Program Number 06-222R01

S 16 SELCH
TEST PROGRAM

Consists of :

Program Description	06-222M95R01A15
Program Listing	06-222M96R01A13
8-Bit Object Tape	06-222R01M17

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16-BIT EXTENDED SELECTOR CHANNEL TEST PROGRAM DESCRIPTION

1. GENERAL

The 16-Bit Extended Selector Channel Test Program can test the 16-Bit Extended Selector Channel (02-530) and the 16-Bit Selector Channel (M70-103).

The 16-Bit Extended Selector Channel can be tested in an extended Memory System consisting of up to 256 kbytes of memory and an 8/16E Processor. It can also be tested in a non-extended memory system consisting of up to 64 kbytes of memory and a 16-Bit Series Processor. The 16-Bit Selector Channel, of course, must operate in a non-extended memory system.

This program detects malfunctions in the Selector Channel and ensures data can be transferred over it.

2. REQUIREMENTS

The following is a list of hardware required, as a minimum, to perform this test:

1. Processor - Model 7/16 Basic or Equivalent for a non-extended memory or a Model 8/16E or Series Sixteen.
2. Minimum Memory - 16 kbytes (32 kbytes with default options).
3. Console Input Device - Teletype or CRT on PASLA (See Appendix 1).
4. Paper Tape Reader - Teletype or High Speed Paper Tape Reader.
5. I/O Devices Required - Magnetic Tape, SELCH Tester, 2.5-10 Megabyte Disc and Mass Storage Disc (40, 67, or 256 megabyte).

The following test programs should be run prior to loading this test:

Memory Test	
Processor Test	
CRT Test	
Common Mag Tape Test	06-172
Common Disc Test	06-173
40 Megabyte Disc Test	06-207
Mass Storage Disc Test (67 or 256 megabyte)	06-200

3. TESTS

The program is divided into eight (8) tests.

Test 0

This test is designed to ensure that every address from ZERO to X'FFFE' can be written into the Starting and Final Address Registers.

Test 1

This test is designed to ensure that data can be transferred through an idle Selector Channel.

Test 2

This test is designed to check the address registers.

Test 3

This test is designed to check data transmission between the Selector Channel and the I/O device under Status Control.

Test 4

This test is designed to check data transmission between the Selector Channel and the I/O device under external interrupt control.

Test 5

This is a scope loop which transfers data from memory to the I/O device continuously. This test terminates when the BREAK key on the console device is depressed or an error condition is detected in the I/O device.

Test 6

This is a scope loop which transfers data from the I/O device to memory continuously. This test terminates when the BREAK key on the console device is depressed or an error condition is detected in the I/O device.

Test 7

This test is designed to check data transmission between the Selector Channel and I/O device under immediate interrupt control. Up to four (4) Selector Channels and corresponding I/O devices can operate simultaneously in a system like environment.

3.1 Selector Channels

Through the program options (see Appendices B and D) one to four (4) Selector Channels and corresponding I/O devices can be assigned to the program for test. In tests 0 through 6 each Selector Channel is tested individually. After one Selector Channel is tested, the same test is repeated with another

Selector Channel. The test is not completed until all assigned Selector Channels are tested. In Test 7, however, all of the assigned Selector Channels operate simultaneously.

3.2 Data Transfer Tests

Basically, the integrity of the Selector Channel is proven by demonstrating that data can be transmitted from memory to an I/O device and back again via the Selector Channel.

Two memory buffers are used to test the data transfer; namely, the Output Buffer and Input Buffer. Known data (IMAGE) are stored in the Output Buffer and a test pattern is stored in the Input Buffer. In the Write Operation data are transferred from the Output Buffer to the I/O device via the Selector Channel. Then, in the Read Operation the data are transferred from the I/O device to the Input Buffer, overwriting the test pattern. The contents of the buffers are then compared.

When the move buffer options are employed, the buffers are moved through available memory starting from the starting address of either buffer depending on options to the Top of Memory which may be location X'3FFFF' in an extended memory system.

3.3 Device Specification

The addresses of the Selector Channel and the I/O device attached to the Selector Channel must be specified through the option commands. (Appendix B and D) The device type must also be specified. If the I/O device is a disc, the address of the disc drive (disc file) along with the cylinder, sector and head number of the disc must also be specified. Alternatively, the default values of these options are used by the program.

3.4 I/O Device

A 2.5-10 Megabyte Disc, a Mass Storage Disc (40, 67, or 256 megabyte), a Magnetic Tape or a SELCH Tester must be connected to each Selector Channel.

Note: A Selector Channel with a Mass Storage Disc may not be tested in Test 1. Normally, a Mass Storage Disc is not used without a Selector Channel; therefore, Test 1 may produce erroneous results. If Test 1 is attempted with a Mass Storage device the test will abort and a "?" will be sent to the console device.

4. LOADING PROCEDURE

4.1 Test Tape Format

Absolute, non-zoned object tape (M17) with front end boot loader.

4.2 Memory Occupied

The test program occupies memory for X'A00' through X'3060'.

4.3 Normal Loading Procedures

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'
For TTY	X'78'	X'0294'
For HSPTR	X'78'	X'0399'
For HSPTR/P	X'78'	X'1399'

2. Place the program tape in the Paper Tape Reader.

3. Execute at address X'30'.

4. When the Processor halts, observe Console Display Registers D1 and D2. If they are ZERO loading is complete; otherwise, repeat loading procedure.

5. Refer to Appendix A and set up the address for the Console Device.

6. Address Memory Location X'A00'.

7. Start program execution. Observe that the following title is output to the Console Device:

```
S16 SELCH TEST 06-222 R01
TOP OF MEMORY Z XXXX
```

The program calculates the last memory location and displays this location in hexadecimal value below the title of the test. This is an 18-bit address which reflects up to 256 kbytes of memory.

Z = The two most significant bits of the address.

XXXX = The remaining 16 bits of the address.

See Appendix F if the top of memory does not correspond to the address displayed.

5. OPERATING PROCEDURES

5.1 Normal Testing

1. When the asterisk is printed, enter the desired options via the console

Device, refer to Appendix B for the Console Device command structure. Refer to Appendix D for the option explanation.

2. Enter the RUN command via the Console Device.

3. Each test selected is executed. If no errors are detected, the message "NO ERROR" is printed. Should an error occur, refer to Section 5.3 for the appropriate section.

