
341E  348C              4701           DC    MAGPTR,0,0,CKMAG     DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR46910
3420  0000
3422  0000
3424  36BA
3426  3ED6              4702           DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT          EXR46920
3428  3FD5
342A  3ED6
342C  0000              4703           DCX   0000,0000            DVRWRK1,DVRWRK2                         EXR46930
342E  0000
3430  0000              4704           DC    0                    BUF1EXT,BUF2EXT                         EXR46940
3432  4A76              4705           DC    MAG2BUF              BUF2STRT (READ)                         EXR46950
3434  4B75              4706           DC    MAG2BUFE             BUF2END                                 EXR46960
3436  4A76              4707           DC    MAG2BUF              BUF2NEXT                                EXR46970
3438  0000              4708           DCX   0000                 SELCHADR                                EXR46980
343A  0000              4709           DC    0                    SLCHGOR,SLCHGOW                         EXR46990
343C                    4710           IFP   MAGTAPE-2                                                    EXR47000
343C  0022              4711  MAGDCB3  DCX   0022,0,A840,0,0      FLAGS,PHASE,PARM,DEVADR,STATUS          EXR47010
343E  0000
3440  A840
3442  0000
3444  0000
3446  348C              4712           DC    MAGPTR,0,0,CKMAG     DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR47020
3448  0000
344A  0000
344C  36BA
344E  3ED6              4713           DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT          EXR47030
3450  3FD5
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3452  3ED6
3454  0000                4714            DCX   0000,0000           DVRWRK1,DVRWRK2                          EXR47040
3456  0000
3458  0000                4715            DC    0                   BUF1EXT,BUF2EXT                          EXR47050
345A  4B76                4716            DC    MAG3BUF             BUF2STRT (READ)                          EXR47060
345C  4C75                4717            DC    MAG3BUFE            BUF2END                                  EXR47070
345E  4B76                4718            DC    MAG3BUF             BUF2NEXT                                 EXR47080
3460  0000                4719            DCX   0000                SELCHADR                                 EXR47090
3462  0000                4720            DC    0                   SLCHGOR,SLCHGOW                          EXR47100
3464                      4721            IFP   MAGTAPE-3                                                    EXR47110
3464  0022                4722  MAGDCB4   DCX   0022,0,A840,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS           EXR47120
3466  0000
3468  A840
346A  0000
346C  0000
346E  348C                4723            DC    MAGPTR,0,0,CKMAG    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK       EXR47130
3470  0000
3472  0000
3474  36BA
3476  3ED6                4724            DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT       EXR47140
3478  3FD5
347A  3ED6
347C  0000                4725            DCX   0000,0000           DVRWRK1,DVRWRK2                          EXR47150
347E  0000
3480  0000                4726            DC    0                   BUF1EXT,BUF2EXT                          EXR47160
3482  4C76                4727            DC    MAG4BUF             BUF2STRT (READ)                          EXR47170
3484  4D75                4728            DC    MAG4BUFE            BUF2END                                  EXR47180
3486  4C76                4729            DC    MAG4BUF             BUF2NEXT                                 EXR47190
3488  0000                4730            DCX   0000                SELCHADR                                 EXR47200
348A  0000                4731            DC    0                   SLCHGOR,SLCHGOW                          EXR47210
                          4732            ENDC                                                               EXR47220
                          4733            ENDC                                                               EXR47230
                          4734            ENDC                                                               EXR47240

      0000 346C           4736  MAGPTR    EQU   *                                                          EXR47260
348C  34A6                4737  MAGPHTB   DC    MAGPH0              PHASE 0 INIT,CLEAR,WAIT DU               EXR47270
348E  34DA                4738            DC    MAGPH1              PHASE 1 WAIT NOMTN, WRITE FM             EXR47280
3490  3538                4739            DC    MAGPH2              PHASE 2 NMTN INTERRUPT                   EXR47290
3492  354E                4740            DC    MAGPH3              PHASE 3 START WRITE                      EXR47300
3494  35A2                4741            DC    MAGPH4              PHASE 4 SELCH INTERRUPT                  EXR47310
3496  35BC                4742            DC    MAGPH5              PHASE 5 NMTN INTERRUPT                   EXR47320
3498  35CE                4743            DC    MAGPH6              PHASE 6 BACK SPACE                       EXR47330
349A  35FA                4744            DC    MAGPH7              PHASE 7 NMTN INTERRUPT                   EXR47340
349C  360C                4745            DC    MAGPH8              PHASE 8 START READ                       EXR47350
349E  3664                4746            DC    MAGPH9              PHASE 9 SELCH INTERRUPT                  EXR47360
34A0  3674                4747            DC    MAGPH10             PHASE 10 NMTN INTERRUPT                  EXR47370
34A2  3686                4748            DC    MAGPH11             PHASE 11 COMPARE DATA                    EXR47380
34A4  3694                4749            DC    MAGPH12             PHASE 12 DISARM, REWIND                  EXR47390
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                          4751  * PHASE 0...INITIALIZATION, CLEAR, WAIT FOR DU STATUS TO CLEAR          EXR47410
                          4752  *                                                                       EXR47420
34A6   0884               4753  MAGPH0   LHR   TEMP,DEV                                                EXR47430
34A8   C480 03CF          4754           NHI   TEMP,X'3CF'          CLEAR TRANSPORT SELECT BITS       EXR47440
34AC   4086 0018          4755           STH   TEMP,DVRWRK1(DCBADR) SAVE FOR OTHER PHASES             EXR47450
34B0   41B0 1DB4          4756           BAL   RET2,TESTLOCK        CHECK INTERLOCK                   EXR47460
34B4   4886 0024          4757           LH    TEMP,SELCHADR(DCBADR)                                   EXR47470
34B8   41B0 1DB4          4758           BAL   RET2,TESTLOCK        TEST SELCH INTERLOCK              EXR47480
34BC   DE40 36D1          4759           OC    DEV,MAGCLEAR        CLEAR CONTROLLER                  EXR47490
34C0   9D45               4760           SSR   DEV,STAT                                              EXR47500
34C2   D256 0008          4761           STB   STAT,STATUS(DCBADR) SAVE STATUS                       EXR47510
34C6   2314               4762           BNMS  MAG0L1              SKIP IF NOT DU                    EXR47520
34C8   41C0 1D42          4763           BAL   RET3,BSTATERR       LOG BAD STATUS ERROR              EXR47530
34CC   0303               4764           BR    RET1                                                  EXR47540
34CE   24F2               4765  MAG0L1   LIS   R15,ONE             PHASE 1 NEXT                      EXR47550
34D0   C4E0 CFFF          4766           NHI   R14,-1-BADSTAT-NOTCOUNT                               EXR47560
34D4   D0E6 0000          4767           STM   R14,0(DCBADR)                                         EXR47570
34D8   0303               4768           BR    RET1                                                  EXR47580

                          4770  * PHASE 1...WRITE FILE MARK, CHECK WRITE PROTECT                        EXR47600
                          4771  *                                                                       EXR47610
34DA   4886 0018          4772  MAGPH1   LH    TEMP,DVRWRK1(DCBADR)                                    EXR47620
34DE   41B0 1DB4          4773           BAL   RET2,TESTLOCK        CHECK INTERLOCK                   EXR47630
34E2   4886 0024          4774           LH    TEMP,SELCHADR(DCBADR)                                   EXR47640
34E6   41B0 1DB4          4775           BAL   RET2,TESTLOCK        CHECK SELCH INTERLOCK             EXR47650
34EA   9D45               4776           SSR   DEV,STAT                                              EXR47660
34EC   D256 0008          4777           STB   STAT,STATUS(DCBADR) SAVE STATUS                       EXR47670
34F0   C350 0010          4778           THI   STAT,X'10'          MOTION?                           EXR47680
34F4   2136               4779           BNZS  MAG1L1              SKIP IF NO                        EXR47690
34F6   C6E0 2000          4780           OHI   R14,NOTCOUNT        SET NOT-COUNTING                  EXR47700
34FA   40E6 0000          4781           STH   R14,0(DCBADR)                                         EXR47710
34FE   0303               4782           BR    RET1                                                  EXR47720
3500   DE40 36D0          4783  MAG1L1   OC    DEV,MAGEOF          WRITE EOF, QUEUE INTERRUPT        EXR47730
3504   9D45               4784           SSR   DEV,STAT                                              EXR47740
3506   D256 0008          4785           STB   STAT,STATUS(DCBADR) SAVE STATUS                       EXR47750
350A   2315               4786           BNMS  MAG1L2              SKIP IF NOT DU                    EXR47760
350C   07FF               4787           XHR   R15,R15             PHASE ZERO NEXT                   EXR47770
350E   40F6 0002          4788           STH   R15,PHASE(DCBADR)                                     EXR47780
3512   2304               4789           BS    MAG1L3                                                EXR47790
                          4790  *                                                                       EXR47800
3514   C350 0010          4791  MAG1L2   THI   STAT,X'10'          MOTION?                           EXR47810
3518   2336               4792           BZS   MAG1L4              SKIP IF YES                       EXR47820
351A   DE40 0D16          4793  MAG1L3   OC    DEV,DISARM                                            EXR47830
351E   41C0 1D42          4794           BAL   RET3,BSTATERR       LOG BAD STATUS ERROR              EXR47840
3522   0303               4795           BR    RET1                WAIT FOR GOOD STATUS              EXR47850
3524   4886 0018          4796  MAG1L4   LH    TEMP,DVRWRK1(DCBADR) WRITE EOF STARTED OK               EXR47860
3528   41B0 1DC8          4797           BAL   RET2,SETLOCK        SET INTERLOCK                     EXR47870
352C   24F4               4798           LIS   R15,TWO             PHASE 2 NEXT                      EXR47880
352E   D390 0D17          4799           LB    DAT,ENABLE          ENABLE INTERRUPTS                 EXR47890
3532   41C0 1D32          4800           BAL   RET3,STARTIO        SET-UP                            EXR47900
3536   0303               4801           BR    RET1                RETURN                            EXR47910
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                        4803  * PHASE 2...EOM AND NOMOTION INTERRUPTS AFTER EOF                    EXR47930
                        4804  *                                                                   EXR47940
3538  41B0 1F8E         4805  MAGPH2   BAL   RET2,MAGSTAT       CHECK INTERRUPT STATUS          EXR47950
353C  D3F9 3548         4806           LB    R15,MAG2NXT(DAT)  SELECT NEXT PHASE               EXR47960
3540  40F6 0002         4807  MAGXL1   STH   R15,PHASE(DCBADR)                                   EXR47970
3544  4300 1D0E         4808           B     ISRETURN                                            EXR47980
                        4809  *                                                                   EXR47990
3548  0600 0418 06      4810  MAG2NXT  DB    THREE,ZERO,TWO,TWELVE,THREE                         EXR48000
354D  00                4811           DB    *                                                   EXR48010


                        4813  * PHASE 3...START WRITE                                            EXR48030
                        4814  *                                                                   EXR48040
354E  D386 001C         4815  MAGPH3   LB    TEMP,BUF1EXT(DCBADR)                                EXR48050
3552  C680 0010         4816           OHI   TEMP,SELCHGOW                                       EXR48060
3556  D286 0027         4817           STB   TEMP,SLCHGOW(DCBADR)                                EXR48070
355A  4886 0018         4818           LH    TEMP,DVRWRK1(DCBADR)                                EXR48080
355E  41B0 1DB4         4819           BAL   RET2,TESTLOCK       CHECK INTERLOCK                 EXR48090
3562  4886 0024         4820           LH    TEMP,SELCHADR(DCBADR)                               EXR48100
3566  41B0 1DB4         4821           BAL   RET2,TESTLOCK       CHECK SELCH INTERLOCK           EXR48110
356A  DD46 0008         4822           SS    DEV,STATUS(DCBADR)                                  EXR48120
356E  2315              4823           BNMS  MAG3L1              SKIP IF NOT DU                  EXR48130
3570  07FF              4824  MAGTOP0  XHR   R15,R15                                            EXR48140
3572  40F6 0002         4825  MAGTOPX  STH   R15,PHASE(DCBADR)  BACK TO PHASE 0 IF DU           EXR48150
3576  0303              4826           BR    RET1               RETURN                          EXR48160
3578  4886 0018         4827  MAG3L1   LH    TEMP,DVRWRK1(DCBADR)                                EXR48170
357C  41B0 1DC8         4828           BAL   RET2,SETLOCK        SET MAG TAPE INTERLOCK BIT      EXR48180
3580  4896 0024         4829           LH    DAT,SELCHADR(DCBADR) PICK UP SELCH ADDRESS          EXR48190
3584  C856 0012         4830           LHI   STAT,BUF1STRT(DCBADR) POINT TO START & END ADRS     EXR48200
3588  41B0 1FD6         4831           BAL   RET2,SLCHSET        SET-UP SELCH FOR TRANSFER       EXR48210
358C  24F8              4832           LIS   R15,FOUR            PHASE 4 FOR SELCH INTERRUPT     EXR48220
358E  D390 36D2         4833           LB    DAT,MAGWRT          DISARM,WRITE                    EXR48230
3592  41C0 1D32         4834           BAL   RET3,STARTIO        SET-UP                          EXR48240
3596  4886 0024         4835           LH    TEMP,SELCHADR(DCBADR)                               EXR48250
359A  DE86 0027         4836           OC    TEMP,SLCHGOW(DCBADR) START SELCH                    EXR48260
359E  9587              4837           EPSR  TEMP,CHAR           RESTORE STATUS                  EXR48270
35A0  0303              4838           BR    RET1                RETURN                          EXR48280


                        4840  * PHASE 4...SELCH INTERRUPT AFTER WRITE                            EXR48300
                        4841  *                                                                   EXR48310
35A2  4856 0014         4842  MAGPH4   LH    STAT,BUF1END(DCBADR) PICK UP EXPECTED END ADRS      EXR48320
35A6  41B0 2020         4843           BAL   RET2,SLCHENDW       STOP SELCH, CHECK END ADRS      EXR48330
35AA  24FA              4844           LIS   R15,FIVE            PHASE 5 FOR NO MOTION           EXR48340
35AC  4846 0006         4845  MAGNMTN  LH    DEV,DEVADR(DCBADR)                                  EXR48350
35B0  D390 0D17         4846           LB    DAT,ENABLE          ALLOW NMTN INTERRUPT            EXR48360
35B4  41C0 1D32         4847           BAL   RET3,STARTIO        SET-UP                          EXR48370
35B8  4300 1D0E         4848           B     ISRETURN            RETURN                          EXR48380
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                          4850  * PHASE 5...NO MOTION INTERRUPT AFTER WRITE                                  EXR48400
                          4851  *                                                                            EXR48410
35BC   41B0 1F8E          4852  MAGPH5   BAL   RET2,MAGSTAT        CHECK INTERRUPT STATUS                   EXR48420
35C0   D3F9 35C8          4853           LB    R15,MAG5NXT(DAT)    SELECT NEXT PAHSE                        EXR48430
35C4   4300 3540          4854           B     MAGXL1                                                       EXR48440
                          4855  *                                                                            EXR48450
35C8   0C00 0A18 06       4856  MAG5NXT  DB    SIX,ZERO,FIVE,TWELVE,THREE                                   EXR48460
35CD   00                 4857           DB    *                                                            EXR48470


                          4859  * PHASE 6...BACKSPACE ONE RECORD                                             EXR48490
                          4860  *                                                                            EXR48500
35CE   4886 0024          4861  MAGPH6   LH    TEMP,SELCHADR(DCBADR)                                        EXR48510
35D2   41B0 1DB4          4862           BAL   RET2,TESTLOCK       TEST SELCH INTERLOCK                     EXR48520
35D6   4886 0018          4863           LH    TEMP,DVRWRK1(DCBADR)                                         EXR48530
35DA   41B0 1DB4          4864           BAL   RET2,TESTLOCK       TEST DEVICE INTERLOCK                    EXR48540
35DE   DD46 0008          4865           SS    DEV,STATUS(DCBADR)  SAVE STATUS                              EXR48550
35E2   4210 3570          4866           BM    MAGTOP0             PHASE 0 NEXT IF DU                       EXR48560
35E6   4886 0018          4867           LH    TEMP,DVRWRK1(DCBADR)                                         EXR48570
35EA   41B0 1DC8          4868           BAL   RET2,SETLOCK        SET DEVICE INTERLOCK BIT                 EXR48580
35EE   24FE               4869           LIS   R15,SEVEN           PHASE 7 NEXT FOR EOM INTERRUPT           EXR48590
35F0   D390 3603          4870           LB    DAT,MAGBKSPC        BACK SPACE COMMAND                       EXR48600
35F4   41C0 1D32          4871           BAL   RET3,STARTIO        SET-UP                                   EXR48610
35F8   0303               4872           BR    RET1                RETURN                                   EXR48620


                          4874  * PHASE 7...EOM AND NO MOTION INTERRUPTS AFTER BACKSPACE                     EXR48640
                          4875  *                                                                            EXR48650
35FA   41B0 1F8E          4876  MAGPH7   BAL   RET2,MAGSTAT        CHECK INTERRUPT STATUS                   EXR48660
35FE   D3F9 3606          4877           LB    R15,MAG7NXT(DAT)    SELECT NEXT.PHASE                        EXR48670
3602   4300 3540          4878           B     MAGXL1                                                       EXR48680
                          4879  *                                                                            EXR48690
3606   1000 0E18 06       4880  MAG7NXT  DB    EIGHT,ZERO,SEVEN,TWELVE,THREE                                EXR48700
360B   00                 4881           DB    *                                                            EXR48710


                          4883  * PHASE 8...START READ                                                       EXR48730
                          4884  *                                                                            EXR48740
360C   D386 001D          4885  MAGPH8   LB    TEMP,BUF2EXT(DCBADR)                                         EXR48750
3610   C680 0030          4886           OHI   TEMP,SELCHGOR                                                EXR48760
3614   D286 0026          4887           STB   TEMP,SLCHGOR(DCBADR)                                         EXR48770
3618   4886 0018          4888           LH    TEMP,DVRWRK1(DCBADR)                                         EXR48780
361C   41B0 1DB4          4889           BAL   RET2,TESTLOCK       TEST DEVICE INTERLOCK                    EXR48790
3620   4886 0024          4890           LH    TEMP,SELCHADR(DCBADR)                                        EXR48800
3624   41B0 1DB4          4891           BAL   RET2,TESTLOCK       TEST SELCH INTERLOCK                     EXR48810
3628   4846 0006          4892           LH    DEV,DEVADR(DCBADR)                                           EXR48820
362C   DD46 0008          4893           SS    DEV,STATUS(DCBADR)  SAVE DEVICE STATUS                       EXR48830
3630   4210 3570          4894           BTC   1,MAGTOP0           PHASE 0 NEXT IF DU                       EXR48840
3634   41B0 1F62          4895           BAL   RET2,BUFCLEAR       CLEAR BUFFER 2                           EXR48850
3638   4886 0018          4896           LH    TEMP,DVRWRK1(DCBADR)                                         EXR48860
```

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363C  41B0 1DC8        4897          BAL   RET2,SETLOCK          SET DEVICE INTERLOCK                EXR48870
3640  4896 0024        4898          LH    DAT,SELCHADR(DCBADR) PICK UP SELCH ADDRESS               EXR48880
3644  C856 001E        4899          LHI   STAT,BUF2STRT(DCBADR) POINT TO START & END ADRS           EXR48890
3648  41B0 1FD6        4900          BAL   RET2,SLCHSET          SET UP THE SELCH                    EXR48900
364C  C8F0 0012        4901          LHI   R15,NINE              PHASE 9 FOR SELCH INTERRUPT         EXR48910
3650  D390 36D4        4902          LB    DAT,MAGREAD           DISARM,READ                         EXR48920
3654  41C0 1032        4903          BAL   RET3,STARTIO          SET-UP                              EXR48930
3658  4886 0024        4904          LH    TEMP,SELCHADR(DCBADR)                                     EXR48940
365C  DE86 0026        4905          OC    TEMP,SLCHGOR(DCBADR) START SELCH                          EXR48950
3660  9587             4906          EPSR  TEMP,CHAR             RESTORE PSW SAVED BY SELCHSET       EXR48960
3662  0303             4907          BR    RET1                  RETURN                              EXR48970

                       4909  * PHASE 9...SELCH INTERRUPT                                             EXR48990
                       4910  *                                                                       EXR49000
3664  4856 0020        4911  MAGPH9  LH    STAT,BUF2END(DCBADR) PICK UP EXPECTED END ADDRESS         EXR49010
3668  41B0 201A        4912          BAL   RET2,SLCHENDR         STOP SELCH, CHECK END ADDRESS       EXR49020
366C  C8F0 0014        4913          LHI   R15,TEN               PHASE 10 NEXT, WAIT NMTN            EXR49030
3670  4300 35AC        4914          B     MAGNMTN                                                   EXR49040

                       4916  * PHASE 10...NO MOTION INTERRUPT AFTER READ                             EXR49060
                       4917  *                                                                       EXR49070
3674  41B0 1F8E        4918  MAGPH10 BAL   RET2,MAGSTAT          CHECK INTERRUPT STATUS              EXR49080
3678  D3F9 3680        4919          LB    R15,MAG10NXT(DAT)     SELECT NEXT PHASE                   EXR49090
367C  4300 3540        4920          B     MAGXL1                                                    EXR49100
                       4921  *                                                                       EXR49110
3680  1600 1418 06     4922  MAG10NXT DB   ELEVEN,ZERO,TEN,TWELVE,THREE                              EXR49120
3685  00               4923          DB    *                                                         EXR49130

                       4925  * PHASE 11...COMPARE DATA                                               EXR49150
                       4926  *                                                                       EXR49160
3686  41B0 1DFC        4927  MAGPH11 BAL   RET2,COMPARE          COMPARE BUFFER 1 & 2                EXR49170
368A  41B0 1E84        4928          BAL   RET2,BUFFMOVE         MOVE INPUT BUFFER                   EXR49180
368E  24F6             4929          LIS   R15,THREE             PHASE 3 NEXT                        EXR49190
3690  4300 3572        4930          B     MAGTOPX                                                   EXR49200

                       4932  * PHASE 12...EOT HANDLER, DISARM REWIND                                 EXR49220
                       4933  *                                                                       EXR49230
3694  4886 0018        4934  MAGPH12 LH    TEMP,DVRWRK1(DCBADR)                                      EXR49240
3698  41B0 1DB4        4935          BAL   RET2,TESTLOCK         TEST DEVICE INTERLOCK               EXR49250
369C  4886 0024        4936          LH    TEMP,SELCHADR(DCBADR)                                     EXR49260
36A0  41B0 1DB4        4937          BAL   RET2,TESTLOCK         TEST SELCH INTERLOCK                EXR49270
36A4  4846 0006        4938          LH    DEV,DEVADR(DCBADR)                                        EXR49280
36A8  DE40 0D16        4939          OC    DEV,DISARM            NO MORE INTERRUPTS                  EXR49290
36AC  DE40 36D1        4940          OC    DEV,MAGCLEAR                                              EXR49300
36B0  24F2             4941          LIS   R15,ONE               PHASE 1 NEXT                        EXR49310
```

MAGNETIC TAPE DRIVER

```
36B2  DE40 36D5          4942          OC    DEV,MAGREWND       REWIND                          EXR49320
36B6  4300 3572          4943          B     MAGTOPX                                            EXR49330


36BA  4886 0024          4945  CKMAG   LH    TEMP,SELCHADR(DCBADR) SELCH ADDRESS GIVEN?        EXR49350
36BE  2135               4946          BNZS  CKMAG1             SKIP IF YES                   EXR49360
36C0  C880 00F0          4947          LHI   TEMP,X'F0'          DEFAULT                       EXR49370
36C4  4086 0024          4948          STH   TEMP,SELCHADR(DCBADR)                             EXR49380
36C8  C880 0085          4949  CKMAG1  LHI   TEMP,X'85'          DEFAULT DEVICE ADDRESS        EXR49390
36CC  4300 3E9C          4950          B     CKDEV                                              EXR49400
                         4951  *                                                                EXR49410
                         4952  *                                                                EXR49420
                         4953  *                                                                EXR49430
36D0  B0                 4954  MAGEOF  DB    X'B0'              DISABLE, WRITE EOF            EXR49440
36D1  20                 4955  MAGCLEAR DB   X'20'              CLEAR                         EXR49450
36D2  E2                 4956  MAGWRT  DB    X'E2'              DISARM, WRITE                 EXR49460
36D3  51                 4957  MAGBKSPC DB   X'51'              ENABLE, BACKSPACE             EXR49470
36D4  E1                 4958  MAGREAD DB    X'E1'              DISARM, READ                  EXR49480
36D5  F8                 4959  MAGREWND DB   X'F8'              DISARM, RE-WIND               EXR49490
                         4960          ENDC                                                     EXR49500
36D6                     4961          IFNZ  DISCS                                            EXR49510
```

```
36D6  0032            4963  DSCDCB1  DCX   0032,0,EF40,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS          EXR49530
36D8  0000
36DA  EF40
36DC  0000
36DE  0000
36E0  398E            4964           DC    DSCPTR,0,0,CKDSC    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR49540
36E2  0000
36E4  0000
36E6  3C66
36E8  3ED6            4965           DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT      EXR49550
36EA  3FD5
36EC  3ED6
36EE  0008            4966           DCX   0008,0000           DVRWRK1,DVRWRK2                         EXR49560
36F0  0000
36F2  0000            4967           DC    0                   BUF1EXT,BUF2EXT                         EXR49570
36F4  4D76            4968           DC    DSC1BUF,DSC1BUFE,DSC1BUF BUF2STRT,BUF2END,BUF2NEXT        EXR49580
36F6  4E75
36F8  4D76
36FA  0000            4969           DCX   0000                SELCHADR                                EXR49590
36FC  0000            4970           DCX   0000                SLCHGOR,SLCHGOW                         EXR49600
36FE  0000            4971           DCX   0000                CONTADR                                 EXR49610
3700  0000            4972           DCX   0000,0000           CYLLOW,CYLHIGH                          EXR49620
3702  0000
3704  0000            4973           DCX   0000                HEADLOW,HEADHIGH                        EXR49630
3706  0000            4974           DCX   0000,0000           SCRTLOW,SCRTHIGH                        EXR49640
3708  0000
370A  0000            4975           DCX   0000,0000,0000      SCTRCUR,CYLCUR,HEADCUR                  EXR49650
370C  0000
370E  0000
3710                  4976           IFP   DISCS-1                                                     EXR49660
3710  0032            4977  DSCDCB2  DCX   0032,0,EF40,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS          EXR49670
3712  0000
3714  EF40
3716  0000
3718  0000
371A  398E            4978           DC    DSCPTR,0,0,CKDSC    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK      EXR49680
371C  0000
371E  0000
3720  3C66
3722  3ED6            4979           DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT      EXR49690
3724  3FD5
3726  3ED6
3728  0009            4980           DCX   0009,0000           DVRWRK1,DVRWRK2                         EXR49700
372A  0000
372C  0000            4981           DCX   0000                BUF1EXT,BUF2EXT                         EXR49710
372E  4E76            4982           DC    DSC2BUF,DSC2BUFE,DSC2BUF BUF2STRT,BUF2END,BUF2NEXT        EXR49720
3730  4F75
3732  4E76
3734  0000            4983           DCX   0000                SELCHADR                                EXR49730
3736  0000            4984           DCX   0000                SLCHGOR,SLCHGOW                         EXR49740
3738  0000            4985           DCX   0000                CONTADR                                 EXR49750
373A  0000            4986           DCX   0000,0000           CYLLOW,CYLHIGH                          EXR49760
373C  0000
```

DISC DRIVER

```
373E  0000          4987          DCX   0000                HEADLOW,HEADHIGH                    EXR49770
3740  0000          4988          DCX   0000,0000           SCRTLOW,SCRTHIGH                    EXR49780
3742  0000
3744  0000          4989          DCX   0000,0000,0000      SCTRCUR,CYLCUR,HEADCUR              EXR49790
3746  0000
3748  0000
374A                4990          IFP   DISCS-2                                             EXR49800
374A  0032          4991 DSCDCB3  DCX   0032,0,EF40,0,0      FLAGS,PHASE,PARM,DEVADR,STATUS      EXR49810
374C  0000
374E  EF40
3750  0000
3752  0000
3754  398E          4992          DC    DSCPTR,0,0,CKDSC    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK  EXR49820
3756  0000
3758  0000
375A  3C66
375C  3ED6          4993          DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT      EXR49830
375E  3FD5
3760  3ED6
3762  000A          4994          DCX   000A,0000           DVRWRK1,DVRWRK2                     EXR49840
3764  0000
3766  0000          4995          DCX   0000                BUF1EXT,BUF2EXT                     EXR49850
3768  4F76          4996          DC    DSC3BUF,DSC3BUFE,DSC3BUF BUF2STRT,BUF2END,BUF2NEXT    EXR49860
376A  5075
376C  4F76
376E  0000          4997          DCX   0000                SELCHADR                            EXR49870
3770  0000          4998          DCX   0000                SLCHGOR,SLCHGOW                     EXR49880
3772  0000          4999          DCX   0000                CONTADR                             EXR49890
3774  0000          5000          DCX   0000,0000           CYLLOW,CYLHIGH                      EXR49900
3776  0000
3778  0000          5001          DCX   0000                HEADLOW,HEADHIGH                    EXR49910
377A  0000          5002          DCX   0000,0000           SCRTLOW,SCRTHIGH                    EXR49920
377C  0000
377E  0000          5003          DCX   0000,0000,0000      SCTRCUR,CYLCUR,HEADCUR              EXR49930
3780  0000
3782  0000
3784                5004          IFP   DISCS-3                                             EXR49940
3784  0032          5005 DSCDCB4  DCX   0032,0,EF40,0,0      FLAGS,PHASE,PARM,DEVADR,STATUS      EXR49950
3786  0000
3788  EF40
378A  0000
378C  0000
378E  398E          5006          DC    DSCPTR,0,0,CKDSC    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK  EXR49960
3790  0000
3792  0000
3794  3C66
3796  3ED6          5007          DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT      EXR49970
3798  3FD5
379A  3ED6
379C  000B          5008          DCX   000B,0000           DVRWRK1,DVRWRK2                     EXR49980
379E  0000
37A0  0000          5009          DCX   0000                BUF1EXT,BUF2EXT                     EXR49990
37A2  5076          5010          DC    DSC4BUF,DSC4BUFE,DSC4BUF BUF2STRT,BUF2END,BUF2NEXT    EXR50000
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37A4  5175
37A6  5076
37A8  0000          5011          DCX   0000                SELCHADR                          EXR50010
37AA  0000          5012          DCX   0000                SLCHGOR,SLCHGOW                   EXR50020
37AC  0000          5013          DCX   0000                CONTADR                           EXR50030
37AE  0000          5014          DCX   0000,0000           CYLLOW,CYLHIGH                    EXR50040
37B0  0000
37B2  0000          5015          DCX   0000                HEADLOW,HEADHIGH                  EXR50050
37B4  0000          5016          DCX   0000,0000           SCRTLOW,SCRTHIGH                  EXR50060
37B6  0000
37B8  0000          5017          DCX   0000,0000,0000      SCTRCUR,CYLCUR,HEADCUR            EXR50070
37BA  0000
37BC  0000
                    5018          ENDC                                                        EXR50080
                    5019          ENDC                                                        EXR50090
                    5020          ENDC                                                        EXR50100
37BE                5021          IFNZ  DSK40MB                                             EXR50110
37BE  0832          5022  DSCDCBA DCX   0832,0,EF40,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS    EXR50120
37C0  0000
37C2  EF40
37C4  0000
37C6  0000
37C8  398E          5023          DC    DSCPTR,0,0,CKDSC40  DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK EXR50130
37CA  0000
37CC  0000
37CE  3C8A
37D0  3ED6          5024          DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT  EXR50140
37D2  3FD5
37D4  3ED6
37D6  000C          5025          DCX   000C,0000            DVRWRK1,DVRWRK2                   EXR50150
37D8  0000
37DA  0000          5026          DCX   0000                BUF1EXT,BUF2EXT                   EXR50160
37DC  5176          5027          DC    DSCABUF,DSCABUFE,DSCABUF BUF2STRT,BUF2END,BUF2NEXT  EXR50170
37DE  5275
37E0  5176
37E2  0000          5028          DCX   0000                SELCHADR                          EXR50180
37E4  0000          5029          DCX   0000                SLCHGOR,SLCHGOW                   EXR50190
37E6  0000          5030          DCX   0000                CONTADR                           EXR50200
37E8  0000          5031          DCX   0000,0000           CYLLOW,CYLHIGH                    EXR50210
37EA  0000
37EC  0000          5032          DCX   0000                HEADLOW,HEADHIGH                  EXR50220
37EE  0000          5033          DCX   0000,0000           SCRTLOW,SCRTHIGH                  EXR50230
37F0  0000
37F2  0000          5034          DCX   0000,0000,0000      SCTRCUR,CYLCUR,HEADCUR            EXR50240
37F4  0000
37F6  0000
37F8                5035          IFP   DSK40MB-1                                           EXR50250
37F8  0832          5036  DSCDCBB DCX   0832,0,EF40,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS    EXR50260
37FA  0000
37FC  EF40
37FE  0000
3800  0000
3802  398E          5037          DC    DSCPTR,0,0,CKDSC40  DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK EXR50270
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3804  0000
3806  0000
3808  3C8A
380A  3ED6          5038          DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT      EXR50280
380C  3FD5
380E  3ED6
3810  000D          5039          DCX   000D,0000           DVRWRK1,DVRWRK2                       EXR50290
3812  0000
3814  0000          5040          DCX   0000                BUF1EXT,BUF2EXT                       EXR50300
3816  5276          5041          DC    DSCBBUF,DSCBBUFE,DSCBBUF BUF2STRT,BUF2END,BUF2NEXT        EXR50310
3818  5375
381A  5276
381C  0000          5042          DCX   0000                SELCHADR                              EXR50320
381E  0000          5043          DCX   0000                SLCHGOR,SLCHGOW                       EXR50330
3820  0000          5044          DCX   0000                CONTADR                               EXR50340
3822  0000          5045          DCX   0000,0000           CYLLOW,CYLHIGH                        EXR50350
3824  0000
3826  0000          5046          DCX   0000                HEADLOW,HEADHIGH                      EXR50360
3828  0000          5047          DCX   0000,0000           SCRTLOW,SCRTHIGH                      EXR50370
382A  0000
382C  0000          5048          DCX   0000,0000,0000      SCTRCUR,CYLCUR,HEADCUR                EXR50380
382E  0000
3830  0000
3832                5049          IFP   DSK40MB-2                                             EXR50390
3832  0832          5050  DSCDCRC DCX   0832,0,EF40,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS        EXR50400
3834  0000
3836  EF40
3838  0000
383A  0000
383C  398E          5051          DC    DSCPTR,0,0,CKDSC40  DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK    EXR50410
383E  0000
3840  0000
3842  3C8A
3844  3ED6          5052          DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT      EXR50420
3846  3FD5
3848  3ED6
384A  000E          5053          DCX   000E,0000           DVRWRK1,DVRWRK2                       EXR50430
384C  0000
384E  0000          5054          DCX   0000                BUF1EXT,BUF2EXT                       EXR50440
3850  5376          5055          DC    DSCCBUF,DSCCBUFE,DSCCBUF BUF2STRT,BUF2END,BUF2NEXT        EXR50450
3852  5475
3854  5376
3856  0000          5056          DCX   0000                SELCHADR                              EXR50460
3858  0000          5057          DCX   0000                SLCHGOR,SLCHGOW                       EXR50470
385A  0000          5058          DCX   0000                CONTADR                               EXR50480
385C  0000          5059          DCX   0000,0000           CYLLOW,CYLHIGH                        EXR50490
385E  0000
3860  0000          5060          DCX   0000                HEADLOW,HEADHIGH                      EXR50500
3862  0000          5061          DCX   0000,0000           SCRTLOW,SCRTHIGH                      EXR50510
3864  0000
3866  0000          5062          DCX   0000,0000,0000      SCTRCUR,CYLCUR,HEADCUR                EXR50520
3868  0000
386A  0000
```

DISC DRIVER

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386C                        5063            IFP   DSK40MB-3                                                  EXR50530
386C  0832                  5064  DSCDCBD   DCX   0832,0,EF40,0,0      FLAGS,PHASE,PARM,DEVADR,STATUS       EXR50540
386E  0000
3870  EF40
3872  0000
3874  0000
3876  398E                  5065            DC    DSCPTR,0,0,CKDSC40    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK   EXR50550
3878  0000
387A  0000
387C  3C8A
387E  3ED6                  5066            DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT       EXR50560
3880  3FD5
3882  3ED6
3884  000F                  5067            DCX   000F,0000             DVRWRK1,DVRWRK2                      EXR50570
3886  0000
3888  0000                  5068            DCX   0000                 BUF1EXT,BUF2EXT                      EXR50580
388A  5476                  5069            DC    DSCDBUF,DSCDBUFE,DSCDBUF BUF2STRT,BUF2END,BUF2NEXT         EXR50590
388C  5575
388E  5476
3890  0000                  5070            DCX   0000                 SELCHADR                             EXR50600
3892  0000                  5071            DCX   0000                 SLCHGOR,SLCHGOW                      EXR50610
3894  0000                  5072            DCX   0000                 CONTADR                              EXR50620
3896  0000                  5073            DCX   0000,0000            CYLLOW,CYLHIGH                       EXR50630
3898  0000
389A  0000                  5074            DCX   0000                 HEADLOW,HEADHIGH                     EXR50640
389C  0000                  5075            DCX   0000,0000            SCRTLOW,SCRTHIGH                     EXR50650
389E  0000
38A0  0000                  5076            DCX   0000,0000,0000       SCTRCUR,CYLCUR,HEADCUR               EXR50660
38A2  0000
38A4  0000
                            5077            ENDC                                                           EXR50670
                            5078            ENDC                                                           EXR50680
                            5079            ENDC                                                           EXR50690
38A6                        5080            IFNZ  MSMDISC                                                  EXR50700
38A6  0C32                  5081  MSMDCB1   DCX   0C32,0,EF40,0,0      FLAGS,PHASE,PARM,DEVADR,STATUS       EXR50710
38A8  0000
38AA  EF40
38AC  0000
38AE  0000
38B0  398E                  5082            DC    DSCPTR,0,0,CKDSC40    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK   EXR50720
38B2  0000
38B4  0000
38B6  3C8A
38B8  3ED6                  5083            DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT       EXR50730
38BA  3FD5
38BC  3ED6
38BE  000C                  5084            DCX   000C,0000             DVRWRK1,DVRWRK2                      EXR50740
38C0  0000
38C2  0000                  5085            D8    0,0                  BUF1EXT,BUF2EXT                      EXR50750
38C4  5576                  5086            DC    MSM1BUF,MSM1BUFE,MSM1BUF BUF2STRT,BUF2END,BUF2NEXT         EXR50760
38C6  5675
38C8  5576
38CA  0000                  5087            DCX   0000                 SELCHADR                             EXR50770
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DISC DRIVER

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38CC  0000            5088           DB    0,0                 SLCHGOR,SLCHGOW                    EXR50780
38CE  0000            5089           DCX   0000,0000,0000      CONTADR,CYLLOW,CYLHIGH             EXR50790
38D0  0000
38D2  0000
38D4  0000            5090           DB    0,0                 HEADLOW,HEADHIGH                   EXR50800
38D6  0000            5091           DCX   0000,0000           SCTRLOW,SCTRHIGH                   EXR50810
38D8  0000
38DA  0000            5092           DCX   0000,0000,0000      SCTRCUR,CYLCUR,HEADCUR             EXR50820
38DC  0000
38DE  0000
38E0                  5093           IFP   MSMDISC-1                                              EXR50830
38E0  0C32            5094  MSMDCB2  DCX   0C32,0,EF40,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS     EXR50840
38E2  0000
38E4  EF40
38E6  0000
38E8  0000
38EA  398E            5095           DC    DSCPTR,0,0,CKDSC40  DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK  EXR50850
38EC  0000
38EE  0000
38F0  3C8A
38F2  3ED6            5096           DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT   EXR50860
38F4  3FD5
38F6  3ED6
38F8  000D            5097           DCX   000D,0000           DVRWRK1,DVRWRK2                    EXR50870
38FA  0000
38FC  0000            5098           DB    0,0                 BUF1EXT,BUF2EXT                    EXR50880
38FE  5676            5099           DC    MSM2BUF,MSM2BUFE,MSM2BUF BUF2STRT,BUF2END,BUF2NEXT   EXR50890
3900  5775
3902  5676
3904  0000            5100           DCX   0000                SELCHADR                           EXR50900
3906  0000            5101           DB    0,0                 SLCHGOR,SLCHGOW                    EXR50910
3908  0000            5102           DCX   0000,0000,0000      CONTADR CYLLOW,CYLHIGH             EXR50920
390A  0000
390C  0000
390E  0000            5103           DB    0,0                 HEADLOW,HEADHIGH                   EXR50930
3910  0000            5104           DCX   0000,0000           SCTRLOW,SCTRHIGH                   EXR50940
3912  0000
3914  0000            5105           DCX   0000,0000,0000      SCTRCUR,CYLCUR,HEADCUR             EXR50950
3916  0000
3918  0000
391A                  5106           IFP   MSMDISC-2                                              EXR50960
391A  0C32            5107  MSMDCB3  DCX   0C32,0,EF40,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS     EXR50970
391C  0000
391E  EF40
3920  0000
3922  0000
3924  398E            5108           DC    DSCPTR,0,0,CKDSC40  DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK  EXR50980
3926  0000
3928  0000
392A  3C8A
392C  3ED6            5109           DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT   EXR50990
392E  3FD5
3930  3ED6
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DISC DRIVER