4. Enter an IMAGE option of AAAA and a TEST option of 1, 3, 4, and 7 via the Console Device.

5. Enter the RUN command via the Console Device.

6. Tests 1, 3, 4, and 7 are executed. If no errors are detected, the message "NO ERROR" is printed.

7. Enter an IMAGE option of 5555 and the RUN command via the Console Device.

8. Tests 1, 3, 4, and 7 are executed. If no errors are detected, the message "NO ERROR" is printed.

9. Enter an IMAGE option of FFFF and the RUN command via the Console Device.

10. Tests 1, 3, 4, and 7 are executed. If no errors are detected, the message "NO ERROR" is printed.

11. Enter an Image Option of 0000 and the RUN command via the Console Device.

12. Tests 1, 3, 4, and 7 are executed. If no errors are detected, the message "NO ERROR" is printed.

13. If all tests have run without detecting an error, the normal testing is complete.

14. Test 7 prints out a message "SELCH INTERRUPT A, B, C, D" after the successful completion of the test. This message specifies the order that the Selector Channels interrupt.

5.2 Optional Testing

1. Certain test options may be modified for further testing. See Appendix D for available options.

2. In order to inhibit all printouts and run the selected tests continuously, the Console Device (Teletype only) can be turned OFF. When this is done, the program counts the total number of times the test is repeated in memory location labelled TOTAL. If an error is detected, the count in the memory location labelled TOTALERR is incremented. The contents of TOTAL are continuously copied into the Console Panel Display.

3. Test 5 and Test 6 are scope loops provided for troubleshooting.

5.3 Error Procedures

5.3.1 Error Messages. When the program detects an error, an error message is output to the Console Device. The error message consists of an error number as shown below:

```
                ERROR XXYY
```

where: XX is the test number in which the error is detected.
       YY is the error number.

In addition to the Test number and Error number, some additional useful data, such as Memory location and contents, may also be printed depending on the error encountered. (See Appendix E) The largest error number is 46. Error numbers 1, 2, 3, 20 thru 24, 28, 29, and 34 have been omitted because of program considerations.

5.3.2 Machine Malfunction. If a machine malfunction interrupt is generated, the following printout results:

```
                MACHINE MALFUNCTION
                X YYYY
```

where: X = the condition code, CVGL, when the interrupt occurs.
       YYYY = the location at which the interrupt occurred. Upon completion of this message, the Processor is placed in the Wait state.

If the Console Device (Teletype only) is OFF when the interrupt is generated, X'AAAAAAAA' is written on the Display and the Processor is placed in the Wait state. To continue test execution, depress the RUN (EXECUTE) switch on the Display.

5.3.3 Illegal Instruction. If an illegal instruction interrupt is generated, the following printout results:

```
                ILLEGAL INSTRUCTION
                XXXX XXXX
```

where: XXXX XXXX = the PSW when the interrupt occurred. Upon completion of the message, the Processor is placed in the Wait state.

If the Console Device (Teletype only) is OFF when the interrupt is generated, X'55555555' is written on the Display and the Processor is placed in the Wait state.

To continue test execution, depress the RUN switch on the Display.

6. PROGRAMMING NOTES

6.1 Interrupts

Test 4 tests Selector Channel interrupts, under external/internal control. Test 7 tests the Selector Channel under immediate interrupt control. It can acknowledge interrupts from the I/O devices but simply dismisses these interrupts. Test 7 also maintains an account of each Selector Channel interrupt condition.

6.2 Magnetic Tape

If the I/O device used in Test 6 is a Magnetic Tape, the tape to be read should be generated in Test 5 to ensure the proper format.

6.3 Extended Memory

A 16-Bit Extended Memory System may contain up to 256 kbytes of memory. This memory is composed of up to four (4) segments (or modules) each containing 64 kbytes of memory, with the exception of the last segment which may contain 32 kbytes of memory. The 16-Bit Extended Selector Channel is limited to operating within one memory segment at a time.

6.4 SELCH Tester

If an I/O device is a SELCH Tester, the data pattern transferred to memory is always 0000,0101,0202,0303...etc., regardless of the IMAGE value selected.

6.5 Memory Allocated to Buffers

The memory allocated to the Output Buffer and Input Buffer which are used to test data transfers through the Selector Channels must be assigned judiciously in order to perform a proper test. The option commands (see Appendix D) that are used in allocating buffer space are OUTBUF, INBUF, BYTE, MEMMOD, MVIN and MVOUT. The default values of these commands are such that the tests should be properly executed. Improper memory assignment can cause erroneous test results.

Certain safeguards, however, are provided in the program to help prevent improper memory assignment. If the options are such that the buffers can access the program memory, the following message is printed after the RUN command is executed:

"ACCESS PROGRAM MEMORY"

The test is not executed and an "*" is printed. No test can be executed until the erroneous command(s) is corrected. The Output Buffer and Input Buffer cannot be assigned to the same memory location. If these Buffers overlap each other or are assigned to memory beyond the top of memory, the following is printed after a RUN command is executed:

"MEMORY ALLOCATION ERROR"

Again, the program is not executed until the option command(s) is corrected.

The memory assigned to background testing through the STRBUF command is not checked for proper assignment. It must be assigned to memory located between the end of the program, ≈X'3000', and the lowest memory assigned to either the Output or Input Buffer.

The size of the Output Buffer is specified by the BYTE value, but the size of the Input Buffer is the BYTE value plus two additional bytes. These two additional bytes must be taken into account when assigning the Input Buffer to memory below the Output Buffer.

If one buffer is to remain stationary and the other buffer is to move through the available memory, the buffer to be moved must be assigned to memory above the stationary buffer. Only when one buffer is stationary and the other buffer moves can data be transferred between different memory segments in an extended memory system.

In tests 1, 3, 4, 5 and 6 the size and location of the buffers are defined directly through the commands in the option table. In Test 7, however, the size and location of the Input Buffer and Output Buffer are modified by the program and are assigned automatically. The size of the Input Buffer and Output Buffer changes to the number of Selector Channels to be tested times the byte size value.

NSELCH x BYTE = SIZE OF BUFFER

The buffer size is modified so that a portion of the buffers of size BYTE is assigned to each Selector Channel.

The starting address of the Output Buffer or Input Buffer, whichever is less, stays the same, but the starting address of the other buffer is changed to compensate for the change in buffer size. The starting address of the latter buffer becomes the address of the next memory location greater than the last location of the first buffer.