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3932  000E                5110            DCX   000E,0000           DVRWRK1,DVRWRK2                          EXR51000
3934  0000
3936  0000                5111            DB    0,0                 BUF1EXT,BUF2EXT                          EXR51010
3938  5776                5112            DC    MSM3BUF,MSM3BUFE,MSM3BUF BUF2STRT,BUF2END,BUF2NEXT             EXR51020
393A  5875
393C  5776
393E  0000                5113            DCX   0000                SELCHADR                                 EXR51030
3940  0000                5114            DB    0,0                 SLCHGOR,SLCHGOW                          EXR51040
3942  0000                5115            DCX   0000,0000,0000      CONTADR CYLLOW,CYLHIGH                   EXR51050
3944  0000
3946  0000
3948  0000                5116            DB    0,0                 HEADLOW,HEADHIGH                         EXR51060
394A  0000                5117            DCX   0000,0000           SCTRLOW,SCTRHIGH                         EXR51070
394C  0000
394E  0000                5118            DCX   0000,0000,0000      SCTRCUR,CYLCUR,HEADCUR                   EXR51080
3950  0000
3952  0000
3954                      5119            IFP   MSMDISC-3                                                    EXR51090
3954  0C32                5120  MSMDCB4   DCX   0C32,0,EF40,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS           EXR51100
3956  0000
3958  EF40
395A  0000
395C  0000
395E  398E                5121            DC    DSCPTR,0,0,CKDSC40  DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK       EXR51110
3960  0000
3962  0000
3964  3C8A
3966  3ED6                5122            DC    DATAPTRN,DPTRNEND,DATAPTRN BUF1STRT,BUF1END,BUF1NEXT         EXR51120
3968  3FD5
396A  3ED6
396C  000F                5123            DCX   000F,0000           DVRWRK,DVRWRK2                           EXR51130
396E  0000
3970  0000                5124            DB    0,0                 BUF1EXT,BUF2EXT                          EXR51140
3972  5876                5125            DC    MSM4BUF,MSM4BUFE,MSM4BUF BUF2STRT,BUF2END,BUF2NEXT             EXR51150
3974  5975
3976  5876
3978  0000                5126            DCX   0000                SELCHADR                                 EXR51160
397A  0000                5127            DB    0,0                 SLCHGOR,SLCHGOW                          EXR51170
397C  0000                5128            DCX   0000,0000,0000      CONTADR CYLLOW,CYLHIGH                   EXR51180
397E  0000
3980  0000
3982  0000                5129            DB    0,0                 HEADLOW,HEADHIGH                         EXR51190
3984  0000                5130            DCX   0000,0000           SCTRLOW,SCTRHIGH                         EXR51200
3986  0000
3988  0000                5131            DCX   0000,0000,0000      SCTRCUR,CYLCUR,HEADCUR                   EXR51210
398A  0000
398C  0000
                          5132            ENDC                                                               EXR51220
                          5133            ENDC                                                               EXR51230
                          5134            ENDC                                                               EXR51240
                          5135  *                                                                            EXR51250
                          5136  * DRIVER FOR 2.5, 10 AND 40 MB DISC SYSTEMS                                   EXR51260
                          5137  * DEVCNTL1 FLAG INDICATES 40 MB DISC.                                        EXR51270
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                                5138  * THE 2.5 AND 10 MB SYSTEMS ARE PROGRAMMED THE SAME, EXCEPT THAT          EXR51280
                                5139  * ON THE 10 MB SYSTEM, TRACKS 0 AND 1 ARE USED TO TEST THE REMOVABLE      EXR51290
                                5140  * CARTRIDGE AND TRACKS 2 AND 3 ARE USED TO TEST THE FIXED DISC AT         EXR51300
                                5141  * DEVICE ADDRESS DEVADR+1.  ALL RANGES OF TRACKS ARE VALID, SO BOTH       EXR51310
                                5142  * DRIVES MAY BE TESTED AT THE SAME TIME.                                  EXR51320
                                5143  *                                                                        EXR51330
                                5144  *                                                                        EXR51340
      0000 398E                 5145  DSCPTR   EQU   *                                                         EXR51350
398E  39BA                      5146  DSCPHTB  DC    DSCPH0          INITIALIZE, WAIT DU & WRT PROT           EXR51360
3990  3A26                      5147          DC    DSCPH1          COMPUTE NEXT SCTR,HEAD,CYL ADRS          EXR51370
3992  3A7C                      5148          DC    DSCPH2          RESTORE                                  EXR51380
3994  3A96                      5149          DC    DSCPH3          FILE INTERRUPT                           EXR51390
3996  3AC0                      5150          DC    DSCPH4          FILE STATUS CHECK                        EXR51400
3998  3AD2                      5151          DC    DSCPH5          SEEK                                     EXR51410
399A  3A96                      5152          DC    DSCPH6          FILE INTERRUPT                           EXR51420
399C  3AF2                      5153          DC    DSCPH7          FILE STATUS CHECK                        EXR51430
399E  3B02                      5154          DC    DSCPH8          SET UP WRITE                             EXR51440
39A0  3B4E                      5155          DC    DSCPH9          SELCH INTERRUPT                          EXR51450
39A2  3B7A                      5156          DC    DSCPH10         CONTROLLER INTERRUPT                     EXR51460
39A4  3A7C                      5157          DC    DSCPH11         RESTORE                                  EXR51470
39A6  3A96                      5158          DC    DSCPH12         FILE INTERRUPT                           EXR51480
39A8  3B90                      5159          DC    DSCPH13         FILE STATUS CHECK                        EXR51490
39AA  3AD2                      5160          DC    DSCPH14         SEEK                                     EXR51500
39AC  3A96                      5161          DC    DSCPH15         FILE INTERRUPT                           EXR51510
39AE  3BA0                      5162          DC    DSCPH16         FILE STATUS CHECK                        EXR51520
39B0  3BB0                      5163          DC    DSCPH17         SET UP READ                              EXR51530
39B2  3BF4                      5164          DC    DSCPH18         SELCH INTERRUPT                          EXR51540
39B4  3C20                      5165          DC    DSCPH19         CONTROLLER INTERRUPT                     EXR51550
39B6  3C36                      5166          DC    DSCPH20         COMPARE DATA                             EXR51560
39B8  3C46                      5167          DC    DSCPH21         CONTROLLER RESET                         EXR51570


                                5169  * PHASE 0...INITIALIZATION, WAIT ON DU AND WRITE PROTECT                 EXR51590
                                5170  *                                                                        EXR51600
39BA  4886 0024                 5171  DSCPH0   LH    TEMP,SELCHADR(DCBADR)                                    EXR51610
39BE  41B0 1DB4                 5172          BAL   RET2,TESTLOCK       TEST SELCH INTERLOCK                   EXR51620
39C2  4886 0028                 5173          LH    TEMP,CONTADR(DCBADR)                                     EXR51630
39C6  41B0 1DB4                 5174          BAL   RET2,TESTLOCK       TEST CONTROLLER INTERLOCK              EXR51640
39CA  4896 0028                 5175          LH    DAT,CONTADR(DCBADR)                                      EXR51650
39CE  41B0 2258                 5176          BAL   RET2,WAITSEEK       HANG UNTIL ALL SEEKS COMPLETE          EXR51660
39D2  4886 0024                 5177          LH    TEMP,SELCHADR(DCBADR)                                    EXR51670
39D6  DE80 0D18                 5178          OC    TEMP,STOPCMND       SELCH STOP                           EXR51680
39DA  4896 0028                 5179          LH    DAT,CONTADR(DCBADR)                                      EXR51690
39DE  DE90 3CB2                 5180          OC    DAT,DSCRESET        RESET THE CONTROLLER                 EXR51700
39E2  4846 0006                 5181          LH    DEV,DEVADR(DCBADR)                                       EXR51710
39E6  9D45                      5182          SSR   DEV,STAT            DEVICE STATUS                        EXR51720
39E8  D256 0008                 5183          STB   STAT,STATUS(DCBADR)                                      EXR51730
39EC  C350 0081                 5184          THI   STAT,X'81'          TEST IF DU OR WRITE PROTECT          EXR51740
39F0  2334                      5185          BZS   DSC0L1              SKIP IF NO                           EXR51750
39F2  41C0 1D42                 5186          BAL   RET3,BSTATERR       BAD STATUS ERROR                     EXR51760
39F6  0303                      5187          BR    RET1                RETURN, HANG IN PHASE 0              EXR51770
39F8  24F4                      5188  DSC0L1   LIS   R15,TWO             NEXT PHASE IS TWO                    EXR51780
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39FA  C4E0 CFFF        5189           NHI   R14,-1-BADSTAT-NOTCOUNT                          EXR51790
39FE  D0E6 0000        5190           STM   R14,0(DCBADR)                                    EXR51800
3A02  C3E0 0400        5191           THI   R14,DEVCNTL2          MSM?                       EXR51810
3A06  2333             5192           BZS   DSC0L2               SKIP IF NO                 EXR51820
3A08  DE40 3CB7        5193           OC    DEV,MSMCLFLT          CLEAR FAULT STATUS         EXR51830
3A0C  4886 002A        5194  DSC0L2   LH    TEMP,CYLLOW(DCBADR)   INITIAL CYLINDER ADDRESS  EXR51840
3A10  4086 0036        5195           STH   TEMP,CYLCUR(DCBADR)                              EXR51850
3A14  D386 002E        5196           LB    TEMP,HEADLOW(DCBADR)  INITIAL HEAD ADRS          EXR51860
3A18  D286 0038        5197           STB   TEMP,HEADCUR(DCBADR)                             EXR51870
3A1C  4886 0030        5198           LH    TEMP,SCTRLOW(DCBADR)  INITIAL SECTOR ADRS        EXR51880
3A20  4086 0034        5199           STH   TEMP,SCTRCUR(DCBADR)                             EXR51890
3A24  0303             5200           BR    RET1                  RETURN                     EXR51900

                       5202  * PHASE 1...COMPUTE NEXT SECTOR,HEAD,CYLINDER ADDRESS           EXR51920
                       5203  *                                                                EXR51930
3A26  4876 0034        5204  DSCPH1   LH    CHAR,SCTRCUR(DCBADR)                             EXR51940
3A2A  D386 0038        5205           LB    TEMP,HEADCUR(DCBADR)                             EXR51950
3A2E  4896 0036        5206           LH    DAT,CYLCUR(DCBADR)                               EXR51960
3A32  2671             5207           AIS   CHAR,1                INCREMENT TO NEXT SECTOR   EXR51970
3A34  4976 0032        5208           CH    CHAR,SCTRHIGH(DCBADR) LIMIT?                     EXR51980
3A38  4320 3A60        5209           BNP   DSC1L3                SKIP IF NO                 EXR51990
3A3C  4876 0030        5210           LH    CHAR,SCTRLOW(DCBADR)  RESET TO LOW LIMIT         EXR52000
3A40  2681             5211           AIS   TEMP,1                INCREMENT HEAD ADDRESS     EXR52010
3A42  D486 002F        5212           CLB   TEMP,HEADHIGH(DCBADR) LIMIT?                     EXR52020
3A46  232B             5213           BNPS  DSC1L2                SKIP IF NO                 EXR52030
3A48  D386 002E        5214           LB    TEMP,HEADLOW(DCBADR)  RESET TO LOW LIMIT         EXR52040
3A4C  2691             5215           AIS   DAT,1                 INCREMENT CYLINDER ADDRESS EXR52050
3A4E  4996 002C        5216           CH    DAT,CYLHIGH(DCBADR)   LIMIT?                     EXR52060
3A52  2323             5217           BNPS  DSC1L1                SKIP IF NO                 EXR52070
3A54  4896 002A        5218           LH    DAT,CYLLOW(DCBADR)    RESET TO LOW LIMIT         EXR52080
3A58  4096 0036        5219  DSC1L1   STH   DAT,CYLCUR(DCBADR)    NEW CYLINDER               EXR52090
3A5C  D286 0038        5220  DSC1L2   STB   TEMP,HEADCUR(DCBADR)  NEW HEAD                   EXR52100
3A60  4076 0034        5221  DSC1L3   STH   CHAR,SCTRCUR(DCBADR)  NEW SECTOR                 EXR52110
3A64  4876 0018        5222           LH    CHAR,DVRWRK1(DCBADR)                             EXR52120
3A68  C880 8000        5223           LHI   TEMP,X'8000'                                     EXR52130
3A6C  CC87 0000        5224           SRHL  TEMP,0(CHAR)                                     EXR52140
3A70  41C0 1DE8        5225           BAL   RET3,BLINK            GO BLINK DISPLAY           EXR52150
3A74  24FA             5226           LIS   R15,FIVE              PHASE 5 IS NEXT            EXR52160
3A76  40F6 0002        5227           STH   R15,PHASE(DCBADR)                                EXR52170
3A7A  0303             5228           BR    RET1                  RETURN                     EXR52180

                       5230  * PHASE 2, PHASE 11...RESTORE                                    EXR52200
                       5231  *                                                                EXR52210
      0000 3A7C        5232  DSCPH2   EQU   *                                                EXR52220
3A7C  0884             5233  DSCPH11  LHR   TEMP,DEV                                        EXR52230
3A7E  41B0 1DC8        5234           BAL   RET2,SETLOCK          SET FILE INTERLOCK         EXR52240
3A82  26F2             5235           AIS   R15,2                 INCREMENT CURRENT PHASE    EXR52250
3A84  D390 3CAE        5236           LB    DAT,RESTORE           RESTORE COMMAND            EXR52260
3A88  41C0 1D32        5237           BAL   RET3,STARTIO          START IT                   EXR52270
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DISC DRIVER

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3A8C  4886 0028          5238           LH    TEMP,CONTADR(DCBADR)                                  EXR52280
3A90  9D89               5239           SSR   TEMP,DAT              WAIT FOR CONTROLLER IDLE        EXR52290
3A92  2221               5240           BFBS  2,1                                                     EXR52300
3A94  0303               5241           BR    RET1                  RETURN, WAIT FOR FILE INTERRUPT EXR52310


                         5243  * PHASE 3, 6, 12, 15...FILE INTERRUPT                                  EXR52330
                         5244  *                                                                       EXR52340
      0000 3A96          5245  DSCPH3   EQU   *                                                       EXR52350
      0000 3A96          5246  DSCPH6   EQU   *                                                       EXR52360
      0000 3A96          5247  DSCPH12  EQU   *                                                       EXR52370
3A96  26F2               5248  DSCPH15  AIS   R15,2                 INCREMENT PHASE                 EXR52380
3A98  C4E0 BFFF          5249           NHI   R14,-1-BUSY           CLEAR BUSY                      EXR52390
3A9C  0884               5250           LHR   TEMP,DEV                                                EXR52400
3A9E  41B0 1DD6          5251           BAL   RET2,CLRLOCK          CLEAR FILE INTERLOCK            EXR52410
3AA2  D0E6 0000          5252           STM   R14,0(DCBADR)                                           EXR52420
3AA6  C3E0 0C00          5253           THI   R14,DEVCNTL1+DEVCNTL2 40 MB OR MSM?                     EXR52430
3AAA  2133               5254           BNZS  DSC3L1                SKIP IF YES                     EXR52440
3AAC  4300 1D0E          5255           B     ISRETURN              RETURN                          EXR52450
3AB0  DE40 3C83          5256  DSC3L1   OC    DEV,D40REATN          RESET ATTENTION                 EXR52460
3AB4  4886 0028          5257           LH    TEMP,CONTADR(DCBADR)                                  EXR52470
3AB8  9D89               5258           SSR   TEMP,DAT              WAIT FOR CONTROLLER IDLE        EXR52480
3ABA  2221               5259           BFBS  2,1                                                     EXR52490
3ABC  4300 1D0E          5260           B     ISRETURN              RETURN                          EXR52500


                         5262  * PHASE 4...FILE STATUS CHECK                                          EXR52520
                         5263  *                                                                       EXR52530
3AC0  41B0 2140          5264  DSCPH4   BAL   RET2,FILESTAT         CHECK FILE STATUS               EXR52540
3AC4  D369 3ACE          5265           LB    TEMP,DSC4NEXT(DAT)    CHOOSE NEXT PHASE               EXR52550
3AC8  4086 0002          5266  DSCP4L1  STH   TEMP,PHASE(DCBADR)                                      EXR52560
3ACC  0303               5267           BR    RET1                                                    EXR52570
                         5268  *                                                                       EXR52580
3ACE  0A                 5269  DSC4NEXT DB    FIVE                  OK                              EXR52590
3ACF  00                 5270           DB    ZERO                  DU OR WRT PROT                  EXR52600
3AD0  02                 5271           DB    ONE                   ILL ADR OR SEEK INC             EXR52610
3AD1  2A                 5272           DB    TWENTY1               WRT CHK                         EXR52620


                         5274  * PHASE 5, PHASE 14...SEEK                                             EXR52640
                         5275  *                                                                       EXR52650
      0000 3AD2          5276  DSCPH5   EQU   *                                                       EXR52660
3AD2  41B0 20C2          5277  DSCPH14  BAL   RET2,FILESET          SET UP FILE FOR SEEK            EXR52670
3AD6  4886 0006          5278           LH    TEMP,DEVADR(DCBADR)                                   EXR52680
3ADA  41B0 1DC8          5279           BAL   RET2,SETLOCK          SET FILE INTERLOCK BIT          EXR52690
3ADE  26F2               5280           AIS   R15,ONE               INCREMENT PHASE                 EXR52700
3AE0  D390 3CAF          5281           LB    DAT,DSCSEEK           SEEK COMMAND                    EXR52710
3AE4  41C0 1D32          5282           BAL   RET3,STARTIO          START SEEK                      EXR52720
3AE8  4886 0028          5283           LH    TEMP,CONTADR(DCBADR)                                  EXR52730
3AEC  9D89               5284           SSR   TEMP,DAT              WAIT FOR CONTROLLER IDLE        EXR52740
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3AEE  2221            5285          BFBS  2,1                                          EXR52750
3AF0  0303            5286          BR    RET1              RETURN, WAIT FOR FILE INTERRUPT EXR52760

                      5288  * PHASE 7...FILE STATUS CHECK                              EXR52780
                      5289  *                                                          EXR52790
3AF2  41B0 2140       5290  DSCPH7  BAL   RET2,FILESTAT      CHECK FILE STATUS        EXR52800
3AF6  D389 3AFE       5291          LB    TEMP,DSC7NEXT(DAT) CHOOSE NEXT PHASE        EXR52810
3AFA  4300 3AC8       5292          B     DSCP4L1                                      EXR52820
                      5293  *                                                          EXR52830
3AFE  10              5294  DSC7NEXT DB   EIGHT             OK                       EXR52840
3AFF  00              5295          DB    ZERO              DU OR WRT PROT           EXR52850
3B00  02              5296          DB    ONE               ILL ADR OR SEEK INC      EXR52860
3B01  2A              5297          DB    TWENTY1           WRT CHK                  EXR52870

                      5299  * PHASE 8...START WRITE                                    EXR52890
                      5300  *                                                          EXR52900
3B02  D386 001C       5301  DSCPH8  LB    TEMP,BUF1EXT(DCBADR)                       EXR52910
3B06  C680 0010       5302          OHI   TEMP,SELCHGOW                              EXR52920
3B0A  D286 0027       5303          STB   TEMP,SLCHGOW(DCBADR)                       EXR52930
3B0E  41B0 1F62       5304          BAL   RET2,BUFCLEAR       CLEAR BUF2             EXR52940
3B12  4886 0028       5305          LH    TEMP,CONTADR(DCBADR)                       EXR52950
3B16  41B0 1DC8       5306          BAL   RET2,SETLOCK        SET CONTROLLER INTERLOCK EXR52960
3B1A  C8F0 0012       5307          LHI   R15,NINE            PHASE 9 NEXT, SELCH INTERRUPT EXR52970
3B1E  D390 0D16       5308          LB    DAT,DISARM          DISARM FILE            EXR52980
3B22  41C0 1D32       5309          BAL   RET3,STARTIO                               EXR52990
3B26  4886 0028       5310          LH    TEMP,CONTADR(DCBADR)                       EXR53000
3B2A  9D89            5311          SSR   TEMP,DAT            WAIT FOR CONTROLLER IDLE EXR53010
3B2C  2221            5312          BFBS  2,1                                        EXR53020
3B2E  4896 0024       5313          LH    DAT,SELCHADR(DCBADR)                       EXR53030
3B32  C856 0012       5314          LHI   STAT,BUF1STRT(DCBADR)                      EXR53040
3B36  4826 0024       5315          LH    R2,SELCHADR(DCBADR)                        EXR53050
3B3A  41B0 1FD6       5316          BAL   RET2,SLCHSET        SET UP THE SELCH       EXR53060
3B3E  41B0 2180       5317          BAL   RET2,CONTSET        SET-UP CONTROLLER      EXR53070
3B42  DE90 3CB0       5318          OC    DAT,DSCWRT          CONTROLLER WRITE       EXR53080
3B46  DE26 0027       5319          OC    R2,SLCHGOW(DCBADR)  START THE SELCH        EXR53090
3B4A  9597            5320          EPSR  DAT,CHAR            RESTORE PSW SAVED BY SLCHSET EXR53100
3B4C  0303            5321          BR    RET1                                       EXR53110

                      5323  * PHASE 9...SELCH INTERRUPT AFTER WRITE                    EXR53130
                      5324  *                                                          EXR53140
3B4E  4856 0014       5325  DSCPH9  LH    STAT,BUF1END(DCBADR) PICK UP EXPECTED END ADRS EXR53150
3B52  41B0 2020       5326          BAL   RET2,SLCHENDW       STOP SELCH, CHECK FINAL ADRS EXR53160
3B56  4846 0028       5327          LH    DEV,CONTADR(DCBADR) GET CONTROLLER ADDRESS   EXR53170
3B5A  C3E0 0C00       5328          THI   R14,DEVCNTL1+DEVCNTL2 40 MB OR MSM?        EXR53180
3B5E  2136            5329          BNZS  DSC9L1            BRANCH IF YES            EXR53190
3B60  9D45            5330          SSR   DEV,STAT                                   EXR53200
3B62  C350 0080       5331          THI   STAT,X'80'        OVERRUN?                 EXR53210
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3B66  4230 3B7A      5332            BNZ   DSCPH10           BRANCH IF YES, PHASE 10          EXR53220
3B6A  26F2           5333  DSC9L1    AIS   R15,ONE           INCREMENT PHASE                  EXR53230
3B6C  40F6 0002      5334            STH   R15,PHASE(DCBADR)                                  EXR53240
3B70  0A44           5335            AHR   DEV,DEV           INDEX INTO LOOK-UP TABLE         EXR53250
3B72  4064 08DA      5336            STH   DCBADR,DCBTAB(DEV) SET UP FOR CONTROLLER INTERRUPT EXR53260
3B76  4300 1D0E      5337            B     ISRETURN          RETURN                           EXR53270

                     5339  * PHASE 10...CONTROLLER INTERRUPT AFTER WRITE                      EXR53290
                     5340  *                                                                  EXR53300
3B7A  41B0 21E8      5341  DSCPH10   BAL   RET2,CONTSTAT     CHECK CONTROLLER STATUS          EXR53310
3B7E  D389 3B8A      5342            LB    TEMP,DSC10NXT(DAT) CHOOSE NEXT PHASE               EXR53320
3B82  4086 0002      5343            STH   TEMP,PHASE(DCBADR)                                 EXR53330
3B86  4300 1D0E      5344            B     ISRETURN          RETURN                           EXR53340
                     5345  *                                                                  EXR53350
3B8A  1C             5346  DSC10NXT  DB    FOURTEEN          OK                               EXR53360
3B8B  00             5347            DB    ZERO              DU                               EXR53370
3B8C  14             5348            DB    TEN               CONTROLLER NOT IDLE              EXR53380
3B8D  2A             5349            DB    TWENTY1           EXAMINE                          EXR53390
3B8E  02             5350            DB    ONE               DATA TRANSFER ERROR              EXR53400
3B8F  00             5351            DB    *                                                  EXR53410

                     5353  * PHASE 13...FILE STATUS CHECK                                     EXR53430
                     5354  *                                                                  EXR53440
3B90  41B0 2140      5355  DSCPH13   BAL   RET2,FILESTAT     CHECK FILE STATUS                EXR53450
3B94  D389 3B9C      5356            LB    TEMP,DSC13NXT(DAT) CHOOSE NEXT PHASE               EXR53460
3B98  4300 3AC8      5357            B     DSCP4L1                                            EXR53470
                     5358  *                                                                  EXR53480
3B9C  1C             5359  DSC13NXT  DB    FOURTEEN          OK                               EXR53490
3B9D  00             5360            DB    ZERO              DU OR WRT PROT                   EXR53500
3B9E  02             5361            DB    ONE               ILL ADDR OR SEEK INC.            EXR53510
3B9F  2A             5362            DB    TWENTY1           WRT CHK                          EXR53520

                     5364  * PHASE 16...FILE STATUS CHECK                                     EXR53540
                     5365  *                                                                  EXR53550
3BA0  41B0 2140      5366  DSCPH16   BAL   RET2,FILESTAT     CHECK FILE STATUS                EXR53560
3BA4  D389 3BAC      5367            LB    TEMP,DSC16NXT(DAT) CHOOSE NEXT PHASE               EXR53570
3BA8  4300 3AC8      5368            B     DSCP4L1                                            EXR53580
                     5369  *                                                                  EXR53590
3BAC  22             5370  DSC16NXT  DB    SEVENTEN          OK                               EXR53600
3BAD  00             5371            DB    ZERO              DU OR WRT PROT                   EXR53610
3BAE  02             5372            DB    ONE               ILL ADR OR SEEK INC.             EXR53620
3BAF  2A             5373            DB    TWENTY1           WRT CHK                          EXR53630

                     5375  * PHASE 17...START READ                                            EXR53650
                     5376  *                                                                  EXR53660
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DISC DRIVER

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3BB0  D386 001D      5377  DSCPH17  LB    TEMP,BUF2EXT(DCBADR)                                    EXR53670
3BB4  C680 0030      5378           OHI   TEMP,SELCHGOR                                          EXR53680
3BB8  D286 0026      5379           STB   TEMP,SLCHGOR(DCBADR)                                    EXR53690
3BBC  4626 0028      5380           LH    R2,CONTADR(DCBADR)                                      EXR53700
3BC0  46D6 0024      5381           LH    R13,SELCHADR(DCBADR)                                    EXR53710
3BC4  0882           5382           LHR   TEMP,R2              CONTROLLER ADDRESS               EXR53720
3BC6  41B0 1DC8      5383           BAL   RET2,SETLOCK         SET CONTROLLER INTERLOCK         EXR53730
3BCA  C8F0 0024      5384           LHI   R15,EIGHTEEN         NEXT PHASE = 18 FOR SELCH INTERRUPT EXR53740
3BCE  D390 0D16      5385           LB    DAT,DISARM           DISARM FILE                      EXR53750
3BD2  41C0 1D32      5386           BAL   RET3,STARTIO                                            EXR53760
3BD6  9D28           5387           SSR   R2,TEMP              WAIT FOR CONTROLLER IDLE         EXR53770
3BD8  2221           5388           BFBS  2,1                                                     EXR53780
3BDA  C856 001E      5389           LHI   STAT,BUF2STRT(DCBADR)                                   EXR53790
3BDE  089D           5390           LHR   DAT,R13              SELCH ADDRESS                    EXR53800
3BE0  41B0 1FD6      5391           BAL   RET2,SLCHSET                                            EXR53810
3BE4  41B0 2180      5392           BAL   RET2,CONTSET         SET UP CONTROLLER                EXR53820
3BE8  DE20 3CB1      5393           OC    R2,DSCREAD           READ DATA                        EXR53830
3BEC  DED6 0026      5394           OC    R13,SLCHGOR(DCBADR)  START THE SELCH                  EXR53840
3BF0  9587           5395           EPSR  TEMP,CHAR            RESTORE PSW SAVED BY SLCHSET     EXR53850
3BF2  0303           5396           BR    RET1                                                    EXR53860

                     5398  * PHASE 18...SELCH INTERRUPT AFTER READ                               EXR53880
                     5399  *                                                                     EXR53890
3BF4  4856 0020      5400  DSCPH18  LH    STAT,BUF2END(DCBADR) EXPECTED END ADDRESS             EXR53900
3BF8  41B0 201A      5401           BAL   RET2,SLCHENDR        STOP SELCH, CHECK ADDRESS        EXR53910
3BFC  4846 0028      5402           LH    DEV,CONTADR(DCBADR)  GET CONTROLLER ADDRESS           EXR53920
3C00  C3E0 0C00      5403           THI   R14,DEVCNTL1+DEVCNTL2 40 MB OR MSM?                     EXR53930
3C04  2136           5404           BNZS  DSC18L1              SKIP IF YES                      EXR53940
3C06  9D45           5405           SSR   DEV,STAT             GET CONTROLLER STATUS            EXR53950
3C08  C350 0080      5406           THI   STAT,X'80'            OVERRUN?                         EXR53960
3C0C  4230 3C20      5407           BNZ   DSCPH19              YES...PHASE 19                   EXR53970
3C10  26F2           5408  DSC18L1  AIS   R15,ONE              INCREMENT PHASE                  EXR53980
3C12  40F6 0002      5409           STH   R15,PHASE(DCBADR)                                       EXR53990
3C16  0A44           5410           AHR   DEV,DEV              INDEX INTO LOOK-UP TABLE         EXR54000
3C18  4064 08DA      5411           STH   DCBADR,DCBTAB(DEV)   SET-UP FOR CONTROLLER INTERRUPT   EXR54010
3C1C  4300 1D0E      5412           B     ISRETURN             RETURN                           EXR54020

                     5414  * PHASE 19...CONTROLLER INTERRUPT AFTER READ                          EXR54040
                     5415  *                                                                     EXR54050
3C20  41B0 21E8      5416  DSCPH19  BAL   RET2,CONTSTAT        CHECK CONTROLLER STATUS          EXR54060
3C24  D389 3C30      5417           LB    TEMP,DSC19NXT(DAT)   CHOOSE NEXT PHASE                EXR54070
3C28  4086 0002      5418           STH   TEMP,PHASE(DCBADR)                                      EXR54080
3C2C  4300 1D0E      5419           B     ISRETURN             RETURN                           EXR54090
                     5420  *                                                                     EXR54100
3C30  28             5421  DSC19NXT DB    TWENTY               OK                               EXR54110
3C31  00             5422           DB    ZERO                 DU                               EXR54120
3C32  26             5423           DB    NINETEEN             CONT NOT IDLE (ERROR)            EXR54130
3C33  2A             5424           DB    TWENTY1              EXAMINE                          EXR54140
3C34  02             5425           DB    ONE                  DATA TRANSFER ERROR              EXR54150
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3C35  00                5426          DB    *                                                    EXR54160



                        5428  * PHASE 20...COMPARE DATA                                          EXR54180
                        5429  *                                                                  EXR54190
3C36  41B0 1DFC         5430  DSCPH20 BAL   RET2,COMPARE        COMPARE BUFFER 1 & 2            EXR54200
3C3A  41B0 1E84         5431          BAL   RET2,BUFFMOVE       MOVE INPUT BUFFER               EXR54210
3C3E  2482              5432          LIS   TEMP,ONE           NEXT PHASE = 1...NEXT SECTOR    EXR54220
3C40  4086 0002         5433          STH   TEMP,PHASE(DCBADR)                                 EXR54230
3C44  0303              5434          BR    RET1                                               EXR54240



                        5436  * PHASE 21...CONTROLLER RESET                                      EXR54260
                        5437  *                                                                  EXR54270
3C46  4886 0024         5438  DSCPH21 LH    TEMP,SELCHADR(DCBADR)                              EXR54280
3C4A  41B0 1D84         5439          BAL   RET2,TESTLOCK      CHECK SELCH INTERLOCK           EXR54290
3C4E  4886 0028         5440          LH    TEMP,CONTADR(DCBADR)                               EXR54300
3C52  41B0 1D84         5441          BAL   RET2,TESTLOCK      CHECK CONTROLLER INTERLOCK      EXR54310
3C56  41B0 2258         5442          BAL   RET2,WAITSEEK      WAIT FOR ALL SEEKS TO COMPLETE  EXR54320
3C5A  DE20 3CB2         5443          OC    R2,DSCRESET        CONTROLLER RESET                EXR54330
3C5E  24F2              5444          LIS   R15,ONE            NEXT PHASE IS 1...NEXT SECTOR   EXR54340
3C60  40F6 0002         5445          STH   R15,PHASE(DCBADR)                                  EXR54350
3C64  0303              5446          BR    RET1                                               EXR54360



3C66  4886 0028         5448  CKDSC   LH    TEMP,CONTADR(DCBADR) CONTROLLER ADDRESS ?          EXR54380
3C6A  2135              5449          BNZS  CKDSC2             BRANCH IF SPECIFIED             EXR54390
3C6C  C880 00B6         5450          LHI   TEMP,X'B6'         DEFAULT TO 'B6'                 EXR54400
3C70  4086 0028         5451          STH   TEMP,CONTADR(DCBADR)                               EXR54410
3C74  4886 0024         5452  CKDSC2  LH    TEMP,SELCHADR(DCBADR) SELCH ADDRESS SPECIFIED?     EXR54420
3C78  2135              5453          BNZS  CKDSC1             BRANCH IF YES                   EXR54430
3C7A  C880 00F0         5454          LHI   TEMP,X'F0'         DEFAULT TO 'F0'                 EXR54440
3C7E  4086 0024         5455          STH   TEMP,SELCHADR(DCBADR)                              EXR54450
3C82  C880 00C6         5456  CKDSC1  LHI   TEMP,X'C6'         DEFAULT DEVICE ADDRESS          EXR54460
3C86  4300 3E9C         5457          B     CKDEV                                              EXR54470



3C8A  4886 0028         5459  CKDSC40 LH    TEMP,CONTADR(DCBADR) CONTROLLER ADDRESS ?          EXR54490
3C8E  2135              5460          BNZS  CK40L2             SKIP IF SPECIFIED               EXR54500
3C90  C880 00FB         5461          LHI   TEMP,X'FB'         DEFAULT TO 'FB'                 EXR54510
3C94  4086 0028         5462          STH   TEMP,CONTADR(DCBADR)                               EXR54520
3C98  4886 0024         5463  CK40L2  LH    TEMP,SELCHADR(DCBADR) SELCH ADDRESS SPECIFIED?     EXR54530
3C9C  2135              5464          BNZS  CK40L1             BRANCH IF YES                   EXR54540
3C9E  C880 00F0         5465          LHI   TEMP,X'F0'         DEFAULT TO 'F0'                 EXR54550
3CA2  4086 0024         5466          STH   TEMP,SELCHADR(DCBADR)                              EXR54560
3CA6  C880 00FC         5467  CK40L1  LHI   TEMP,X'FC'         DEFAULT DEVICE ADDRESS          EXR54570
3CAA  4300 3E9C         5468          B     CKDEV                                              EXR54580
                        5469  *                                                                  EXR54590
                        5470  *                                                                  EXR54600
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                                5471  *                                                                  EXR54610
3CAE   41                       5472  RESTORE  DB    X'41'        ENABLE, RESTORE                       EXR54620
3CAF   42                       5473  DSCSEEK  DB    X'42'        ENABLE, SEEK                          EXR54630
3CB0   42                       5474  DSCWRT   DB    X'42'        ENABLE, WRITE                         EXR54640
3CB1   41                       5475  DSCREAD  DB    X'41'        ENABLE, READ                          EXR54650
3CB2   08                       5476  DSCRESET DB    X'08'        CONTROLLER RESET                      EXR54660
3CB3   08                       5477  D40REATN DB    X'08'        40 MB RESET ATTENTION                 EXR54670
3CB4   04                       5478  D40REHD  DB    X'04'        40 MB RESET HEAD                      EXR54680
3CB5   10                       5479  D40CYL   DB    X'10'        40 MB CYLINDER TAG                    EXR54690
3CB6   20                       5480  D40HEAD  DB    X'20'        40 MB HEAD TAG                        EXR54700
3CB7   70                       5481  MSMCLFLT DB    X'70'        MSM CLEAR FAULT STATUS                EXR54710
3CB8                            5482           DB    *                                                  EXR54720
                                5483           ENDC                                                     EXR54730
                                5484           ENDC                                                     EXR54740
                                5485           ENDC                                                     EXR54750
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3CB8  0040            5487  MEMDCB   DCX   0040,0,0880,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS        EXR54770
3CBA  0000
3CBC  0880
3CBE  0000
3CC0  0000
3CC2  3CD6            5488           DC    MEMPTR,0,0,CKMEM    DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK    EXR54780
3CC4  0000
3CC6  0000
3CC8  3DC4
3CCA  0000            5489           DC    0,0,0               MEMLOW,MEMHIGH,BUF1NEXT               EXR54790
3CCC  0000
3CCE  0000
3CD0  0000            5490           DCX   0000,0000           DVRWRK1,DVRWRK2                       EXR54800
3CD2  0000
3CD4  0000            5491           DCX   0000                BUF1EXT,BUF2EXT                       EXR54810


      0000 3CD6       5493  MEMPTR   EQU   *                                                        EXR54830
3CD6  3CDA            5494  MEMPHTB  DC    MEMPH0              INITIALIZE                            EXR54840
3CD8  3D06            5495           DC    MEMPH1                                                    EXR54850


                      5497  * PHASE 0...INITIALIZE                                                  EXR54870
                      5498  *                                                                       EXR54880
3CDA  24F2            5499  MEMPH0   LIS   R15,ONE             PHASE 1 NEXT                          EXR54890
3CDC  40F6 0002       5500           STH   R15,PHASE(DCBADR)                                       EXR54900
3CE0  D3E6 001C       5501           LB    R14,BUF1EXT(DCBADR) PICK UP MEMORY LOW ADDRESS            EXR54910
3CE4  48F6 0012       5502           LH    R15,MEMLOW(DCBADR)                                      EXR54920
3CE8  C3F0 03FE       5503           THI   R15,X'3FE'          SEE IF ON 1 K BOUNDARY                EXR54930
3CEC  2336            5504           BZS   MEMP0L1                                                 EXR54940
3CEE  C6F0 03FF       5505           OHI   R15,X'3FF'          ROUND UP TO 1KB BOUNDARY              EXR54950
3CF2  26F1            5506           AIS   R15,1                                                   EXR54960
3CF4  4EE0 07D8       5507           ACH   R14,ZEROS                                               EXR54970
3CF8  D0E6 0018       5508  MEMP0L1  STM   R14,DVRWRK1(DCBADR) COPY TO DVRWRK1,DVRWRK2               EXR54980
3CFC  C880 4000       5509           LHI   TEMP,X'4000'                                            EXR54990
3D00  41C0 1DE8       5510           BAL   RET3,BLINK          BLINK MEMORY TEST BIT                 EXR55000
3D04  0303            5511           BR    RET1                RETURN TO DISPATCHER                  EXR55010


                      5513  * PHASE 1...TEST 1KB OF MEMORY                                          EXR55030
                      5514  *                                                                       EXR55040
3D06  C4E0 CFFF       5515  MEMPH1   NHI   R14,-1-BADSTAT-NOTCOUNT                                  EXR55050
3D0A  40E6 0000       5516           STH   R14,FLAGS(DCBADR)                                       EXR55060
3D0E  D1E6 0018       5517           LM    R14,DVRWRK1(DCBADR) PICK UP WORKING ADDRESS             EXR55070
3D12  ECE0 000D       5518           SRL   R14,13              CONVERT TO 8K SEGMENT NUMBER          EXR55080
3D16  0AFF            5519           AHR   R15,R15                                                 EXR55090
3D18  485F 1D74       5520           LH    STAT,BIT0(R15)      BIT MASK                            EXR55100
3D1C  90F5            5521           SRLS  R15,5               MEMORY MAP INDEX                    EXR55110
3D1E  445F 0ADC       5522           NH    STAT,MEMMAP(R15)    MEMORY AVAILABLE?                   EXR55120
3D22  4330 3D9E       5523           BZ    MEMP1L3A            SKIP IF NO                          EXR55130
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3D26   D1E6 0018          5524           LM    R14,DVRWRK1(DCBADR) YES, GET ADDRESS AGAIN            EXR55140
3D2A   4BF0 07DC          5525           SH    R15,MOVER+2         SKIP IF MOVEABLE BUFFER           EXR55150
3D2E   4FE0 07DA          5526           SCH   R14,MOVER           IS IN THIS BLOCK.                 EXR55160
3D32   4330 3D9E          5527           BZ    MEMP1L3A                                              EXR55170
                          5528  *                                                                     EXR55180
3D36   4856 0018          5529           LH    STAT,DVRWRK1(DCBADR) PICK UP ADDRESS                  EXR55190
3D3A   4876 001A          5530           LH    CHAR,DVRWRK2(DCBADR)                                  EXR55200
3D3E   41C0 0DE2          5531           BAL   RET3,ADRSET         CONVERT TO PROGRAM ADDRESS        EXR55210
3D42   4077 0000          5532  MEMP1L1  STH   CHAR,0(CHAR)        STORE ADDRESS AS DATA             EXR55220
3D46   2672               5533           AIS   CHAR,2                                               EXR55230
3D48   C370 03FE          5534           THI   CHAR,X'03FE'        1K BOUNDARY YET?                  EXR55240
3D4C   2035               5535           BNZS  MEMP1L1             LOOP IF NO                        EXR55250
                          5536  *                                                                     EXR55260
3D4E   4856 0018          5537           LH    STAT,DVRWRK1(DCBADR) BACK TO START OF THIS SEGMENT    EXR55270
3D52   4876 001A          5538           LH    CHAR,DVRWRK2(DCBADR)                                  EXR55280
3D56   41C0 0DE2          5539           BAL   RET3,ADRSET         CONVERT TO PROGRAM ADDRESS        EXR55290
3D5A   4897 0000          5540  MEMP1L2  LH    DAT,0(CHAR)         FETCH DATA                        EXR55300
3D5E   0597               5541           CLHR  DAT,CHAR            COMPARE TO EXPECTED               EXR55310
3D60   4330 3D94          5542           BE    MEMP1L3             BRANCH IF ALIKE                   EXR55320
3D64   4070 1E80          5543           STH   CHAR,EXPECTED                                         EXR55330
3D68   4090 1E82          5544           STH   DAT,ACTUAL                                            EXR55340
3D6C   41C0 1BCE          5545           BAL   RET3,ERRORLOG       GET SPACE ON ERROR QUEUE          EXR55350
3D70   C890 3C61          5546           LHI   DAT,X'3C61'         MEMORY PATTERN ERROR              EXR55360
3D74   4098 0000          5547           STH   DAT,0(TEMP)                                           EXR55370
3D78   4890 1E80          5548           LH    DAT,EXPECTED                                          EXR55380
3D7C   4098 0004          5549           STH   DAT,4(TEMP)         STORE EXPECTED DATA               EXR55390
3D80   4890 1E82          5550           LH    DAT,ACTUAL                                            EXR55400
3D84   4098 0006          5551           STH   DAT,6(TEMP)         STORE ACTUAL DATA                 EXR55410
3D88   D1E6 0018          5552           LM    R14,DVRWRK1(DCBADR)                                   EXR55420
3D8C   D0E8 0008          5553           STM   R14,8(TEMP)         STORE BLOCK START ADDRESS         EXR55430
3D90   41C0 1C0C          5554           BAL   RET3,QUEUECHK       CHECK THE ERROR QUEUE             EXR55440
                          5555  *                                                                     EXR55450
3D94   2672               5556  MEMP1L3  AIS   CHAR,2                                               EXR55460
3D96   C370 03FE          5557           THI   CHAR,X'03FE'                                          EXR55470
3D9A   4230 3D5A          5558           BNZ   MEMP1L2             LOOP                              EXR55480
                          5559  *                                                                     EXR55490
3D9E   D1E6 0018          5560  MEMP1L3A LM    R14,DVRWRK1(DCBADR)                                   EXR55500
3DA2   C6F0 03FF          5561           OHI   R15,X'03FF'         ROUND UP TO NEXT 1KB BLOCK        EXR55510
3DA6   26F1               5562           AIS   R15,1                                                 EXR55520
3DA8   4EE0 07D8          5563           ACH   R14,ZEROS                                             EXR55530
3DAC   D0E6 0018          5564           STM   R14,DVRWRK1(DCBADR) START ADRS FOR NEXT TEST          EXR55540
3DB0   D396 001D          5565           LB    DAT,BUF2EXT(DCBADR)                                   EXR55550
3DB4   4BF6 0014          5566           SH    R15,MEMHIGH(DCBADR) COMPARE TO LIMIT                  EXR55560
3DB8   0FE9               5567           SCHR  R14,DAT                                               EXR55570
3DBA   0323               5568           BNPR  RET1                RETURN, STAY IN PHASE 1           EXR55580
                          5569  *                                                                     EXR55590
3DBC   07FF               5570  MEMP1L4  XHR   R15,R15                                               EXR55600
3DBE   40F6 0002          5571           STH   R15,PHASE(DCBADR)   PHASE 0 NEXT                      EXR55610
3DC2   0303               5572           BR    RET1                RETURN TO DISPATCHER              EXR55620