Enough memory must be available in each memory segment to allow for the size of the buffers calculated in Test 7. Generally, the worst case is presented by the first segment; the buffers must fit between the end of the program and memory location X'OFFFF'. If enough space is not available, Test 7 may abort and a "?" is printed to the output device.

Note: The command OPTION prints the label and values of all the options. This option is useful when erroneous memory assignments are encountered.

The value of BYTE is always one less than the value specified through the option, and the values of INBUF and OUTBUF are always even values.

APPENDIX A

USER DEVICE DEFINITION

The byte labelled IO (see listing) has the default value for the Teletype as an Input-Output console device. If the set-up is different, it must be changed as follows:

```
IO     0                        7
       ┌─────────────────────────┐
       │     CONSOLE DEVICE      │
       │       IDENTIFIER        │
       └─────────────────────────┘
```

KEYBOARD DEVICE IDENTIFIER	EXPLANATION
X'01'	GDT/CRT on PASLA/PALM Interface, strapped for FDX and the highest baud rate.
X'02'	TTY on TTY Interface GDT/CRT on Current Loop Interface. HDX
0, X'03' - X'04'	Reserved. The program defaults it to 2.
X'05"	MICRO IO
X'06' - X'FF'	Reserved. The program defaults it to 2.

The GDT (Graphic Display Terminal) or CRT; if used on the PASLA/PALM Interface, should be strapped for the Device Address of X'10' and X'11 for the receiving and transmitting sides, respectively. If it is different, the byte labelled CRTADR (see the listing) must be changed to the address of the receiving side.

The Teletype or Current Loop Interface, if used, should be strapped for the device address of X'02'. If it is different, the byte labelled TTYADR (see the listing) must be changed accordingly.

APPENDIX B

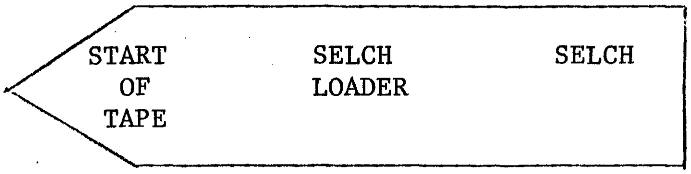
OPTION/COMMAND INPUT STRUCTURE

An asterisk (*) is printed on the console device to indicate that the program is awaiting an option input. Any option may then be typed in from the Console Input Device followed by a space and the desired hex value; an exception is the test option which accepts arguments separated by commas. A Carriage Return (CR) is issued to terminate every option input. An invalid command or value causes a "?" followed by a Carriage Return (CR), Line Feed (LF), and an asterisk (*) to occur.

APPENDIX C

SELCH LOADER

The SELCH Loader must be loaded using the 50 sequence as described in Section 5.3. The SELCH Loader resides in memory from X'80 to X'CF and loads the SELCH test starting at Location X'A00'. While reading the program tape, each data byte location is output to the Display Panel. While loading the SELCH Test into memory, it performs an exclusive OR of each instruction to verify that the test loaded correctly. If the test loads correctly, the Loader zeros Display Registers D1 and D2 and halts the processor. The loading procedures in Section 5.3 must be repeated if the test did not load correctly.



TAPE FORMAT

APPENDIX D

OPTION TABLE

OPTION	DEFAULT VALUE	DESCRIPTION
TEST	0-4	Selects the test or tests to be executed.
NOMSG	0	Determines whether all messages are printed or only error messages. 0 = All messages 1 = Error messages only
CONTIN	0	Enables the user to run all tests selected continuously until the Break key returns the program to the Command Mode. 0 = normal execution 1 = continuous execution
OPTION	N/A	Console device prints the option label and values.
BYTE	X'500'	Specifies the number of bytes (in hex) to be transferred. Byte can be any value from 4 to X'8000'.
IMAGE	X'1234'	Specifies the data pattern (in hex) to be transferred. Refer to Section 7.5.
OUTBUF	X'4000'	Specifies the starting address of the Output Buffer (Read from memory/Write to I/O device). Refer to Section 7.5.
INBUF	X'4500'	Specifies the starting address of the Input Buffer (Read from I/O device/ Write to memory). Refer to Section 7.5.
BKGRND	0	Specifies whether the background testing consists of store multiple, floating point, or store and load halfword operations. 0 = store multiple 1 = floating point 2 = store and load halfword
STRBUF	X'3100	Specifies the starting address of the buffer used for background testing. Refer to Section 7.5.

OPTION TABLE (Continued)

OPTION	DEFAULT VALUE	DESCRIPTION
MVOUT	1	Specifies whether the Output Buffer is moved through all the available memory or remains at the location specified by the OUTBUF option. 0 = is not moved. 1 = is moved. Refer to Section 7.5.
MVIN	1	Specifies whether the Input Buffer is moved through all the available memory or remains at the location specified by the INBUF option. 0 = is not moved. 1 = is moved. Refer to Section 7.5.
MEMMOD	0	Specifies the memory segment or module the Output Buffer and Input Buffer are assigned. The MEMMOD value is the value of the two most significant bits of the 18-bit address required in an extended memory system. MEMMOD Memory Range 0 X'00000-0FFFF' 1 X'10000-1FFFF' 2 X'20000-2FFFF' 3 X'30000-3FFFF' Refer to Section 7.5.
SELCH 1	X'F0'	Specifies the address of each Selector Channel to be tested.
SELCH 2	X'F1'	
SELCH 3	X'F2'	
SELCH 4	X'F3'	
IODEV1	X'B6'	Specifies the address of the Controller of the I/O device attached to each Selector Channel.
IODEV2	X'B6'	
IODEV3	X'B6'	
IODEV4	X'B6'	

APPENDIX D (Continued)

OPTION TABLE (Continued)

OPTION	DEFAULT VALUE	DESCRIPTION
DEV1	X'1'	Specifies the device type of each I/O device. 0 = SELCH Tester 1 = 2.5-10 Megabyte Disc 2 = Mag Tape 3 = Mass Storage Disc (40, 67, or 256 megabyte).
DEV2	X'1'	
DEV3	X'1'	
DEV4	X'1'	
DISFL1	X'C6'	Specifies the Disc file address or Disc Drive for each Disc.
DISFL2	X'C6'	
DISFL3	X'C6'	
DISFL4	X'C6'	
CYLN1	X'0'	Specifies the Disc cylinder to which data are transferred.
CYLN2	X'0'	
CYLN3	X'0'	
CYLN4	X'0'	
HEAD1	X'0'	Specifies the Disc head to which data are transferred.
HEAD2	X'0'	
HEAD3	X'0'	
HEAD4	X'0'	
SECT1	X'0'	Specifies the Disc sector number to which data are transferred.
SECT2	X'0'	
SECT3	X'0'	
SECT4	X'0'	
NSELCH	1	Specifies the number of Selector Channel-I.O devices to be tested.
TSELCH	0	Specifies the Select Channel to be tested. 0 = Test all Selector Channels up to NSELCH 1 = Test Selector Channel #1 only 2 = Test Selector Channel #2 only 3 = Test Selector Channel #3 only 4 = Test Selector Channel #4 only The NSELCH must be specified before the TSELCH option is specified and the TSELCH option must be equal to or less than NSELCH.