3DC4   D1E0 07DE          5574  CKMEM    LM    R14,MEMSTART        POINT TO TOP OF EXERCISOR         EXR55640
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MEMORY TEST DRIVER

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3DC8  D396 001C          5575          LB    DAT,BUF1EXT(DCBADR)                          EXR55650
3DCC  4BF6 0012          5576          SH    R15,MEMLOW(DCBADR)  COMPARE TO SPECIFIED LOW LIMIT  EXR55660
3DD0  0FE9               5577          SCHR  R14,DAT                                      EXR55670
3DD2  2187               5578          BLS   CKMEM1              SKIP IF SPECIFEID LOW IS OVER TOP  EXR55680
3DD4  D1E0 07DE          5579          LM    R14,MEMSTART        IF NOT, FORCE IT UP TO TOP OF  EXR55690
3DD8  D2E6 001C          5580          STB   R14,BUF1EXT(DCBADR) THE EXERCISOR              EXR55700
3DDC  40F6 0012          5581          STH   R15,MEMLOW(DCBADR)                           EXR55710
3DE0  D1E0 07E2          5582  CKMEM1  LM    R14,MEMTOP          PICK UP ACTUAL TOP OF MEMORY  EXR55720
3DE4  D396 001D          5583          LB    DAT,BUF2EXT(DCBADR)                          EXR55730
3DE8  4BF6 0014          5584          SH    R15,MEMHIGH(DCBADR) COMPARE TO SPECIFIED HIGH LIMIT  EXR55740
3DEC  0FE9               5585          SCHR  R14,DAT                                      EXR55750
3DEE  2387               5586          BNLS  CKMEM2              OK IF LESS OR EQUAL      EXR55760
3DF0  D1E0 07E2          5587          LM    R14,MEMTOP          ELSE, FORCE DOWN TO ACTUAL  EXR55770
3DF4  D2E6 001D          5588          STB   R14,BUF2EXT(DCBADR) MEMORY TOP               EXR55780
3DF8  40F6 0014          5589          STH   R15,MEMHIGH(DCBADR)                          EXR55790
3DFC  D3E6 001C          5590  CKMEM2  LB    R14,BUF1EXT(DCBADR)                          EXR55800
3E00  48F6 0012          5591          LH    R15,MEMLOW(DCBADR)                           EXR55810
3E04  D396 001D          5592          LB    DAT,BUF2EXT(DCBADR)                          EXR55820
3E08  4BF6 0014          5593          SH    R15,MEMHIGH(DCBADR) COMPARE LOW & HIGH LIMITS  EXR55830
3E0C  0FE9               5594          SCHR  R14,DAT                                      EXR55840
3E0E  0293               5595          BTCR  9,RET1                                       EXR55850
3E10  D396 001C          5596          LB    DAT,BUF1EXT(DCBADR) DEFAULT HIGH = LOW       EXR55860
3E14  D296 001D          5597          STB   DAT,BUF2EXT(DCBADR)                          EXR55870
3E18  4896 0012          5598          LH    DAT,MEMLOW(DCBADR)                           EXR55880
3E1C  4096 0014          5599          STH   DAT,MEMHIGH(DCBADR)                          EXR55890
3E20  0303               5600          BR    RET1                                         EXR55900
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3E22  0000             5602  MMPDCB   DCX   0000,0,8800,0,0     FLAGS,PHASE,PARM,DEVADR,STATUS        EXR55920
3E24  0000
3E26  8800
3E28  0000
3E2A  0000
3E2C  3E34             5603           DC    MMPPTR,0,0,CKMMP    OVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK    EXR55930
3E2E  0000
3E30  0000
3E32  3E98
3E34  3E38             5604  MMPPTR   DC    MMPPH0              PHASE 0 INITIALIZE                    EXR55940
3E36  3E82             5605           DC    MMPPH1              PHASE 1 PROTECT INTERRUPT             EXR55950


                       5607  * PHASE 0...INITIALIZE PROTECT CONTROLLER                                 EXR55970
                       5608  *                                                                         EXR55980
3E38  DE40 3EAA        5609  MMPPH0   OC    DEV,PROTON          TURN ON PROTECT                       EXR55990
3E3C  9840             5610           WHR   DEV,ZERO            CLEAR MASK                            EXR56000
3E3E  9840             5611           WHR   DEV,ZERO                                                  EXR56010
3E40  9840             5612           WHR   DEV,ZERO                                                  EXR56020
3E42  9840             5613           WHR   DEV,ZERO                                                  EXR56030
3E44  24F2             5614           LIS   R15,ONE             PHASE 1 NEXT                          EXR56040
3E46  C4E0 CFFF        5615           NHI   R14,-1-BADSTAT-NOTCOUNT                                   EXR56050
3E4A  C6E0 4000        5616           OHI   R14,BUSY            SET FLAGS                             EXR56060
3E4E  D0E6 0000        5617           STM   R14,0(DCBADR)                                             EXR56070
3E52  C880 0200        5618           LHI   TEMP,X'0200'                                              EXR56080
3E56  41C0 1DE8        5619           BAL   RET3,BLINK          BLINK BIT 14                          EXR56090
3E5A  DE40 3EAA        5620           OC    DEV,PROTON                                                EXR56100
3E5E  D840 3EAC        5621           WH    DEV,PATTERN1        OUTPUT PROTECT PATTERN                EXR56110
3E62  9840             5622           WHR   DEV,ZERO                                                  EXR56120
3E64  9840             5623           WHR   DEV,ZERO                                                  EXR56130
3E66  9840             5624           WHR   DEV,ZERO                                                  EXR56140
3E68  9588             5625           EPSR  TEMP,TEMP           CAPTURE CURRENT PSW                   EXR56150
3E6A  C680 0100        5626           OHI   TEMP,X'0100'        SET USER MODE                         EXR56160
3E6E  9598             5627           EPSR  DAT,TEMP            LOAD PSW                              EXR56170
3E70  4090 0000        5628  MMPP0L1  STH   DAT,0               TRY TO STORE                          EXR56180
3E74  4200 0000        5629           NOP                                                             EXR56190
3E78  4200 0000        5630           NOP                                                             EXR56200
3E7C  0000             5631  MMPP0L2  DC    0,0                 FORCE ILLEGAL                         EXR56210
3E7E  0000
3E80  0303             5632           BR    RET1                                                      EXR56220


                       5634  * PHASE1...INTERRUPT FROM PROTECT CONTROLLER                              EXR56240
                       5635  *                                                                         EXR56250
3E82  4006 000C        5636  MMPPH1   STH   ZERO,CURWAIT(DCBADR)                                      EXR56260
3E86  D256 0008        5637           STB   STAT,STATUS(DCBADR)                                       EXR56270
3E8A  DE40 3EAB        5638           OC    DEV,PROTOFF         PROTECT OFF                           EXR56280
3E8E  07FF             5639           XHR   R15,R15                                                   EXR56290
3E90  40F6 0002        5640           STH   R15,PHASE(DCBADR)   PHASE 0 NEXT                          EXR56300
3E94  4300 1D0E        5641           B     ISRETURN            RETURN                                EXR56310
                       5642  *                                                                         EXR56320
```

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                          5643  *                                                                    EXR56330
3E98   C880 00AE          5644  CKMMP     LHI   TEMP,X'AE'          DEFAULD DEVICE ADDRESS         EXR56340
3E9C   4846 0006          5645  CKDEV     LH    DEV,DEVADR(DCBADR)  IS ADDRESS GIVEN?              EXR56350
3EA0   0233               5646            BNZR  RET1                EXIT IF YES                    EXR56360
3EA2   0848               5647            LHR   DEV,TEMP           USE DEFAULT                    EXR56370
3EA4   4046 0006          5648            STH   DEV,DEVADR(DCBADR)                                 EXR56380
3EA8   0303               5649            BR    RET1                                               EXR56390
                          5650  *                                                                    EXR56400
                          5651  *                                                                    EXR56410
3EAA   60                 5652  PROTON    DB    X'60'                                              EXR56420
3EAB   50                 5653  PROTOFF   DB    X'50'                                              EXR56430
3EAC   F000               5654  PATTERN1  DC    X'F000'                                            EXR56440


                          5656  * SPECIAL DCB                                                        EXR56460
                          5657  *                                                                    EXR56470
3EAE   0000               5658  SPCLDCB   DCX   0000,0,8000,0,0   FLAGS,PHASE,PARM,DEVADR,STATUS   EXR56480
3EB0   0000
3EB2   8000
3EB4   0000
3EB6   0000
3EB8   6976               5659            DC    SPCLPTR,0,0,CKSPCL  DVRENTRY,CURWAIT,ERRCOUNT,PARMCHCK  EXR56490
3EBA   0000
3EBC   0000
3EBE   6976
3EC0   0000               5660            DC    0,0,0               BUF1STRT,BUF1END,BUF1NEXT      EXR56500
3EC2   0000
3EC4   0000
3EC6   0000               5661            DC    0,0                 DVRWRK1,DVRWRK2                EXR56510
3EC8   0000
3ECA   00                 5662            DB    0                   BUF1EXT,BUF2EXT                EXR56520
3ECC   0000               5663            DC    0,0,0               BUF2STRT,BUF2END,BUF2NEXT      EXR56530
3ECE   0000
3ED0   0000
3ED2   0000               5664            DC    0                                                  EXR56540
3ED4   0000               5665            DC    0                                                  EXR56550
       0000 3ED5          5666  LNZB      EQU   *-1                                                EXR56560
3ED6                      5667  DATAPTRN  DS    256                                                EXR56570
       0000 3FD5          5668  DPTRNEND  EQU   *-1                                                EXR56580
3FD6                      5669  SLCHPAT   DS    256                                                EXR56590
       0000 40D5          5670  SLCHPATE  EQU   *-1                                                EXR56600
40D6                      5671            IFNZ  PAPRTAPE                                           EXR56610
40D6                      5672  PTRBUF    DS    256                                                EXR56620
       0000 41D5          5673  PTRBUFE   EQU   *-1                                                EXR56630
                          5674            ENDC                                                     EXR56640
41D6                      5675            IFNZ  CASSETTE                                           EXR56650
41D6                      5676  CAS1BUF   DS    256                 CASSETTE READ BUFFER           EXR56660
       0000 42D6          5677  CAS1BUFE  EQU   *                                                  EXR56670
42D6                      5678            IFP   CASSETTE-1                                         EXR56680
42D6                      5679  CAS2BUF   DS    256                 CASSETTE READ BUFFER           EXR56690
       0000 43D6          5680  CAS2BUFE  EQU   *                                                  EXR56700
43D6                      5681            IFP   CASSETTE-2                                         EXR56710
```

```
43D6                    5682  CAS3BUF  DS    256              CASSETTE READ BUFFER      EXR56720
      0000 44D6         5683  CAS3BUFE EQU   *                                          EXR56730
44D6                    5684           IFP   CASSETTE-3                                 EXR56740
44D6                    5685  CAS4BUF  DS    256              CASSETTE READ BUFFER      EXR56750
      0000 45D6         5686  CAS4BUFE EQU   *                                          EXR56760
                        5687           ENDC                                             EXR56770
                        5688           ENDC                                             EXR56780
                        5689           ENDC                                             EXR56790
                        5690           ENDC                                             EXR56800
45D6                    5691           IFNZ  FLOPPY                                     EXR56810
45D6                    5692  FMD1BUF  DS    128              FLOPPY READ BUFFER        EXR56820
      0000 4655         5693  FMD1BUFE EQU   *-1                                       EXR56830
4656                    5694           IFP   FLOPPY-1                                   EXR56840
4656                    5695  FMD2BUF  DS    128              FLOPPY READ BUFFER        EXR56850
      0000 46D5         5696  FMD2BUFE EQU   *-1                                       EXR56860
46D6                    5697           IFP   FLOPPY-2                                   EXR56870
46D6                    5698  FMD3BUF  DS    128              FLOPPY READ BUFFER        EXR56880
      0000 4755         5699  FMD3BUFE EQU   *-1                                       EXR56890
4756                    5700           IFP   FLOPPY-3                                   EXR56900
4756                    5701  FMD4BUF  DS    128              FLOPPY READ BUFFER        EXR56910
      0000 47D5         5702  FMD4BUFE EQU   *-1                                       EXR56920
                        5703           ENDC                                             EXR56930
                        5704           ENDC                                             EXR56940
                        5705           ENDC                                             EXR56950
                        5706           ENDC                                             EXR56960
47D6                    5707           IFNZ  CARDRDR                                    EXR56970
47D6                    5708  CRDBUF   DS    160                                       EXR56980
      0000 4876         5709  CRDBUFE  EQU   *                                          EXR56990
                        5710           ENDC                                             EXR57000
4876                    5711           IFNZ  SLCHTSTR                                   EXR57010
4876                    5712  SLCHBUF  DS    256                                       EXR57020
      0000 4975         5713  SLCHBUFE EQU   *-1                                       EXR57030
                        5714           ENDC                                             EXR57040
4976                    5715           IFNZ  MAGTAPE                                    EXR57050
4976                    5716  MAG1BUF  DS    256                                       EXR57060
      0000 4A75         5717  MAG1BUFE EQU   *-1                                       EXR57070
4A76                    5718           IFP   MAGTAPE-1                                  EXR57080
4A76                    5719  MAG2BUF  DS    256                                       EXR57090
      0000 4B75         5720  MAG2BUFE EQU   *-1                                       EXR57100
4B76                    5721           IFP   MAGTAPE-2                                  EXR57110
4B76                    5722  MAG3BUF  DS    256                                       EXR57120
      0000 4C75         5723  MAG3BUFE EQU   *-1                                       EXR57130
4C76                    5724           IFP   MAGTAPE-3                                  EXR57140
4C76                    5725  MAG4BUF  DS    256                                       EXR57150
      0000 4D75         5726  MAG4BUFE EQU   *-1                                       EXR57160
                        5727           ENDC                                             EXR57170
                        5728           ENDC                                             EXR57180
                        5729           ENDC                                             EXR57190
                        5730           ENDC                                             EXR57200
4D76                    5731           IFNZ  DISCS                                      EXR57210
4D76                    5732  DSC1BUF  DS    256                                       EXR57220
      0000 4E75         5733  DSC1BUFE EQU   *-1                                       EXR57230
4E76                    5734           IFP   DISCS-1                                    EXR57240
```

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4E76                    5735  DSC2BUF   DS    256                                 EXR57250
      0000 4F75         5736  DSC2BUFE  EQU   *-1                                 EXR57260
4F76                    5737            IFP   DISCS-2                             EXR57270
4F76                    5738  DSC3BUF   DS    256                                 EXR57280
      0000 5075         5739  DSC3BUFE  EQU   *-1                                 EXR57290
5076                    5740            IFP   DISCS-3                             EXR57300
5076                    5741  DSC4BUF   DS    256                                 EXR57310
      0000 5175         5742  DSC4BUFE  EQU   *-1                                 EXR57320
                        5743            ENDC                                      EXR57330
                        5744            ENDC                                      EXR57340
                        5745            ENDC                                      EXR57350
                        5746            ENDC                                      EXR57360
5176                    5747            IFNZ  DSK40MB                             EXR57370
5176                    5748  DSCABUF   DS    256                                 EXR57380
      0000 5275         5749  DSCABUFE  EQU   *-1                                 EXR57390
5276                    5750            IFP   DSK40MB-1                           EXR57400
5276                    5751  DSCBBUF   DS    256                                 EXR57410
      0000 5375         5752  DSCBBUFE  EQU   *-1                                 EXR57420
5376                    5753            IFP   DSK40MB-2                           EXR57430
5376                    5754  DSCCBUF   DS    256                                 EXR57440
      0000 5475         5755  DSCCBUFE  EQU   *-1                                 EXR57450
5476                    5756            IFP   DSK40MB-3                           EXR57460
5476                    5757  DSCDBUF   DS    256                                 EXR57470
      0000 5575         5758  DSCDBUFE  EQU   *-1                                 EXR57480
                        5759            ENDC                                      EXR57490
                        5760            ENDC                                      EXR57500
                        5761            ENDC                                      EXR57510
                        5762            ENDC                                      EXR57520
5576                    5763            IFNZ  MSMDISC                             EXR57530
5576                    5764  MSM1BUF   DS    256                                 EXR57540
      0000 5675         5765  MSM1BUFE  EQU   *-1                                 EXR57550
5676                    5766            IFP   MSMDISC-1                           EXR57560
5676                    5767  MSM2BUF   DS    256                                 EXR57570
      0000 5775         5768  MSM2BUFE  EQU   *-1                                 EXR57580
5776                    5769            IFP   MSMDISC-2                           EXR57590
5776                    5770  MSM3BUF   DS    256                                 EXR57600
      0000 5875         5771  MSM3BUFE  EQU   *-1                                 EXR57610
5876                    5772            IFP   MSMDISC-3                           EXR57620
5876                    5773  MSM4BUF   DS    256                                 EXR57630
      0000 5975         5774  MSM4BUFE  EQU   *-1                                 EXR57640
                        5775            ENDC                                      EXR57650
                        5776            ENDC                                      EXR57660
                        5777            ENDC                                      EXR57670
                        5778            ENDC                                      EXR57680
5976                    5779  AUTOIO    DS    4096                                EXR57690
                        5780  *                                                   EXR57700
      0000 6976         5781  SPCLPTR   EQU   *           SPECIAL DRIVER GOES HERE EXR57710
      0000 6976         5782  CKSPCL    EQU   *                                   EXR57720
                        5783  *                                                   EXR57730
      0000 6976         5784  EXEREND   EQU   *                                   EXR57740
```

CHKSUM/M17 PUNCHER

```
6976  2400           5786  $CHKSUM  LIS   R0,0          PUNCH M17 TAPE WITH CHECKSUM          EXR57760
6978  9510           5787        EPSR  R1,R0          CLEAR PSW                             EXR57770
                     5788  *                                                                  EXR57780
697A  C810 02D0      5789        LHI   R1,X'02D0'      START ADDRESS                         EXR57790
697E  2421           5790        LIS   R2,1           INCREMENT                             EXR57800
6980  C830 3ED5      5791        LHI   R3,LNZB        FINAL ADDRESS                         EXR57810
6984  2440           5792        LIS   R4,0           CHECKSUM BYTE                         EXR57820
6986  D351 0000      5793  $GEN     LB   R5,0(R1)                                           EXR57830
698A  0745           5794        XHR   R4,R5                                               EXR57840
698C  C110 6986      5795        BXLE  R1,$GEN                                             EXR57850
6990  D240 008D      5796        STB   R4,MN+3        CHECKSUM BYTE TO BOOT LOADER          EXR57860
                     5797  *                                                                  EXR57870
6994  C810 0080      5798  $TAPE    LHI   R1,X'0080'                                        EXR57880
6998  9E21           5799        OCR   R2,R1          DISPLAY : NORMAL MODE                 EXR57890
699A  9444           5800        EXBR  R4,R4                                               EXR57900
699C  9824           5801        WHR   R2,R4          CHECKSUM BYTE TO D1                   EXR57910
699E  9411           5802        EXBR  R1,R1                                               EXR57920
69A0  9501           5803        EPSR  R0,R1          HALT PROCESSOR.                       EXR57930