Note: All option values are specified in hexadecimal.

OPTION EXAMPLE

Four (4) Selector Channels are to be tested. The I/O devices connected to the respective Selector Channels are (1) 2.5-10 Megabyte Disc, (2) Magnet Tape, (3) Selch Tester, and (4) Mass Storage Disc (40, 67, or 256 megabyte).

The device address and parameter options to be sent to the console device would be the following:

SELCH1	F0
SELCH2	F1
SELCH3	F2
SELCH4	F3
IODEV1	B6
IODEV2	B5
IODEV3	D0
IODEV4	B7
DEV1	1
DEV2	2
DEV3	0
DEV4	3
DISFL1	C6
DISFL4	C7
CYLN1	0
CYLN4	0
HEAD1	0
HEAD4	0
SECT1	0
SECT4	0
NSELCH	4

To test all four Selector Channels:

```
TSELCH 0
```

To test only the third Selector Channel:

```
TSELCH 3
```

To test only the first two Selector Channels:

```
NSELCH 2
TSELCH 0
```

Note: If a default value is to be used, the option does not have to be specified.

APPENDIX E

ERROR TABLE

TT04 - Read the wrong address from the Selector Channel (Note 4)

TT05 - The Selector Channel Busy bit failed to go low after a Stop command was issued. (Note 3)

TT06 - Abnormal termination of data transfer. (Note 3)

TT07 - The Selector Channel Busy bit was set at the termination of a data transfer (Note 3)

TT08 - The final address read from the Selector Channel was not equal to the expected address. (Note 4)

TT09 - The Selector Channel Busy bit failed to go low in the time allocated for a data transfer. (Note 3)

TT10 - Magnet Tape Device Unavailable (Note 3)

TT11 - 2.5-10 Megabyte Disc Write Check Set. (Note 3)

TT12 - 2.5-10 Megabyte Disc Not Ready Set. (Note 3)

TT13 - 2.5-10 Megabyte Disc Ex, Seek Inc, or Not Ready Set. (Note 3)

TT14 - 2.5-10 Mega or Mass Storage Disc has Write Protected (Note 3)

TT15 - Data transfer under status control is incorrect. (Note 5)

TT16 - Data transfer under external interrupt control is incorrect. (Note 5)

TT17 - Failed to receive an interrupt from a Selector Channel on a Write operation during an external or immediate interrupt control operation (Note 1)

TT18 - Failed to receive an interrupt from a Selector Channel on a Read operation during an external interrupt control operation. (Note 2)

TT19 - Interrupting device address is not equal to the Selector Channel or I/O device during an external interrupt operation. (Note 6)

TT25 - Selector Channel status bits other than Busy set during a data transfer. (Note 3)

TT26 - No Motion bit failed to set on Magnet Tape. (Note 3)

TT27 - False sync from Selector Channel. (Note 2)

TT30 - False sync from I/O device (Note 2)

TT31 - Abnormal termination of a data transfer through an idle Selector Channel. (Note 3)

TT32 - Data transferred through an idle Selector Channel is incorrect. (Note 5)

TT33 - Final address read from the Selector Channel is not equal to the final address written to it. (Note 4)

TT35 - Background testing failed with store and load halfword instructions. (Note 1)

TT36 - Background testing failed with floating point instructions. (Note 1)

TT37 - Output Buffer modified after a data transfer from memory to the I/O device. (Note 5)

TT38 - Last memory location of Input Buffer was modified after a data transfer from the I/O device to memory. (Note 5)

TT39 - A device other than the designated Selector Channel, Controller or Driver caused an immediate interrupt. (Note 1)

TT40 - A Selector Channel failed to interrupt after a write operation before time out during an immediate interrupt operation. (Note 1)

TT41 - A Selector Channel did not cause a proper immediate interrupt to the Interrupt Service Pointer Table. (Note 1)

TT42 - A Selector Channel failed to interrupt after a Read operation before time out during an immediate interrupt operation (Note 1)

TT43 - Mass Storage Disc not ready before time out.

TT44 - Data transfer under immediate interrupt control is incorrect. (Note 5)

TT45 - Mass Storage Disc Driver not available after a Seek operation. (Note 3)

TT46 - Mass Storage Disc Driver has an unrecoverable error. (Note 3)

NOTE 1 - TTEE

TT = Test number of error
EE = Error number

NOTE 2 - TTEE

AA
TT = Test number of error
EE = Error number
AA = Address of Selector Channel under test.

Note: AA is the address of the Selector Channel that is functioning during the test when the error occurred. The actual error is defined by the error number.

NOTE 3 - TTEE

AA
BB

TT = Test number of error
EE = Error number
AA = Address of Selector Channel under test
BB = Status of Selector Channel or I/O device

NOTE 4 - TTEE
AA

XXXX
ZZZZ

TT = Test number of error
EE = Error number
AA = Address of the Selector Channel under test.
XXXX = Final Memory Address written to the Selector Channel
ZZZZ = Final Memory Address read from the Selector Channel

NOTE 5 - TTEE
AA
MEMORY W XXXX
EX YYYY
RD ZZZZ

TT = Test number of error
EE = Error number
AA = Address of Selector Channel under test
W XXXX = Address of memory location where error occurred.

This is an 18-bit address which can specify a location in an extended memory system. The W is the number of the memory segment or the two most significant bits of the address.

YYYY = Expected contents of the memory location
ZZZZ = Actual contents of this location.

NOTE: The address of the memory location is the address in the Input buffer except for Error 37 where it is the address in the Output buffer.

In the cases of Error 15, 16, 32, and 44, the expected contents are the contents of a memory in the Output Buffer. The expected contents should have the same value of IMAGE except in the case of the SELCH tester. Theoretically, the contents of this memory located in the Output Buffer are transferred to an associated memory in the Input Buffer the address of which is displayed "W XXXX". The actual contents are the contents of this Input Buffer memory.

<u>NOTE 6</u> - TTEE
BB

STATUS CC

TT = Test number of error
EE = Error number
BB = Device address
CC = Device status

APPENDIX F

TOP OF MEMORY VALUE

The TOP OF MEMORY value displayed at the start of the program is the top of memory calculated by the test program. This value is the last memory location that the program "thinks" exists in the system. If value displayed does not reflect the actual top of core, double check the available memory of the system.

If the test program's TOP OF MEMORY value must be changed, change the contents of the memory labelled ACTTOCMS and ACTTOCLS. The contents of ACTTOCMS should equal the two most significant bits of the 18-bit address required for 256 kbytes of memory. ACTTOCLS should contain the value of the last 16 bits of address. To maintain this modified TOP OF MEMORY value restart the program at the memory location label PRT≠X 'OB40'. All values are to be expressed in hexadecimal.

APPENDIX G

RELATED DOCUMENTS

Test Program Listing	06-222M96
Test Program Paper Tape	06-222M17

```
**06222
         CROSS
         ERLST
         TARGT 16
         NORX3
         WIDTH 120
SEL16    PROG  16BIT SELECTOR CHANNEL TEST   06-222M96 R01
* * * * * * * * * * * * * * * * * * * * * * * * * * * *
*                                                     *
* COPYRIGHT PERKIN-ELMER, INC. 3/79                   *
*                                                     *
* PROGRAM USES BASIC MODEL 7/16 INSTRUCTION SET       *
*                                                     *
* THIS PROGRAM TESTS THE EXTENDED SELECTOR CHANNEL    *
* AND CAN TEST THE 16 BIT SELECTOR CHANNEL.           *
*                                                     *
* EIGHT TESTS ARE PROVIDED:                           *
*                                                     *
* TEST 0 - INSURES THAT EVERY ADDRESS FROM ZERO TO    *
*          X'FFFE'  CAN BE WRITTEN INTO THE STARTING  *
*          AND FINAL ADDRESS REGISTERS.               *
*                                                     *
* TEST 1 - INSURES THAT DATA CAN BE TRANSFERRED       *
*          THROUGH AN IDLE SELCH.                     *
*                                                     *
* TEST 2 - CHECKS THE ADDRESS REGISTERS AND INSURES   *
*          THAY ARE FUNCTIONING CORRECTLY.            *
*                                                     *
* TEST 3 - CHECKS DATA TRANSMISSIONS, BETWEEN THE     *
*          SELECTOR CHANNEL AND AN I/O DEVICE UNDER   *
*          STATUS CONTROL.                            *
*                                                     *
* TEST 4 - CHECKS DATA TRANSMISSIONS, BETWEEN THE     *
*          SELECTOR CHANNEL AND AN I/O DEVICE UNDER   *
*          EXTERNAL INTERRUPT CONTROL.                *
*                                                     *
* TEST 5 - THIS IS A SCOPE LOOP WHICH TRANSFERS DATA  *
*          FROM MEMORY TO THE I/O DEVICE CONTINUOUSLY *
*                                                     *
* TEST 6 - THIS IS A SCOPE LOOP WHICH TRANSFERS DATA  *
*          FROM THE I/O DEVICE TO MEMORY CONTINUOUSLY.*
*                                                     *
* TEST 7 - CHECKS UP TO FOUR SELCH OPERATING          *
*          SIMULTANEOUSLY IN A SYSTEM LIKE ENVIRONMENT*
*          UNDER IMMEDIATE INTERRUPT CONTROL          *
*                                                     *
* THE I/O DEVICE MAY  BE (1) MAGNETIC TAPE, (2)       *
* SELCH TESTER, (3) 2.5-10 MEGA BYTE DISC OR          *
* (4) MASS STORAGE DISC (40, 67 OR 256 MEGA BYTE).    *
*                                                     *
* THIS  SELECTOR CHANNEL TEST CAN TRANSFER            *
* DATA BETWEEN THE  SELECTOR CHANNEL AND AN           *
* EXTENDED MEMORY SYSTEM CONTANING UP TO 256 K        *
```

```
                              54  * BYTES OF MEMORY IN A 16 BIT MACHINE                 *
                              55  *                                                     *
                              56  * THE PROCESSOR MUST BE EQUIPPED WITH A CONSOLE       *
                              57  * DEVICE. ALL OPTIONS ARE CONTROLLED FROM THE CONSOLE *
                              58  * DEVICE AND MAY BE SELECTED OR CHANGED WITHOUT       *
                              59  * RESTARTING THE PROGRAM.                             *
                              60  *                                                     *
                              61  * LOAD TAPE 06-222M17R01 USING THE 50 SEQUENCE.       *
                              62  *                                                     *
                              63  * * * * * * * * * * * * * * * * * * * * * * * * * * * *
                              64  *
                              65  *
                              66  *
      0000 0000               67  R0        EQU   0
      0000 0001               68  R1        EQU   1
      0000 0002               69  R2        EQU   2
      0000 0003               70  R3        EQU   3
      0000 0004               71  R4        EQU   4
      0000 0005               72  R5        EQU   5
      0000 0006               73  R6        EQU   6
      0000 0007               74  R7        EQU   7
      0000 0008               75  R8        EQU   8
      0000 0009               76  R9        EQU   9
      0000 000A               77  R10       EQU   10
      0000 000B               78  R11       EQU   11