69A2  D360 007A      5805  $PUNCH   LB   R6,X'7A'      GET BOUTDV (PUNCH) ADDRESS.           EXR57950
69A6  DE60 007B      5806        OC    R6,X'7B'       START TAPE PUNCH                      EXR57960
69AA  9D60           5807        SSR   R6,R0                                               EXR57970
69AC  2081           5808        BTBS  8,1                                                 EXR57980
69AE  41F0 69F0      5809        BAL   R15,$TAPL      PUNCH LEADER                          EXR57990
69B2  9411           5810        EXBR  R1,R1          (R1) = X'8000'                        EXR58000
69B4  C830 00CF      5811        LHI   R3,X'CF'                                            EXR58010
69B8  DA61 0000      5812  $PNCH1   WD   R6,0(R1)      PUNCH BOOT LOADER                     EXR58020
69BC  9D60           5813        SSR   R6,R0                                               EXR58030
69BE  2081           5814        BTBS  8,1                                                 EXR58040
69C0  C110 69B8      5815        BXLE  R1,$PNCH1                                           EXR58050
69C4  41F0 69F6      5816        BAL   R15,$TAPL1     PUNCH ONE-FOLD GAP.                   EXR58060
                     5817  *                                                                  EXR58070
69C8  D340 008D      5818        LB    R4,MN+3        GET CHECKSUM BYTE                     EXR58080
69CC  C810 02D0      5819        LHI   R1,X'2D0'      START ADDRESS                         EXR58090
69D0  C830 3ED5      5820        LHI   R3,LNZB        END ADDRESS                           EXR58100
69D4  D351 0000      5821  $PNCH2   LB   R5,0(R1)      PUNCH PROGRAM                         EXR58110
69D8  0745           5822        XHR   R4,R5                                               EXR58120
69DA  9A65           5823        WDR   R6,R5                                               EXR58130
69DC  9401           5824        EXBR  R0,R1                                               EXR58140
69DE  9820           5825        WHR   R2,R0          DATA ADDRESS TO DISPLAY               EXR58150
69E0  9D60           5826        SSR   R6,R0                                               EXR58160
69E2  2081           5827        BTBS  8,1                                                 EXR58170
69E4  C110 69D4      5828        BXLE  R1,$PNCH2                                           EXR58180
69E8  41F0 69F0      5829        BAL   R15,$TAPL      PUNCH TRAILER.                        EXR58190
69EC  4300 6994      5830        B     $TAPE          DISPLAY CHECKSUM, HALT PROCESSOR      EXR58200


69F0  C800 0100      5832  $TAPL    LHI   R0,256        TO PUNCH BLANK LEADER               EXR58220
69F4  2303           5833        BS    $TAPLP                                              EXR58230
69F6  C800 0055      5834  $TAPL1   LHI   R0,85         TO PUNCH 1-FOLD GAP                 EXR58240
```

CHKSUM/M17 PUNCHER

```
69FA  2701          5835  $TAPLP  SIS   R0,1                          EXR58250
69FC  032F          5836          BNPR  R15          RETURN           EXR58260
69FE  2430          5837          LIS   R3,0                          EXR58270
6A00  9A63          5838          WDR   R6,R3        PUNCH BLANK FRAME EXR58280
6A02  9D68          5839          SSR   R6,R8                         EXR58290
6A04  2081          5840          BTBS  8,1                           EXR58300
6A06  2206          5841          BS    $TAPLP       CONTINUE.        EXR58310
                    5842  *                                           EXR58320
6A08                5843          END                                 EXR58330
```

CHKSUM/M17 PUNCHER

ASSEMBLED BY CAL 03-066R05-00 (32-BIT)

START OPTIONS: SCR,CRO,ERL,T=16

NO CAL ERRORS
NO CAL WARNINGS
2 PASSES