      0000 000C               79  R12       EQU   12
      0000 000D               80  R13       EQU   13
      0000 000E               81  R14       EQU   14
      0000 000F               82  R15       EQU   15
      0000 0003               83  SELCH     EQU   R3
      0000 0004               84  IODEVS    EQU   R4
      0000 000A               85  WORK      EQU   R10
      0000 000B               86  WORK1     EQU   R11
      0000 000C               87  STAT      EQU   R12
      0000 0005               88  DRIVER    EQU   R5
                              89  *
                              90  *
                              91  *
0000R                         92            ORG   X'80'
0080  C810 0A00               93  LOADER    LHI   R1,X'A00'            LOAD START ADRS OF PROGRAM
0084  2421                    94            LIS   R2,1                 LOAD INCREMENT VALUE
0086  C830 3061               95            LHI   R3,PROGEND           LOAD END ADRS OF PROGRAM
008A  D340 0078               96            LB    R4,X'78'             LOAD INPUT DEVICE ADRS
008E  DE40 0079               97            OC    R4,X'79'             ISSUE OUTPUT COMMAND TO INPUT DEVICE
0092  0788                    98            XHR   R8,R8                ZERO REGISTER 8
0094  9D45                    99  STATUS1   SSR   R4,R5                SENSE STATUS OF INPUT DEVICE
0096  20D1                   100            BTBS  X'D',1               WAIT FOR GOOD STATUS
0098  9B46                   101            RDR   R4,R6                READ DATA BYTE FROM TAPE
009A  0866                   102            LHR   R6,R6                IS DATA BYTE READ = ZERO ?
009C  2234                   103            BZS   STATUS1              YES, READ NEXT BYTE
009E  D261 0000              104  STR       STB   R6,0(R1)             NO, STORE BYTE IN MEMORY
00A2  9471                   105            EXBR  R7,R1                EXCHANGE BYTES OF CURRENT ADRS
00A4  9827                   106            WHR   R2,R7                WRITE CURRENT ADRS TO DISPLAY
00A6  D371 0000              107            LB    R7,0(R1)             LOAD DATA BYTE FROM MEMORY
00AA  0787                   108            XHR   R8,R7                EXCLUSIVE OR DATA BYTE INTO REGISTER
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```
00AC    9D45                   109            SSR   R4,R5             SENSE STATUS OF INPUT DEVICE
00AE    20D1                   110            BTBS  X'D',1            WAIT FOR GOOD STATUS
00B0    9B46                   111            RDR   R4,R6             READ DATA BYTE FROM TAPE
00B2    C110 009E              112            BXLE  R1,STR            REPEAT UNTIL ENTIRE PROGRAM LOADED
00B6    C580 00D3              113  MN        CLHI  R8,X'D3'          IS CHECKSUM CORRECT ?
00BA    2135                   114            BNES  PSWHALT2          NO, HALT PROCESSOR
00BC    0777                   115            XHR   R7,R7             YES, ZERO REGISTER 7
00BE    9827                   116            WHR   R2,R7             WRITE ZERO TO DISPLAY
00C0    C200 00C8              117            LPSW  HALT1             HALT PROCESSOR AND SET LOC TO X'A00'
00C4    C200 00CC              118  PSWHALT2  LPSW  HALT2             HALT PROCESSOR AND SET LOC TO X'50'
00C8    8000                   119  HALT1     DC    X'8000',X'A00'
00CA    0A00
00CC    8000                   120  HALT2     DC    X'8000',X'50'
00CE    0050
                               121  *
                               122  *
                               123  *
00D0                           124            ORG   X'A00'
0A00    4300 0A04              125  BADST     B     STARTO
0A04    C200 2EAC              126  STARTO    LPSW  SET1
0A08    C810 2FC2              127  EXEC      LHI   R1,RSAVE          REG. SAVE POINTER
0A0C    4010 0022              128            STH   R1,X'22'
0A10    C810 2FBA              129            LHI   R1,PSWSAVE        CURRENT PSW SAVE POINTER
0A14    4010 0026              130            STH   R1,X'26'
0A18    0700                   131            XHR   R0,R0
0A1A    4000 002C              132            STH   R0,X'2C'          FLPT NEW PSW
0A1E    C810 2A2C              133            LHI   R1,FLPT
0A22    4010 002E              134            STH   R1,X'2E'
0A26    4000 0034              135            STH   R0,X'34'          ILL INST NEW PSW
0A2A    C810 2AA4              136            LHI   R1,ILGINT
0A2E    4010 0036              137            STH   R1,X'36'
0A32    4000 003C              138            STH   R0,X'3C'          MAC MAL NEW PSW
0A36    C810 2AD4              139            LHI   R1,MALFTN
0A3A    4010 003E              140            STH   R1,X'3E'
0A3E    4000 0044              141            STH   R0,X'44'          EXT INT NEW PSW
0A42    C810 2A64              142            LHI   R1,EXTINT
0A46    4010 0046              143            STH   R1,X'46'
0A4A    4000 004C              144            STH   R0,X'4C'          FIX POINT DIV. NEW PSW
0A4E    C810 2A18              145            LHI   R1,FIXPT
0A52    4010 004E              146            STH   R1,X'4E'
0A56    C800 2A8A              147            LHI   R0,EXTINT1        AUTO I/O SERVICE TABLE
0A5A    C810 00D0              148            LHI   R1,X'D0'
0A5E    2422                   149            LIS   R2,2
0A60    C830 02CE              150            LHI   R3,X'2CE'
0A64    40C1 0000              151  XCC       STH   R0,0(R1)
0A68    C110 0A64              152            BXLE  R1,XCC
                               153  *
                               154  *
0A6C    C8A0 AAAA              155            LHI   R10,X'AAAA'       LOAD PATTERN
0A70    C830 6666              156            LHI   R3,X'6666'
0A74    C810 0000              157            LHI   R1,0              START ADR = X'0000 20000'
0A78    C8B0 2000              158            LHI   R11,X'2000'