```
$CHKSUM   0000 6976   5786*
$GEN      0000 6986   5793*  5795
$PNCH1    0000 69B8   5812*  5815
$PNCH2    0000 69D4   5821*  5828
$PUNCH    0000 69A2   5805*
$TAPE     0000 6994   5798*  5830
$TAPL     0000 69F0   5809   5829   5832*
$TAPL1    0000 69F6   5816   5834*
$TAPLP    0000 69FA   5833   5835*  5841
ABORT     0000 18E6   1940   1942*  1978  2001  2027  2301  2357  2457
ABSTOP    0000 6A08
ACL1L1    0000 2E88   4189*
ACLDCB    0000 2E3E    999   4163*
ACLPH0    0000 2E5E   4169   4174*
ACLPH1    0000 2E7A   4170   4185*
ACLPHTB   0000 2E5A   4169*
ACLPTR    0000 2E5A   4164   4168*
ACMNDEND  0000 0E72    650    974*
ACMNDTBL  0000 0E1E    644    959*
ACTUAL    0000 1E82   2625   2638   2650*  2869  2879  4500  4510  5544  5550
ADC       0000 0002
ADDSLCH   0000 04AA    404*   408
ADRSET    0000 0DE2    323    922*  1362  1377  2616  2620  2731  5531  5539
ADRSETX   0000 0E08    927    935*
AFAULT    0000 1916    269   1965*
AFAULT1   0000 192A   1960   1967   1972*
ARITH     0000 16BA   1792   1802*
ARITH1    0000 16C6   1805   1807*
AUTOIO    0000 5976    365    423   1787  5779*
BACKCMND  0000 0F6A    960   1117*
BACKGRND  0000 1616   1706   1750*
BADSTAT   0000 1000    173*  1560   2338  2340  2482  2646  2811  3526  3798  4267  4596  4766  5189
                      5515   5615
BCKSWTCH  0000 0800    117*   255   1117  1158  1750
BFCLRL1   0000 1F76   2734*  2738
BIT0      0000 1D74    289    296   1890  1897  1903  2519  2524*  2687  5520
BLANK     0000 0AF0    564*   566
BLINK     0000 1DE8   1819   1857   1912  2594*  3813  4177  4219  4272  4468  4606  5225  5510  5619
BLINKY    0000 07E8    522*  1597   1702  2594   2595  2598
BSTATERR  0000 1D42   2495*  2779   2857  2977   3081  3323  3330  3522  3549  3794  3829  3860  3916
                      4020   4060   4121  4593   4763  4794  5186
BSTATX    0000 1D5E   2495   2502*
BUF1END   0000 0014    141*  1666   2048  2056   2643  3233  3366  3598  3844  4139  4241  4631  4842
                      5325
BUF1EXT   0000 001C    146*   763   1321  2615   4602  4815  5301  5501  5575  5580  5590  5596
```

CHKSUM/M17 PUNCHER

BUF1NEXT	0000 0016	143*	2041	2055	3171	3224	3232	3343	3360	3365	3582	3594	3597	4124
		4135	4138	4221	4226	4229	4240							
BUF1STRT	0000 0012	139*	1668	2612	3170	3342	3581	3841	4123	4220	4266	4288	4290	4619
		4830	5314											
BUF2END	0000 0020	149*	1628	2671	2698	2701	2710	2737	3431	3682	3901	4035	4667	4911
		5400												
BUF2EXT	0000 001D	147*	766	1329	2619	2667	2696	2706	2729	4641	4885	5377	5565	5583
		5588	5592	5597										
BUF2NEXT	0000 0022	150*	2733	3227	3261	3270	3276	3394	3426	3429	3668	3681	3686	3896
		3897	3900	4023	4034	4039								
BUF2SAVE	0000 1F5C	2668	2670	2672	2699	2700	2705	2707	2709	2718*				
BUF2STRT	0000 001E	148*	1627	2613	2669	2697	2708	2730	2732	3260	3275	3392	3667	4022
		4655	4899	5389										
BUFCLEAR	0000 1F62	2729*	3391	3669	3885	4024	4651	4895	5304					
BUFFMOV1	0000 1EBC	2665	2676*	2692										
BUFFMOV2	0000 1EC4	2675	2678*											
BUFFMOV3	0000 1EF8	2690	2694*											
BUFFMOVE	0000 1E84	2661*	4670	4928	5431									
BUFRESTR	0000 1F1A	1418	2693	2703*										
BUSY	0000 4000	171*	1560	1632	1721	2406	2483	2767	2812	3063	3168	3191	3356	3407
		3878	3923	4054	4143	4152	4189	4244	4268	4292	4347	4386	4532	5249
		5616												
C300ADR	0000 02E2	242*												
CARDRDR	0000 0001	65*	989	3974	5707									
CARSL300	0000 0008	125*	536	1521	3147	3157	3173	3214	3243	3278				
CAS0L1	0000 26FA	3521	3525*											
CAS1BUF	0000 41D6	3473	3473	5676*										
CAS1BUFE	0000 42D6	3473	5677*											
CAS1L1	0000 2724	3537	3541*											
CAS1L2	0000 2736	3544	3547*											
CAS1L3	0000 2740	3546	3550*											
CAS1L4	0000 2746	3548	3552*											
CAS2BUF	0000 42D6	3480	3480	5679*										
CAS2BUFE	0000 43D6	3480	5680*											
CAS2NEXT	0000 276A	3562	3566*											
CAS3BUF	0000 43D6	3487	3487	5682*										
CAS3BUFE	0000 44D6	3487	5683*											
CAS3L1	0000 2784	3578	3581*											
CAS4BUF	0000 44D6	3494	3494	5685*										
CAS4BUFE	0000 45D6	3494	5686*											
CAS4L1	0000 27C8	3593	3604*											
CAS4NEXT	0000 27D8	3605	3609*											
CAS5NEXT	0000 27EE	3619	3623*											
CAS6L1	0000 2808	3635	3638*											
CAS7NEXT	0000 282E	3648	3652*											
CAS8L1	0000 2848	3664	3667*											
CAS9L1	0000 288C	3680	3683	3689*										
CAS9NEXT	0000 289C	3690	3694*											
CASBKSPC	0000 28D1	3641	3725*											
CASCLEAR	0000 28CE	3518	3712	3722*										
CASDCB1	0000 2632	1004	3468*											
CASDCB2	0000 2656	1006	3475*											
CASDCB3	0000 267A	1008	3482*											

CHKSUM/M17 PUNCHER

CASDCB4	0000 269E	1010	3489*											
CASEOF	0000 28CF	3541	3723*											
CASPH0	0000 26DA	3499	3514*											
CASPH1	0000 2706	3500	3532*											
CASPH10	0000 28A2	3509	3703*											
CASPH11	0000 28AE	3510	3710*											
CASPH2	0000 275A	3501	3561*											
CASPH3	0000 2770	3502	3575*											
CASPH4	0000 27A0	3503	3592*											
CASPH5	0000 27DE	3504	3618*											
CASPH6	0000 27F4	3505	3632*											
CASPH7	0000 281E	3506	3647*											
CASPH8	0000 2834	3507	3661*											
CASPH9	0000 286A	3508	3679*											
CASPHTB	0000 26C2	3499*												
CASPTR	0000 26C2	3469	3476	3483	3490	3498*								
CASREAD	0000 28D2	3673	3726*											
CASREWND	0000 28D3	3715	3727*											
CASSETTE	0000 0004	68*	1003	1005	1007	1009	2743	3466	3474	3481	3488	5675	5678	5681
		5684												
CASWRT	0000 28D0	3586	3724*											
CHAR	0000 0007	97*	303	322	324	326	436	478	481	482	563	564	573	574
		576	577	582	583	585	592	593	595	597	602	605	608	611
		615	617	627	628	632	635	643	647	663	674	675	683	684
		731	742	753	810	813	815	818	821	823	825	827	829	831
		832	836	856	857	858	859	860	861	895	897	898	900	901
		902	902	903	929	931	1139	1141	1222	1223	1361	1363	1376	1378
		1392	1393	1395	1399	1410	1484	1485	1487	1493	1603	1604	1606	1716
		1717	2398	2399	2399	2400	2402	2403	2514	2515	2516	2517	2549	2565
		2566	2580	2581	2614	2617	2618	2621	2621	2622	2625	2628	2638	2639
		2730	2734	2735	2741	2773	2774	2804	2805	2810	2811	2812	2813	2817
		2846	2849	2871	2872	2873	2874	2876	3111	3146	3152	3155	3162	3207
		3218	3250	3412	3415	3415	3420	3420	3427	3447	3448	3452	3806	3807
		3806	3810	3811	3933	3934	3935	3937	3937	3938	3940	3945	3946	3948
		4324	4325	4326	4328	4333	4626	4662	4837	4906	5204	5207	5208	5210
		5221	5222	5224	5320	5395	5530	5532	5532	5533	5534	5538	5540	5541
		5543	5556	5557										
CK40L1	0000 3CA6	5464	5467*											
CK40L2	0000 3C98	5460	5463*											
CKACL	0000 2E9A	4164	4195*											
CKCAS	0000 28C6	3469	3476	3483	3490	3718*								
CKCLK	0000 2F9E	4254	4297*											
CKCRD	0000 2D20	3977	4071*											
CKDEV	0000 3E9C	3457	3719	3967	4072	4159	4196	4249	4353	4441	4538	4679	4950	5457
		5468	5645*											
CKDMUX	0000 323A	4452	4537*											
CKDSC	0000 3C66	4964	4978	4992	5006	5448*								
CKDSC1	0000 3C82	5453	5456*											
CKDSC2	0000 3C74	5449	5452*											
CKDSC40	0000 3C8A	5023	5037	5051	5065	5082	5095	5106	5121	5459*				
CKFMD	0000 2B4A	3732	3742	3752	3762	3945*								
CKFMD1	0000 2B92	3964	3966*											
CKFMD1A	0000 2B6C	3952	3955*											

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```
CKFMD1B   0000 2B76    3956   3958*
CKFMD2    0000 2B80    3961*
CKFMD3    0000 2B88    3960   3963*
CKINT8    0000 3034    4305   4352*
CKLNP     0000 2E36    4082   4104   4158*
CKMAG     0000 36BA    4690   4701   4712   4723   4945*
CKMAG1    0000 36C8    4946   4949*
CKMEM     0000 3DC4    5488   5574*
CKMEM1    0000 3DE0    5578   5582*
CKMEM2    0000 3DFC    5586   5590*
CKMMP     0000 3E98    5603   5644*
CKPIC     0000 2F20    4199   4248*
CKPTRP    0000 25FC    3298   3444*
CKPTRP1   0000 2600    3445*
CKPTRP2   0000 2618    3449   3452*
CKPTRP3   0000 2622    3451   3455*
CKPTRP4   0000 2626    3453   3456*
CKSLCH    0000 33D4    4562   4674*
CKSLCH1   0000 33E2    4675   4678*
CKSPCL    0000 6976    5659   5782*
CKULI     0000 311E    4365   4440*
CLIFADR   0000 02DE     240*
CLKDCB    0000 2F2A    1001   1569   4253*
CLKISR    0000 2F6A    4263   4277*  4282
CLKPH0    0000 2F42    4258   4263*
CLKPH1    0000 2F82    4259   4288*
CLKPHTR   0000 2F3E    4258*
CLKPTR    0000 2F3E    4254   4257*
CLOCK     0000 0001      67*   998   4161
CLRLOCK   0000 1DD6    2578*  3067   3922   5251
CMND01    0000 0BB8     625*
CMND02    0000 0BD6     631    635*
CMND04    0000 0BDA     634    642*
CMND05    0000 0BE6     645*   651
CMND05A   0000 0BF2     646    649*
CMND06    0000 0BFC     648    654*
CMND07    0000 0C02     652    659*
CMND08    0000 0C0A     661*   667
CMND08A   0000 0C16     662    665*
CMND09    0000 0C26     664    671*
CMND10    0000 0C44     673    681*
CMND11    0000 0C6C     676    693*
CMND12    0000 0D06     780*
CMNDBUF   0000 07FC     531*   564
CMNDBUFE  0000 084B     532*   600
CMNDBUFS  0000 07FC     530*   567    580    625    626    627   1626
CMNDERR1  0000 0D78     816    839*
CMNDERR2  0000 0D80     824    828    830    842*
CMNDPROC  0000 0AE0     461    560*   620    669    679    685    781    784    840    843   1142   1144   1165
                       1195   1244   1383   1393   1403   1409   1413   1424   1435
CMNDPSW   0000 0530     459    461*
COMMANDE  0000 08D2     535*   622    811    819
COMN      0000 04D4     411    422*
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```
COMN1       0000 04EC      431*   434
COMN1A      0000 04F8      436*   437
COMN2       0000 0504      441*   445
COMN3       0000 1376     1511*  1513
COMPARE     0000 1DFC     2611*  3437   3703   3930   4066   4669   4927   5430
COMPARE1    0000 1E04     2614*  2644
COMPARE2    0000 1E66     2623   2641*
CON2ND      0000 245F     3176   3246   3289*
CON5L1      0000 2422     3270*
CONADR      0000 02DA      238*   381    382
CONDCB      0000 2290      372    474    568   1517   1625   1652   2051   2352   3126*
CONDSBL     0000 2459     3189   3288*
CONENRD     0000 2477     3263   3293*
CONENWT     0000 2471     3180   3282   3292*
CONP0L1     0000 22D6     3148   3150*
CONP0L2     0000 22E8     3154   3157*
CONP1L1     0000 231E     3174   3177*
CONP2L1     0000 235C     3199*
CONP2L1A    0000 237A     3207*  3212
CONP2L1B    0000 2380     3210*
CONP2L1C    0000 238A     3206   3214*
CONP2L1D    0000 2368     3202*  3215
CONP2L2     0000 239E     3204   3213   3217   3221*
CONP2L3     0000 23A4     3187   3224*
CONP2L3A    0000 23B8     3226   3230*
CONP2L3B    0000 23CE     3229   3236*
CONP3L1     0000 23EA     3244   3247*
CONP6L1     0000 244A     3279   3281*
CONPH0      0000 22C2     3134   3144*
CONPH1      0000 22FA     3135   3167*
CONPH2      0000 232E     3136   3186*
CONPH3      0000 23D8     3137   3242*
CONPH4      0000 23FC     3138   3257*
CONPH5      0000 241A     3139   3268*
CONPH6      0000 242A     3140   3272*
CONPHTB     0000 22B4     3134*
CONPRINT    0000 0534      277    472*
CONPRNT1    0000 054A      478*   483
CONPTR      0000 22B4     3127   3133*
CONRD       0000 246B     3145   3201   3291*
CONREAD     0000 0AFC      568*   588
CONREAD1    0000 0B04      570*
CONREAD2    0000 0B0C      572*   584    601
CONREAD3    0000 0B7C      581    598    604*
CONREAD4    0000 0B86      594    607*
CONREAD5    0000 0B8E      596    610*
CONREAD6    0000 0B94      603    606    609    612*
CONSAV      0000 05AA      472    484    490*
CONSET1     0000 0472      376    378*
CONTADR     0000 0028      155*   707   1285   2908   2969   3001   3052   5173   5175   5179   5238   5257   5283
                          5305   5310   5327   5360   5402   5440   5448   5451   5459   5462
CONTSET     0000 2180     3001*  5317   5392
CONTSET1    0000 21A0     3003   3011*
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CONTSTAT	0000	21E8	3052*	5341	5416									
CONTYP	0000	02D8	236*	374	3144	3172	3188	3199	3242	3262	3277			
CONWRT	0000	2465	3177	3247	3281	3290*								
CRD1L1	0000	2CC6	4036	4041*										
CRD1L2	0000	2CF2	4033	4053*										
CRD1L3	0000	2D0C	4056	4061*										
CRDBUF	0000	47D6	3981	3981	5708*									
CRDBUFE	0000	4876	3981	5709*										
CRDCLEAR	0000	2D28	4013	4076*										
CRDDATA	0000	28CE	3978	3978	3983*									
CRDDATAE	0000	2C6D	3978	4004*										
CRDDCB	0000	28AA	990	3976*										
CRDFEED	0000	2D29	4026	4077*										
CRDP0L1	0000	2C8A	4017	4020*										
CRDP0L2	0000	2C90	4019	4022*										
CRDP0L3	0000	2C98	4024*											
CRDPH0	0000	2C74	4007	4013*										
CRDPH1	0000	2CA8	4008	4032*										
CRDPH2	0000	2D14	4009	4066*										
CRDPHTB	0000	2C6E	4007*											
CRDPTR	0000	2C6E	3977	4006*										
CRLFNULL	0000	0D88	856*	1163	1231	1337	1381	1433						
CSTAT01	0000	21EC	3053*	3057										
CSTAT02	0000	222E	3075*	3077										
CSTAT03	0000	2236	3073	3078*										
CURWAIT	0000	000C	136*	1727	1728	2431	2809	3687	5636					
CVTASCI1	0000	0D9E	876*	1228	1282	1287	1292							
CVTASCII	0000	0D9C	875*	1230	1299	1302	1307	1310	1315	1318	1327	1335	1374	1380	1430
			1432											
CYLCUR	0000	0036	165*	2930	2937	3004	3016	5195	5206	5219				
CYLHIGH	0000	002C	159*	734	1300	5216								
CYLLOW	0000	002A	157*	729	1297	5194	5218							
D40CYL	0000	3CB5	2938	5479*										
D40HEAD	0000	3CB6	2946	3023	5480*									
D40REATN	0000	3CB3	2934	3011	5256	5477*								
D40REHD	0000	3CB4	2941	3018	5478*									
DAT	0000	0009	100*	273	274	275	287	288	288	289	310	311	312	313	314
			317	343	344	348	364	364	365	367	374	375	377	378	380
			380	381	422	422	424	426	427	439	441	443	444	562	564
			565	626	642	645	661	700	707	714	729	734	741	745	752
			756	764	767	809	809	833	835	836	896	900	904	1200	1201
			1205	1227	1229	1280	1285	1290	1297	1300	1305	1308	1313	1316	1321
			1322	1322	1323	1325	1329	1330	1330	1331	1333	1345	1350	1351	1363
			1368	1369	1369	1370	1372	1378	1399	1400	1428	1431	1474	1475	1477
			1483	1484	1495	1496	1510	1511	1512	1529	1532	1534	1539	1542	1560
			1561	1567	1571	1572	1583	1584	1586	1587	1630	1631	1631	1632	1633
			1634	1635	1653	1654	1659	1659	1660	1661	1673	1674	1700	1703	1703
			1704	1713	1714	1719	1719	1721	1724	1735	1736	1758	1759	1760	1760
			1761	1762	1763	1770	1771	1776	1776	1777	1778	1779	1785	1786	1787
			1788	1794	1795	1796	1796	1797	1798	1799	1808	1809	1810	1810	1811
			1812	1813	1829	1830	1832	1833	1834	1835	1836	1837	1838	1839	1846
			1847	1848	1848	1849	1850	1851	1867	1868	1870	1871	1872	1873	1880
			1881	1882	1882	1883	1884	1885	1897	1898	1901	1902	1903	1904	1905

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		1906 1936 1937 1974 1975 1997 1998 2015 2016 2017 2018 2096 2097
		2098 2100 2110 2114 2123 2132 2141 2150 2160 2169 2252 2253 2260
		2261 2263 2264 2266 2286 2286 2287 2288 2311 2333 2334 2335 2336
		2337 2338 2340 2341 2390 2391 2448 2449 2485 2497 2498 2617 2622
		2624 2626 2626 2627 2628 2632 2633 2636 2637 2674 2677 2678 2679
		2682 2684 2684 2685 2688 2689 2691 2695 2697 2698 2699 2700 2701
		2763 2776 2780 2783 2786 2802 2806 2818 2819 2820 2837 2839 2841
		2861 2863 2869 2879 2880 2881 2882 2917 2918 2919 2974 2978 2981
		2984 3001 3009 3012 3019 3024 3027 3028 3059 3075 3076 3078 3082
		3086 3089 3108 3194 3195 3347 3362 3372 3373 3398 3555 3562 3586
		3605 3619 3641 3648 3673 3690 3848 3855 3856 3857 3896 3898 3899
		3900 3901 3903 3918 3919 3920 4026 4042 4043 4046 4047 4048 4049
		4126 4179 4231 4331 4339 4340 4341 4380 4395 4396 4401 4402 4403
		4404 4405 4421 4422 4427 4428 4429 4430 4431 4474 4490 4497 4498
		4500 4501 4502 4504 4505 4508 4509 4510 4511 4526 4582 4582 4584
		4585 4618 4622 4654 4658 4799 4806 4829 4833 4846 4853 4870 4877
		4898 4902 4919 5175 5179 5180 5206 5215 5216 5218 5219 5236 5239
		5258 5265 5281 5284 5291 5308 5311 5313 5318 5320 5342 5356 5367
		5385 5390 5417 5540 5541 5544 5546 5547 5548 5549 5550 5551 5565
		5567 5575 5577 5583 5585 5592 5594 5596 5597 5598 5599 5627 5628
DATAPTRN	0000 3ED6	448 3299 3299 3470 3470 3477 3477 3484 3484 3491 3491 3733 3733
		3734 3743 3743 3744 3753 3753 3754 3763 3763 3764 4691 4691 4702
		4702 4713 4713 4724 4724 4965 4965 4979 4979 4993 4993 5007 5007
		5024 5024 5038 5038 5052 5052 5066 5066 5083 5083 5096 5096 5109
		5109 5122 5122 5667*
DATASTUP	0000 0516	448* 451
DATSAVE	0000 20BE	2841 2871 2886*
DCBADR	0000 0006	95* 372 373 383 404 441 442 474 475 477 568 569 570
		613 671 682 687 691 697 700 707 714 729 734 741 745
		752 756 763 764 766 767 775 1196 1199 1200 1211 1229 1245
		1248 1252 1261 1263 1278 1280 1285 1290 1297 1300 1305 1308 1313
		1316 1321 1325 1329 1333 1417 1464 1465 1471 1474 1479 1517 1518
		1520 1523 1526 1529 1530 1542 1548 1550 1552 1553 1554 1555 1556
		1557 1558 1561 1562 1563 1569 1571 1573 1583 1587 1625 1627 1628
		1630 1633 1635 1636 1652 1653 1666 1668 1670 1671 1705 1705 1710
		1713 1717 1727 1728 1737 1739 1746 1893 1893 1934 1934 1972 1972
		1995 1995 2035 2036 2039 2041 2042 2048 2051 2052 2055 2056 2209
		2211 2230 2250 2260 2331 2331 2334 2335 2337 2341 2352 2393 2395
		2403 2404 2409 2412 2412 2414 2429 2431 2432 2484 2552 2612 2613
		2615 2619 2629 2630 2643 2645 2647 2662 2667 2669 2671 2696 2697
		2698 2701 2706 2708 2710 2729 2730 2732 2733 2737 2768 2769 2814
		2843 2844 2852 2854 2858 2860 2884 2907 2908 2911 2914 2917 2921
		2925 2930 2931 2937 2945 2966 2967 2969 2971 2973 2986 3001 3004
		3005 3007 3014 3016 3022 3027 3032 3052 3058 3062 3064 3066 3068
		3074 3083 3150 3160 3169 3170 3171 3192 3200 3224 3227 3232 3233
		3237 3248 3259 3260 3261 3270 3274 3275 3276 3317 3321 3324 3328
		3331 3339 3342 3343 3345 3357 3360 3362 3365 3366 3369 3373 3388
		3392 3394 3396 3408 3413 3417 3425 3426 3429 3431 3439 3445 3456
		3516 3520 3527 3532 3535 3539 3543 3545 3552 3563 3575 3577 3579
		3581 3582 3583 3594 3597 3598 3601 3606 3620 3632 3634 3636 3638
		3649 3661 3663 3665 3667 3668 3670 3681 3682 3686 3687 3691 3705
		3710 3714 3788 3791 3799 3800 3801 3806 3808 3810 3811 3812 3815
		3826 3830 3836 3837 3841 3844 3846 3854 3861 3865 3872 3875 3880

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                                3385   3446   3450   5253   5328   5403
DEVCNTL2  0000 0400             175*  1268   1654   2053   2915   2928   3002   3029   3072   3168   3235   3257   3325
                                3336   3446   3454   5191   5253   5328   5403
DFLOAT    0000 16E4            1806   1816*
DFLOAT1   0000 1746            1827   1841*
DFLOAT2   0000 1754            1843   1845*
DFLTCMND  0000 0F70             961   1122*
DFLTEST2  0000 174A            1842*  1850   1959
DFLTSWCH  0000 0040             122*  1122   1156   1816
DIGTLIO   0000 0000              77*  1088
DIGTLMPX  0000 0001              76*  1085   4448
DISARM    0000 0D16             431    786*  2766   3550   4053   4142   4154   4192   4238   4793   4939   5308   5385
DISC      0000 0010             179*
DISCS     0000 0004              73*  1030   1032   1034   1036   2888   4961   4976   4990   5004   5731   5734   5737
                                5740
DISPATCH  0000 14F4            1643   1652*
DMUXDCB   0000 312A            1086   4450*
DMUXP0L1  0000 315C            4469*
DMUXP2L1  0000 31E8            4499   4513*
DMUXP2L2  0000 3228            4523   4531*
DMUXPH0   0000 314C            4459   4465*
DMUXPH1   0000 317A            4460   4481*
DMUXPH2   0000 31AA            4461   4497*
DMUXPTR   0000 3146            4451   4459*
DMUXSQR   0000 3243            4488   4533   4542*
DMUXSQW   0000 3242            4469   4524   4541*
DPTRNEND  0000 3FD5            3299   3470   3477   3484   3491   4691   4702   4713   4724   4965   4979   4993   5007
                                5024   5038   5052   5066   5083   5096   5109   5122   5668*
DRIVER    0000 1CC6            1672   1747   2429*
DSC0L1    0000 39F8            5185   5188*
DSC0L2    0000 3A0C            5192   5194*
DSC10NXT  0000 3B8A            5342   5346*
DSC13NXT  0000 3B9C            5356   5359*
DSC16NXT  0000 3BAC            5367   5370*
DSC18L1   0000 3C10            5404   5408*
DSC19NXT  0000 3C30            5417   5421*
DSC1BUF   0000 4D76            4968   4968   5732*
DSC1BUFE  0000 4E75            4968   5733*
DSC1L1    0000 3A58            5217   5219*
DSC1L2    0000 3A5C            5213   5220*
DSC1L3    0000 3A60            5209   5221*
DSC2BUF   0000 4E76            4982   4982   5735*
DSC2BUFE  0000 4F75            4982   5736*
DSC3BUF   0000 4F76            4996   4996   5738*
DSC3BUFE  0000 5075            4996   5739*
DSC3L1    0000 3AB0            5254   5256*
DSC4BUF   0000 5076            5010   5010   5741*
DSC4BUFE  0000 5175            5010   5742*
DSC4NEXT  0000 3ACE            5265   5269*
DSC7NEXT  0000 3AFE            5291   5294*
DSC9L1    0000 3B6A            5329   5333*
DSCABUF   0000 5176            5027   5027   5748*
DSCABUFE  0000 5275            5027   5749*
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DSCBBUF	0000 5276	5041	5041	5751*										
DSCBBUFE	0000 5375	5041	5752*											
DSCCBUF	0000 5376	5055	5055	5754*										
DSCCBUFE	0000 5475	5055	5755*											
DSCDBUF	0000 5476	5069	5069	5757*										
DSCDBUFE	0000 5575	5069	5758*											
DSCDCB1	0000 36D6	1031	4963*											
DSCDCB2	0000 3710	1033	4977*											
DSCDCB3	0000 374A	1035	4991*											
DSCDCB4	0000 3784	1037	5005*											
DSCDCBA	0000 37BE	1043	5022*											
DSCDCBB	0000 37F8	1045	5036*											
DSCDCBC	0000 3832	1047	5050*											
DSCDCBD	0000 386C	1049	5064*											
DSCP4L1	0000 3AC8	5266*	5292	5357	5368									
DSCPH0	0000 39BA	5146	5171*											
DSCPH1	0000 3A26	5147	5204*											
DSCPH10	0000 3B7A	5156	5332	5341*										
DSCPH11	0000 3A7C	5157	5233*											
DSCPH12	0000 3A96	5158	5247*											
DSCPH13	0000 3B90	5159	5355*											
DSCPH14	0000 3AD2	5160	5277*											
DSCPH15	0000 3A96	5161	5248*											
DSCPH16	0000 3BA0	5162	5366*											
DSCPH17	0000 3BB0	5163	5377*											
DSCPH18	0000 3BF4	5164	5400*											
DSCPH19	0000 3C20	5165	5407	5416*										
DSCPH2	0000 3A7C	5148	5232*											
DSCPH20	0000 3C36	5166	5430*											
DSCPH21	0000 3C46	5167	5438*											
DSCPH3	0000 3A96	5149	5245*											
DSCPH4	0000 3AC0	5150	5264*											
DSCPH5	0000 3AD2	5151	5276*											
DSCPH6	0000 3A96	5152	5246*											
DSCPH7	0000 3AF2	5153	5290*											
DSCPH8	0000 3B02	5154	5301*											
DSCPH9	0000 3B4E	5155	5325*											
DSCPHTB	0000 398E	5146*												
DSCPTR	0000 398E	4964	4978	4992	5006	5023	5037	5051	5065	5082	5095	5108	5121	5145*
DSCREAD	0000 3CB1	5393	5475*											
DSCRESET	0000 3CB2	5180	5443	5476*										
DSCSEEK	0000 3CAF	5281	5473*											
DSCWRT	0000 3CB0	5318	5474*											
DSK40MB	0000 0004	74*	1042	1044	1046	1048	2888	5021	5035	5049	5063	5747	5750	5753
		5756												
DSPCH01	0000 1542	1655	1658	1678*										
DSPCH01A	0000 1562	1684	1687*											
DSPCH01B	0000 1564	1686	1688*											
DSPCH02	0000 1568	1679	1681	1692*										
DSPCH03	0000 159C	1695	1710*											
DSPCH03A	0000 15BC	1715	1719*											