0A7C    D210 305E              159  FINDTOC   STB   R1,ACTADUP        STORE MOST SIG BITS
0A80    41F0 1E7A              160            BAL   R15,ADRTRANO      CONVERT TO PROGRAM ADR
0A84    084C                   161            LHR   R4,R12
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0A86   2642             162           AIS   R4,2            NEXT ADDRESS LOCATION
0A88   489C 0000        163           LH    R9,0(R12)       SAVE CONTENTS OF MEMORY
0A8C   4854 0000        164           LH    R5,0(R4)        LOCATIONS
0A90   C5C0 8000        165           CLHI  R12,X'8000'     TEST FOR 16 BIT SELCH
0A94   4230 0AD4        166           BNE   FINDTOC2        ADR 8000 NO, CONTINUE
0A98   95FF             167           EPSR  R15,R15         GET CURRENT PSW
0A9A   C4F0 00F0        168           NHI   R15,X'00F0'     TEST FOR MODULE 1
0A9E   C5F0 0010        169           CLHI  R15,X'10'
0AA2   4230 0AD4        170           BNE   FINDTOC2        IF NOT 1 0000 ADR CONTINUE
0AA6   95FF             171           EPSR  R15,R15         GET PSW AGAIN
0AA8   40F0 2F70        172           STH   R15,SPSW        SAVE IT
0AAC   4030 8000        173           STH   R3,X'8000'      STORE 6666 IN 1 0000
0AB0   40A0 8002        174           STH   R10,X'8002'     STORE AAAA IN 1 0002
0AB4   C8E0 0000        175           LHI   R14,X'0000'     MEMORY MODULE 0
0AB8   95FE             176           EPSR  R15,R14         SET PSW
0ABA   4880 8000        177           LH    R8,X'8000'      GET CONTENTS OF 0 8000
0ABE   4860 8002        178           LH    R6,X'8002'      GET CONTENTS OF 0 8002
0AC2   48E0 2F70        179           LH    R14,SPSW        GET CURRENT PSW
0AC6   95FE             180           EPSR  R15,R14         RESTORE IT
0AC8   0583             181           CLHR  R8,R3           SAME DATA ?
0ACA   4230 0AD4        182           BNE   FINDTOC2        NO, CONTINUE
0ACE   05A6             183           CLHR  R10,R6          SAME DATA ?
0AD0   4330 0B10        184           BE    FINDTOC1        YES THAN FOUND TOP
0AD4   40AC 0000        185  FINDTOC2 STH   R10,0(R12)      STORE PATTERN
0AD8   4034 0000        186           STH   R3,0(R4)
0ADC   08FF             187           LHR   R15,R15
0ADE   488C 0000        188           LH    R8,0(R12)       RETREIVE
0AE2   4864 0000        189           LH    R6,0(R4)
0AE6   409C 0000        190           STH   R9,0(R12)       RESTORE MEMORY
0AEA   4054 0000        191           STH   R5,0(R4)
0AEE   058A             192           CLHR  R8,R10
0AF0   4230 0B10        193           BNE   FINDTOC1
0AF4   0536             194           CLHR  R3,R6
0AF6   4230 0B10        195           BNE   FINDTOC1
0AFA   CAB0 2000        196           AHI   R11,X'2000'     INC MEM BY X'2000'
0AFE   4380 0A7C        197           BNC   FINDTOC         IF NO CARRY TRY THIS LOCATION
0B02   CA10 0001        198           AHI   R1,1            INC MS PART OF ACTUAL ADR BY 1
0B06   07BB             199           XHR   R11,R11         ZERO LS PART OF ACTUAL ADR
0B08   C510 0005        200           CLHI  R1,5            IS MEMORY LESS THAN 256KB
0B0C   4280 0A7C        201           BL    FINDTOC         YES, TRY THIS LOCATION
                        202  *
0B10   D3E0 305E        203  FINDTOC1 LB    R14,ACTADUP     FOUND TOC
0B14   27B1             204           SIS   R11,1
0B16   4FE0 2E4C        205           SCH   R14,ZERO        SUBTRACT A HW
0B1A   95DD             206           EPSR  R13,R13         ZERO PSW 8-11 BITS
0B1C   C4D0 FF0F        207           NHI   R13,X'FF0F'
0B20   950D             208           EPSR  R0,R13
0B22   40E0 2FBE        209           STH   R14,ACTTOCMS      STORE PARAMETERS
0B26   40B0 2FC0        210           STH   R11,ACTTOCLS
0B2A   081E             211           LHR   R1,R14
0B2C   41E0 2B50        212           BAL   R14,CONVERT     CONVERT MS BITS TO ASCII
0B30   0000             213           DC    X'0'
0B32   2E40             214           DC    Z(TOCMS)
0B34   4810 2FC0        215           LH    R1,ACTTOCLS
0B38   41E0 2B50        216           BAL   R14,CONVERT     CONVERT LS BITS TO ASCII
```

```
0B3C   000C                  217           DC    X'C'
0B3E   2E44                  218           DC    Z(TOCLS)
0B40   48E0 2E6A             219  PRT      LH    R11,CRTFLG
0B44   4330 0B50             220           BZ    PRTTITLE
0B48   D3E0 2E70             221           LB    R11,ADDRESS
0B4C   DEE0 2E73             222           OC    R11,CRTCMD
0B50   41F0 2B9E             223  PRTTITLE BAL   R15,PRINT           PRINT "SELCH 06-222R01"
0B54   2CFA                  224           DC    Z(TITLE)            START ADRS OF MESSAGE
0B56   2D17                  225           DC    Z(ENDOF)            END ADRS OF MESSAGE
0B58   41F0 2B9E             226  PRTTOC   BAL   R15,PRINT           PRINT TOC PARAMETERS
0B5C   2E2E                  227           DC    Z(TOCMESG)          PRINT TOC PARAMETERS
0B5E   2E47                  228           DC    Z(TOCMESGE)
                             229  *
                             230  *
                             231  *
                             232  *        O P T I O N   T A B L E
                             233  *
                             234  *
                             235  *
0B60   4300 0CD2             236  ORG      B     TTYIN
0B64   F800                  237  TEST     DC    X'F800',C'TEST  '
0B66   5445 5354 2020
0B6C   0000                  238  NOMSG    DC    X'0',C'NOMSG '
0B6E   4E4F 4D53 4720
0B74   0000                  239  CONTIN   DC    X'0',C'CONTIN'
0B76   434F 4E54 494E
0B7C   0000                  240  BKGRND   DC    X'0',C'BKGRND'
0B7E   424B 4752 4E44
0B84   0001                  241  NSELCH   DC    X'1',C'NSELCH'
0B86   4E53 454C 4348
0B8C   00F0                  242  SELCHN1  DC    X'F0',C'SELCH1'
0B8E   5345 4C43 4831