DSPCH04	0000 160A	1722	1746*											
DSPCHCNT	0000 07FA	529*	1598	1699	1700									

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FLP0	0000 1858	1842	1876	1917*											
FLP1	0000 1860	1820	1821	1822	1823	1825	1841	1858	1859	1860	1861	1863	1875	1918*	
FLP2	0000 1868	1826	1864	1919*											
FLTCMND	0000 0F76	962	1127*												
FLTSWTCH	0000 1000	116*	1127	1154	1854										
FLTTEST2	0000 17C8	1876*	1884	1954											
FMD	0000 0008	180*	1539	1714	2261	2396									
FMD0L1	0000 29BC	3793	3797*												
FMD1BUF	0000 45D6	3737	3737	5692*											
FMD1BUFE	0000 4655	3737	5693*												
FMD2BUF	0000 4656	3747	3747	5695*											
FMD2BUFE	0000 46D5	3747	5696*												
FMD3BUF	0000 46D6	3757	3757	5698*											
FMD3BUFE	0000 4755	3757	5699*												
FMD4BUF	0000 4756	3767	3767	5701*											
FMD4BUFE	0000 47D5	3767	5702*												
FMDDCB1	0000 28D4	1068	3731*												
FMDDCB2	0000 2902	1070	3741*												
FMDDCB3	0000 2930	1072	3751*												
FMDDCB4	0000 295E	1074	3761*												
FMDP1L1	0000 29E0	3809	3811*												
FMDP2L0	0000 29FE	3823*	3833												
FMDP2L0A	0000 2A0E	3825	3829*												
FMDP2L1	0000 2A18	3828	3832*												
FMDP2L2	0000 2A38	3842*	3845												
FMDP3L0	0000 2A7A	3865*	3870												
FMDP3L1	0000 2A82	3863	3867*												
FMDP3L2	0000 2A8C	3859	3866	3871*											
FMDP5L1	0000 2ACE	3898*	3902												
FMDP6L1	0000 2AFA	3912	3916*												
FMDP6L2	0000 2AFE	3915	3917*												
FMDP7L1	0000 2B2A	3933*	3942												
FMDP7L2	0000 2B38	3936	3938*												
FMDPH0	0000 299C	3775	3786*												
FMDPH1	0000 2900	3776	3806*												
FMDPH2	0000 29F4	3777	3820*												
FMDPH3	0000 2A54	3778	3854*												
FMDPH3A	0000 2A62	3858*	3873												
FMDPH4	0000 2AAE	3779	3885*												
FMDPH5	0000 2ABA	3780	3892*												
FMDPH6	0000 2AEA	3781	3910*	3914											
FMDPH7	0000 2B20	3782	3930*												
FMDPHTB	0000 298C	3775*													
FMDPTR	0000 298C	3732	3742	3752	3762	3774*									
FMDREAD	0000 2BA6	3893	3972*												
FMDRESET	0000 2B9A	3789	3969*												
FMDRIVE	0000 07F8	398	528*	1603	1606	1716	2268	2269	2398	3933	3938	3941	3949	3950	
FMDSEL	0000 0F26	1066*	2403												
FMDSELCT	0000 2B3C	1607	3939*												
FMDSTOP	0000 2BA2	3848	3855	3903	3918	3971*									
FMDWRT	0000 2B9E	3838	3970*												
FORMAT	0000 1A3C	1665	2075	2091*											
FORMAT1	0000 1A54	2097*	2099												

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```
                                5419   5641
ISRFILL     0000 044C           365*    369
LADC        0000 0001
LASTDCB     0000 12CC           660    1395   1425*  2211
LEADER      0000 0096           213*    217
LNP0L1      0000 2DDA          4120   4123*
LNP1L1      0000 2E0E          4134   4142*
LNP1L2      0000 2E1A          4141   4146*
LNP1L3      0000 2E1C          4145   4147*
LNPDATA     0000 2D46          4083   4083   4085*  4105   4105
LNPDATAE    0000 2D8D          4083   4096*  4105
LNPDCB1     0000 2D2A           993   4081*
LNPDCB2     0000 2DA6           995   4103*
LNPPH0      0000 2DC8          4111   4117*
LNPPH1      0000 2DF0          4112   4133*
LNPPH2      0000 2E24          4113   4152*
LNPPHTB     0000 2DC2          4111*
LNPPTR      0000 2DC2          4082   4104   4110*
LNZB        0000 3ED5           209   5666*  5791   5820
LOAD        0000 00A0           218*   224
LOGCMND     0000 0F7C           963   1132*
LOGSWTCH    0000 2000           115*   255    1132   1152   2342
LOWLNPD     0000 2D8A          4094*
LOWLNPDE    0000 2DA5          4101*
LRNCUR      0000 0028           154*  3801   3806   3811   3836   3875
LRNHIGH     0000 002C           158*  3808   3955   3957   3958   3962
LRNLOW      0000 002A           156*  3800   3810   3951   3954   3963   3965
MAG0L1      0000 34CE          4762   4765*
MAG10NXT    0000 3680          4919   4922*
MAG1BUF     0000 4976          4694   4696   5716*
MAG1BUFE    0000 4A75          4695   5717*
MAG1L1      0000 3500          4779   4783*
MAG1L2      0000 3514          4786   4791*
MAG1L3      0000 351A          4789   4793*
MAG1L4      0000 3524          4792   4796*
MAG2BUF     0000 4A76          4705   4707   5719*
MAG2BUFE    0000 4B75          4706   5720*
MAG2NXT     0000 3548          4806   4810*
MAG3BUF     0000 4B76          4716   4718   5722*
MAG3BUFE    0000 4C75          4717   5723*
MAG3L1      0000 3578          4823   4827*
MAG4BUF     0000 4C76          4727   4729   5725*
MAG4BUFE    0000 4D75          4728   5726*
MAG5NXT     0000 35C8          4853   4856*
MAG7NXT     0000 3606          4877   4880*
MAGBKSPC    0000 36D3          4870   4957*
MAGCLEAR    0000 36D1          4759   4940   4955*
MAGDCB1     0000 33EC          1019   4689*
MAGDCB2     0000 3414          1021   4700*
MAGDCB3     0000 343C          1023   4711*
MAGDCB4     0000 3464          1025   4722*
MAGEOF      0000 36D0          4783   4954*
MAGNMTN     0000 35AC          4845*  4914
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MAGPH0     0000 34A6      4737   4753*
MAGPH1     0000 34DA      4738   4772*
MAGPH10    0000 3674      4747   4918*
MAGPH11    0000 3686      4748   4927*
MAGPH12    0000 3694      4749   4934*
MAGPH2     0000 3538      4739   4805*
MAGPH3     0000 354E      4740   4815*
MAGPH4     0000 35A2      4741   4842*
MAGPH5     0000 35BC      4742   4852*
MAGPH6     0000 35CE      4743   4861*
MAGPH7     0000 35FA      4744   4876*
MAGPH8     0000 360C      4745   4885*
MAGPH9     0000 3664      4746   4911*
MAGPHTB    0000 348C      4737*
MAGPTR     0000 348C      4690   4701   4712   4723   4736*
MAGREAD    0000 36D4      4902   4958*
MAGREWND   0000 36D5      4942   4959*
MAGSTAT    0000 1F8E      2763*  3561   3604   3618   3647   3689   4805   4852   4876   4918
MAGTAPE    0000 0004        72*  1018   1020   1022   1024   2743   4687   4699   4710   4721   5715   5718   5721
                          5724
MAGTOP0    0000 3570      4824*  4866   4894
MAGTOPX    0000 3572      4825*  4930   4943
MAGWRT     0000 36D2      4833   4956*
MAGXL1     0000 3540      4807*  4854   4878   4920
MALFGO     0000 19B0      2024   2026*
MALFSTOP   0000 19AC      2021   2024*
MALFUNCT   0000 1978       265   2008*  2015
MAPCMND    0000 12CE       966   1427*
MAXWAIT    0000 7FF8        82*  1729
MEMDCB     0000 3CB8      1094   5487*
MEMHIGH    0000 0014       142*   767   1333   5566   5584   5589   5593   5599
MEMLOW     0000 0012       140*   764   1325   5502   5576   5581   5591   5598
MEMMAP     0000 0ADC       284    285    290    305    330    332    342    545*  1428   1431   2689   5522
MEMORY     0000 0040       177*  1201   1475   1534   1567
MEMP0L1    0000 3CF8      5504   5508*
MEMP1L1    0000 3D42      5532*  5535
MEMP1L2    0000 3D5A      5540*  5558
MEMP1L3    0000 3D94      5542   5556*
MEMP1L3A   0000 3D9E      5523   5527   5560*
MEMP1L4    0000 3DBC      5570*
MEMPH0     0000 3CDA      5494   5499*
MEMPH1     0000 3D06      5495   5515*
MEMPHTB    0000 3CD6      5494*
MEMPTR     0000 3CD6      5488   5493*
MEMSTART   0000 07DE       280    520*  2673   2674   5574   5579
MEMTOP     0000 07E2       281    352    521*  5582   5587
MICROBUS   0000 0010       124*   536   3153   3205
MICROIO    0000 02E4       243*
MMPDCB     0000 3E22      1095   5602*
MMPP0L1    0000 3E70      5628*
MMPP0L2    0000 3E7C      1931   5631*
MMPPH0     0000 3E38      5604   5609*
MMPPH1     0000 3E82      5605   5636*
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PARERR1	0000	1988	2010	2013*										
PARITY	0000	0020	123*	1692	2009	2011								
PARM	0000	0004	132*	697	1278	1399								
PARMCHCK	0000	0010	136*	775										
PARMFLG0	0000	0C6C	697*											
PARMFLG1	0000	0C7A	698	704*										
PARMFLG2	0000	0C86	705	711*										
PARMFLG3	0000	0C92	712	718*										
PARMFLG4	0000	0C94	722*											
PARMFLG5	0000	0C96	726*											
PARMFLG6	0000	0CB0	727	738*										
PARMFLG7	0000	0CCA	739	749*										
PARMFLG8	0000	0CE4	750	760*										
PARMFLG9	0000	0D00	761	771*										
PASLA	0000	0000	79*	1079										
PASLADR	0000	02DC	239*											
PASLAFLG	0000	0004	126*	536	1521	3147	3173	3214	3243	3278				
PASRG2S	0000	2458	3149	3287*										
PATTERN1	0000	3EAC	5621	5654*										
PFLG5L1	0000	0CAC	732	734*										
PFLG6L1	0000	0CC6	743	745*										
PFLG7L1	0000	0CE0	754	756*										
PHASE	0000	0002	131*	477	570	613	682	1562	1635	1670	2036	2925	3317	3324	3331
			3339	3369	3388	3439	3545	3563	3579	3601	3606	3620	3636	3649	3665
			3691	3705	3714	3815	3830	3865	3887	3932	4061	4068	4217	4316	4415
			4437	4614	4634	4783	4807	4825	5227	5266	5334	5343	5409	5418	5433
			5445	5500	5571	5640									
PICBUF	0000	2EBE	4200	4200	4203*										
PICBUFE	0000	2EC6	4200	4207*											
PICDCB	0000	2EA2	1000	4198*											
PICP2L1	0000	2F14	4242	4244*											
PICPH0	0000	2ECC	4210	4216*											
PICPH1	0000	2EE4	4211	4226*											
PICPH2	0000	2F02	4212	4238*											
PICPHTB	0000	2EC6	4210*												
PICPTR	0000	2EC6	4199	4209*											
PICSTART	0000	2F28	4231	4250*											
PRINTERS	0000	0002	66*	992	994	4079	4102								
PRMSCN2	0000	0D38	817*	837											
PRMSCN3	0000	0D68	826	832*											
PRNTCELL	0000	1214	1346	1355	1368*										
PROMPTS	0000	075C	514*	560											
PROTOFF	0000	3EAB	5638	5653*											
PROTON	0000	3EAA	5609	5620	5652*										
PTPON	0000	2631	3347	3464*											
PTPSTAT	0000	19D4	2043*	2045	2049										
PTPSTOP	0000	262F	3327	3358	3462*										
PTPSTOP1	0000	2518	3355*	3381											
PTPSTOP2	0000	251A	3356*	3380											
PTRBUF	0000	40D6	3302	3302	5672*										
PTRBUFE	0000	41D5	3302	5673*											
PTRON	0000	2630	3398	3463*											
PTRPOL1	0000	24CE	3319	3322	3325*										

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PTRP1L1    0000 24F6    3337   3342*
PTRP2L1    0000 252A    3354   3360*
PTRP2L2    0000 2550    3363   3372*
PTRP4L1    0000 2576    3386   3391*
PTRP5L1    0000 25AE    3405   3412*
PTRP5L1A   0000 25C4    3414   3419*
PTRP5L2    0000 25CE    3419   3421   3424*
PTRPDCB    0000 247E     985    986    987   1261   2035   3297*
PTRPPH0    0000 24B0    3306   3316*
PTRPPH1    0000 24E8    3307   3336*
PTRPPH2    0000 2512    3308   3353*
PTRPPH3    0000 255A    3309   3378*
PTRPPH4    0000 2568    3310   3385*
PTRPPH5    0000 2596    3311   3404*
PTRPPH6    0000 25F0    3312   3437*
PTRPPHTB   0000 24A2    3306*
PTRPPTR    0000 24A2    3298   3305*
PTRSTOP    0000 262E    3320   3409   3461*
PTRSTOP1   0000 259C    3406*
PTRSTOP2   0000 259E    3407*  3432
PURETOP    0000 0000R
QFULL      0000 0200     119*   455   2063   2306   2347   2348
QUECHK00   0000 1C32    2332   2342*
QUECHK01   0000 1C38    2339   2344*
QUECHK02   0000 1C46    2343   2348*
QUECHK03   0000 1C58    2349   2351   2357*
QUEUECHK   0000 1C0C    1741   1764   1780   1800   1814   1840   1852   1874   1886   1907   1939   1977   2000
                        2026   2331*  2454   2501   2640   2883   3221   4406   4432   4512   5554
QUEUESIZ   0000 0084      81*   534   2291
R0         0000 0000      84*   472    484   1889   1908   1913   2297   5786   5787   5803   5807   5813   5824
                        5825   5826   5832   5834   5835
R1         0000 0001      86*   207    218    224    249   1621   5787   5789   5793   5795   5798   5799   5802
                        5802   5803   5810   5812   5815   5819   5821   5824   5828
R10        0000 000A     101*   358    358    365
R11        0000 000B     103*   359
R12        0000 000C     105*   360
R13        0000 000D     107*   309    330    332    335    337    361    473    478    480    567    579    580
                         583    592    599    600    607    610    621    622    625    629    633    674    683
                         686    690    810    811    817    818    819   1139   1149   1162   1182   1183   1263
                        1264   1268   1278   1283   1283   1288   1288   1293   1293   1294   1294   1295   1295
                        1303   1303   1311   1311   1319   1319   1392   1485   1662   1894   1897   1898   1903
                        1905   1910   1984   1989   2055   2056   2058   2059   2072   2100   2103   2110   2114
                        2123   2132   2141   2150   2160   2169   2613   2618   2642   2912   4060   5381   5390
                        5394
R13SAVE    0000 07F6     527*   686    690
R14        0000 000E     108*   258    258    259    260    262    264    266    268    270    280    281    286
                         296    315    321    328    334    338    342    345    347    347    349    351    352
                         362    362    366    368    857    859    861    877    878    903    905   1162   1181
                        1182   1207   1217   1218   1220   1221   1224   1248   1249   1260   1271   1274   1323
                        1324   1331   1332   1371   1427   1541   1576   1666   1895   1926   1938   1944   1946
                        1953   1957   1965   1969   1976   1992   1999   2008   2008   2014   2019   2020   2052
                        2053   2094   2109   2113   2122   2131   2140   2149   2159   2168   2173   2175   2365
                        2391   2392   2395   2396   2400   2401   2401   2402   2404   2406   2410   2429   2452
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REMESS	0000	05F6	418	495*										
REPCMND	0000	11FC	971	1359*										
RESTART	0000	04C0	231	413*	1620	2070	2079							
RESTORE	0000	3CAE	5236	5472*										
RET1	0000	0003	89*	479	572	614	616	618	699	706	713	728	733	740	744
			751	755	762	765	776	812	814	820	822	862	879	1151	1153
			1155	1157	1159	1161	1163	1185	1228	1230	1231	1282	1287	1292	1299
			1302	1307	1310	1315	1318	1327	1335	1337	1343	1359	1374	1380	1381
			1430	1432	1433	1607	1665	1672	1747	2075	2176	2553	2926	3156	3158
			3163	3182	3253	3326	3329	3332	3340	3349	3389	3400	3440	3523	3528
			3540	3551	3557	3580	3588	3637	3643	3666	3675	3706	3716	3795	3802
			3816	3831	3850	3888	3906	3943	4021	4028	4069	4122	4129	4181	4222
			4234	4273	4299	4317	4334	4382	4412	4416	4435	4438	4472	4477	4594
			4598	4615	4627	4663	4764	4768	4782	4795	4801	4826	4838	4872	4907
			5187	5200	5228	5241	5267	5286	5321	5396	5434	5446	5511	5568	5572
			5595	5600	5632	5646	5649								
RET2	0000	000B	104*	876	908	1418	1544	1578	2102	2112	2116	2125	2134	2143	2152
			2162	2171	2550	2567	2582	2648	2663	2702	2712	2742	2765	2778	2782
			2785	2787	2821	2885	2907	2910	2913	2931	2932	2966	2968	2970	2986
			2987	3010	3030	3033	3061	3066	3067	3068	3080	3085	3088	3090	3118
			3123	3391	3437	3517	3533	3553	3561	3576	3584	3604	3618	3633	3639
			3647	3662	3669	3671	3689	3703	3711	3787	3821	3822	3824	3835	3877
			3885	3922	3930	4024	4066	4581	4589	4608	4610	4617	4620	4632	4645
			4647	4651	4653	4656	4668	4669	4670	4756	4758	4773	4775	4797	4805
			4819	4821	4828	4831	4843	4852	4862	4864	4868	4876	4889	4891	4895
			4897	4900	4912	4918	4927	4928	4935	4937	5172	5174	5176	5234	5251
			5264	5277	5279	5290	5304	5306	5316	5317	5326	5341	5355	5366	5383
			5391	5392	5401	5416	5430	5431	5439	5441	5442				
RET3	0000	000C	106*	323	405	672	681	780	923	937	955	1362	1364	1377	1379
			1734	1741	1757	1764	1769	1780	1793	1800	1807	1814	1819	1828	1840
			1845	1852	1857	1866	1874	1879	1886	1900	1907	1912	1935	1939	1973
			1977	1996	2000	2013	2026	2206	2213	2231	2235	2251	2262	2270	2315
			2353	2447	2454	2486	2495	2496	2501	2520	2548	2564	2578	2599	2616
			2620	2631	2640	2731	2771	2779	2803	2846	2857	2858	2859	2860	2870
			2874	2875	2876	2877	2883	2977	3081	3084	3110	3193	3221	3323	3330
			3348	3399	3522	3549	3556	3587	3642	3674	3794	3813	3829	3849	3860
			3905	3916	4020	4027	4041	4050	4121	4127	4177	4180	4219	4232	4272
			4332	4381	4398	4406	4424	4432	4468	4475	4491	4503	4512	4527	4593
			4606	4623	4659	4763	4794	4800	4834	4847	4871	4903	5186	5225	5237
			5282	5309	5386	5510	5531	5539	5545	5554	5619				
RUN00	0000	1300	1464*	1468											
RUN01	0000	1314	1471*	1506											
RUN02	0000	133A	1484*	1497											
RUN03	0000	134E	1486	1493*											
RUN04	0000	1354	1495*												
RUN05	0000	1366	1476	1478	1489	1494	1504*								
RUN05A	0000	1396	1522	1525*											
RUN06	0000	139A	1526*	1591											
RUN06A	0000	13BE	1531	1536*											
RUN07	0000	13EA	1538	1548*											
RUN070A	0000	1412	1535	1540	1551	1560*									
RUN08	0000	1454	1568	1575	1583*										
RUN08A	0000	145E	1570	1586*											

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SLCHSET	0000	1FD6	2802*	4620	4656	4831	4900	5316	5391					
SLCHTDCB	0000	3284	1016	4561*										
SLCHTOP0	0000	331C	4613*	4650										
SLCHTOPX	0000	331E	4614*	4672										
SLCHTSTR	0000	0001	70*	1015	4559	5711								
SPCLDCB	0000	3EAE	1096	5658*										
SPCLPTR	0000	6976	5659	5781*										
START	0000	02E8	230	248*	416									
STARTIO	0000	1D32	2482*	3348	3399	3556	3587	3642	3674	3849	3905	4027	4127	4180	4232
			4332	4381	4475	4491	4527	4623	4659	4800	4834	4847	4871	4903	5237
			5282	5309	5386										
STARTX	0000	00B8	226	227*											
STAT	0000	0005	93*	321	926	928	928	930	932	933	935	1360	1375	1572	1573
			1574	1739	1740	1774	1775	1802	2043	2362	2387	2409	2451	2500	2615
			2619	2630	2635	2729	2764	2777	2781	2784	2819	2820	2842	2854	2855
			2862	2863	2868	2920	2921	2922	2935	2939	2942	2947	2972	2973	2975
			2975	2979	2982	3012	3019	3024	3053	3056	3058	3060	3079	3087	3104
			3107	3109	3115	3116	3120	3121	3178	3186	3197	3202	3203	3208	3210
			3211	3216	3219	3251	3268	3353	3379	3404	3519	3520	3534	3535	3536
			3542	3543	3547	3592	3679	3790	3791	3792	3823	3826	3827	3832	3839
			3858	3861	3862	3867	3871	3872	3894	3910	3911	3913	4014	4015	4016
			4018	4032	4032	4045	4057	4117	4118	4119	4133	4281	4400	4426	4507
			4590	4591	4619	4631	4655	4667	4760	4761	4776	4777	4778	4784	4785
			4791	4830	4842	4899	4911	5182	5183	5184	5314	5325	5330	5331	5389
			5400	5405	5406	5520	5522	5529	5537	5637					
STATE	0000	000A	102*	255	320	354	371	379	414	415	455	561	571	587	589
			591	604	619	922	1140	1143	1150	1152	1154	1156	1158	1160	1412
			1414	1423	1457	1458	1502	1521	1546	1580	1619	1678	1680	1692	1750
			1816	1854	1888	1892	2009	2011	2063	2306	2342	2347	2348	2350	2441
			2446	2455	2664	2666	2711	3147	3153	3157	3173	3205	3214	3243	3278
STATESAV	0000	0ADA	414	539*	1458	1888	1892								
STATSAVE	0000	20C0	2842	2862	2887*										
STATUS	0000	0008	134*	1573	1739	2409	2630	2854	2876	2921	2973	3058	3150	3160	3248
			3321	3328	3520	3535	3543	3577	3634	3663	3791	3826	3861	3872	4015
			4118	4471	4591	4611	4649	4761	4777	4785	4822	4865	4893	5183	5637
STOP02	0000	1A08	2054	2057	2063*										
STOP03	0000	1A12	2064	2067*											
STOP04	0000	1A20	2068	2072*	2078										
STOPCMND	0000	0D18	788*	1488	2818	2850	5178								
STOPTEST	0000	19B8	1942	2035*											
STOPTST1	0000	19E6	2038	2040	2044	2051*									
SVCERR	0000	1944	272	1984*											
SVCERR1	0000	195E	1988	1990	1995*										
SVCFILL	0000	0346	274*	276											
SVCTEST	0000	1696	1790	1791*	1798	1987	1989								
SVCTST1	0000	169C	1791	1793*											
SWTCHCOM	0000	0F86	1118	1123	1128	1133	1139*								
TEMP	0000	0008	99*	250	252	256	257	272	274	277	278	289	290	291	291
			294	295	295	296	296	305	306	313	341	354	371	378	379
			381	382	383	387	388	389	390	394	395	396	397	417	423
			424	425	440	442	447	447	448	448	449	450	453	454	476
			477	612	613	629	630	632	763	766	775	776	808	808	833
			834	877	951	951	952	953	1117	1122	1127	1132	1137	1140	1143

CHKSUM/M17 PUNCHER

1190	1191	1192	1193	1196	1197	1198	1226	1240	1241	1242	1243	1245
1246	1247	1272	1273	1298	1301	1306	1309	1314	1317	1326	1334	1344
1373	1404	1405	1406	1410	1411	1416	1417	1419	1420	1421	1422	1429
1462	1464	1466	1467	1470	1471	1472	1473	1504	1505	1525	1526	1527
1528	1537	1589	1590	1595	1596	1599	1600	1601	1602	1611	1612	1613
1626	1627	1628	1629	1657	1662	1663	1664	1667	1668	1669	1670	1682
1683	1685	1687	1688	1693	1694	1696	1697	1710	1711	1712	1726	1727
1728	1729	1736	1738	1740	1759	1761	1763	1766	1767	1771	1773	1775
1777	1779	1786	1795	1797	1799	1809	1811	1813	1818	1830	1833	1835
1837	1839	1847	1849	1851	1856	1868	1871	1873	1881	1883	1885	1902
1904	1906	1911	1937	1938	1975	1976	1998	1999	2014	2016	2018	2020
2036	2037	2039	2041	2046	2047	2048	2067	2072	2073	2074	2077	2091
2092	2095	2097	2201	2202	2203	2205	2205	2209	2210	2228	2229	2230
2232	2234	2250	2252	2253	2254	2255	2257	2258	2259	2265	2266	2267
2268	2269	2289	2290	2291	2299	2312	2313	2344	2345	2346	2363	2364
2364	2388	2389	2389	2390	2393	2434	2435	2449	2450	2451	2453	2498
2499	2500	2514	2516	2518	2518	2519	2519	2549	2565	2566	2579	2580
2581	2594	2595	2596	2597	2598	2633	2634	2635	2637	2639	2661	2662
2667	2668	2669	2670	2671	2672	2673	2676	2680	2681	2683	2685	2686
2687	2687	2689	2694	2696	2705	2706	2707	2708	2709	2710	2732	2733
2736	2737	2739	2739	2740	2741	2769	2772	2773	2774	2802	2804	2805
2806	2807	2807	2808	2808	2809	2810	2813	2814	2815	2815	2816	2817
2845	2847	2848	2849	2872	2875	2877	2878	2880	2882	2908	2909	2911
2912	2967	2969	3005	3006	3007	3008	3009	3014	3015	3016	3017	3028
3055	3056	3065	3074	3075	3083	3084	3108	3109	3111	3144	3145	3170
3171	3172	3176	3177	3180	3188	3189	3195	3196	3197	3199	3201	3224
3227	3228	3230	3231	3232	3233	3242	3246	3247	3260	3261	3262	3263
3270	3271	3275	3276	3277	3281	3282	3342	3343	3344	3345	3360	3361
3364	3365	3366	3392	3393	3394	3395	3396	3413	3424	3425	3426	3427
3428	3429	3431	3444	3455	3514	3515	3516	3532	3552	3562	3563	3575
3581	3582	3583	3594	3595	3596	3597	3598	3600	3601	3605	3606	3619
3620	3632	3638	3648	3649	3661	3667	3668	3670	3681	3682	3684	3685
3686	3690	3691	3704	3705	3710	3713	3714	3718	3786	3788	3789	3800
3801	3812	3820	3834	3837	3838	3841	3842	3843	3844	3846	3848	3854
3855	3876	3892	3893	3897	3903	3917	3918	3921	3939	3940	3941	3947
3948	3949	3950	3951	3953	3954	3955	3957	3958	3959	3961	3962	3963
3965	3966	4022	4023	4034	4035	4037	4038	4039	4043	4044	4045	4047
4049	4071	4123	4124	4135	4136	4137	4138	4139	4158	4174	4175	4176
4185	4186	4187	4195	4218	4220	4221	4226	4227	4228	4229	4240	4241
4248	4263	4264	4265	4266	4271	4283	4288	4289	4290	4321	4322	4323
4325	4338	4341	4345	4346	4352	4399	4400	4401	4403	4405	4407	4408
4408	4409	4410	4411	4425	4426	4427	4429	4431	4433	4434	4440	4467
4482	4483	4484	4485	4505	4506	4507	4509	4511	4513	4514	4515	4516
4519	4520	4521	4522	4537	4579	4580	4583	4583	4584	4586	4588	4602
4603	4604	4605	4607	4609	4616	4624	4625	4626	4641	4642	4643	4644
4646	4652	4660	4661	4662	4674	4676	4677	4678	4753	4754	4755	4757
4772	4774	4796	4815	4816	4817	4818	4820	4827	4835	4836	4837	4861
4863	4867	4885	4886	4887	4888	4890	4896	4904	4905	4906	4934	4936
4945	4947	4948	4949	5171	5173	5177	5178	5194	5195	5196	5197	5198
5199	5205	5211	5212	5214	5220	5223	5224	5233	5238	5239	5250	5257
5258	5265	5266	5278	5283	5284	5291	5301	5302	5303	5305	5310	5311
5342	5343	5356	5367	5377	5378	5379	5382	5387	5395	5417	5418	5432
5433	5438	5440	5448	5450	5451	5452	5454	5455	5456	5459	5461	5462