0B94   00F1                  243  SELCHN2  DC    X'F1',C'SELCH2'
0B96   5345 4C43 4832
0B9C   00F2                  244  SELCHN3  DC    X'F2',C'SELCH3'
0B9E   5345 4C43 4833
0BA4   00F3                  245  SELCHN4  DC    X'F3',C'SELCH4'
0BA6   5345 4C43 4834
0BAC   00B6                  246  IODEVN1  DC    X'B6',C'IODEV1'
0BAE   494F 4445 5631
0BB4   00B6                  247  IODEVN2  DC    X'B6',C'IODEV2'
0BB6   494F 4445 5632
0BBC   00B6                  248  IODEVN3  DC    X'B6',C'IODEV3'
0BBE   494F 4445 5633
0BC4   00B6                  249  IODEVN4  DC    X'B6',C'IODEV4'
0BC6   494F 4445 5634
0BCC   0001                  250  DEVICEN1 DC    X'1',C'DEV1  '
0BCE   4445 5631 2020
0BD4   0001                  251  DEVICEN2 DC    X'1',C'DEV2  '
0BD6   4445 5632 2020
0BDC   0001                  252  DEVICEN3 DC    X'1',C'DEV3  '
0BDE   4445 5633 2020
0BE4   0001                  253  DEVICEN4 DC    X'1',C'DEV4  '
0BE6   4445 5634 2020
0BEC   00C6                  254  DISFILN1 DC    X'C6',C'DISFL1'
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0BEE    4449 5346 4C31
0BF4    00C6                255  DISFILN2 DC     X'C6',C'DISFL2'
0BF6    4449 5346 4C32
0BFC    00C6                256  DISFILN3 DC     X'C6',C'DISFL3'
0BFE    4449 5346 4C33
0C04    00C6                257  DISFILN4 DC     X'C6',C'DISFL4'
0C06    4449 5346 4C34
0C0C    0000                258  CYCNUMB1 DC     X'0',C'CYLN1 '
0C0E    4359 4C4E 3120
0C14    0000                259  CYCNUMB2 DC     X'0',C'CYLN2 '
0C16    4359 4C4E 3220
0C1C    0000                260  CYCNUMB3 DC     X'0',C'CYLN3 '
0C1E    4359 4C4E 3320
0C24    0000                261  CYCNUMB4 DC     X'0',C'CYLN4 '
0C26    4359 4C4E 3420
0C2C    0000                262  SECTORN1 DC     X'0',C'SECT1 '
0C2E    5345 4354 3120
0C34    0000                263  SECTORN2 DC     X'0',C'SECT2 '
0C36    5345 4354 3220
0C3C    0000                264  SECTORN3 DC     X'0',C'SECT3 '
0C3E    5345 4354 3320
0C44    0000                265  SECTORN4 DC     X'0',C'SECT4 '
0C46    5345 4354 3420
0C4C    0000                266  HEAD1    DC     X'0',C'HEAD1 '
0C4E    4845 4144 3120
0C54    0000                267  HEAD2    DC     X'0',C'HEAD2 '
0C56    4845 4144 3220
0C5C    0000                268  HEAD3    DC     X'0',C'HEAD3 '
0C5E    4845 4144 3320
0C64    0000                269  HEAD4    DC     X'0',C'HEAD4 '
0C66    4845 4144 3420
0C6C    04FF                270  BYTE7    DC     X'4FF',C'BYTE  '
0C6E    4259 5445 2020
0C74    1234                271  IMAGE    DC     X'1234',C'IMAGE'
0C76    494D 4147 4520
0C7C    0001                272  MOVEOUT  DC     X'1',C'MVOUT '
0C7E    4D56 4F55 5420
0C84    0001                273  MOVEIN   DC     X'1',C'MVIN  '
0C86    4D56 494E 2020
0C8C    4000                274  BUFADR1  DC     X'4000',C'OUTBUF'
0C8E    4F55 5442 5546
0C94    4500                275  BUFADR2  DC     X'4500',C'INBUF'
0C96    494E 4255 4620
0C9C    0000                276  MEMMOD   DC     X'0',C'MEMMOD'
0C9E    4D45 4D4D 4F44
0CA4    3100                277  MULTADR  DC     X'3100',C'STRBUF'
0CA6    5354 5242 5546
0CAC    0000                278  TESTSEL  DC     X'0',C'TSELCH'
0CAE    5453 454C 4348
0CB4    0000                279  MESS     DC     X'0',C'OPTION'
0CB6    4F50 5449 4F4E
0CBC    0000                280  RUN      DC     X'0',C'RUN   ',X'0',X'FFFF'
0CBE    5255 4E20 2020
0CC4    0000
0CC6    FFFF
```

```
                                281  *
                                282  *
                                283  *
         0000 0C0C              284  XX        EQU   CYCNUMB1
         0000 0C2C              285  YY        EQU   SECTORN1
         0000 0BCC              286  ZZ        EQU   DEVICEN1
                                287  *
                                288  *
                                289  *
0CC8     C8E0 2B9E              290  QUESTNZ   LHI   R14,PRINT
0CCC     01FE                   291  QUESTN    BALR  R15,R14          OUTPUT A CR, LF, ?, CR, LF
0CCE     2D78                   292            DC    Z(QMARK)
0CD0     2D7D                   293            DC    Z(QEND)
                                294  *
                                295  *
                                296  *
0CD2     C8E0 2B9E              297  TTYIN     LHI   R14,PRINT        SETUP R14 FOR PRINT ROUTINE
0CD6     C890 0CCC              298            LHI   R9,QUESTN        SETUP R9 FOR ERROR ROUTINE
0CDA     01FE                   299  LF        BALR  R15,R14          OUTPUT AN * TO INDICATE
0CDC     2D7E                   300            DC    Z(ASTERISK)      WE ARE READY FOR INPUT
0CDE     2D81                   301            DC    Z(ENDAST)
0CE0     C880 2000              302            LHI   R8,X'2000'       DISABLE INTERRUPTS ENSURED
0CE4     9518                   303            EPSR  R1,R8
0CE6     C800 2020              304            LHI   R0,X'2020'       BLANK OUT TTY BUFFER
0CEA     4000 2FB4              305            STH   R0,TTYBUF
0CEE     4000 2FB6              306            STH   R0,TTYBUF+2
0CF2     4000 2FB8              307            STH   R0,TTYBUF+4
0CF6     DEB0 2E6F              308            OC    R11,RDCMD        SET READ MODE
0CFA     0711                   309            XHR   R1,R1            CLEAR TTY INDEX
0CFC     41F0 2B80              310  RDCHR     BAL   R15,GETCHR       GET A CHARACTER
0D00     C500 000D              311            CLHI  R0,X'0D'         IS IT A CR ?
0D04     233A                   312            BES   OKIN             YES TRY TO MATCH IT TO TABLE
0D06     C500 0020              313            CLHI  R0,X'20'         IS IT A BLANK ?
0D0A     2337                   314            BES   OKIN             YES, TRY A MATCH
0D0C     D201 2FB4              315            STB   R0,TTYBUF(R1)    NO, STORE THE CHARACTER
0D10     2611                   316            AIS   R1,1             BUMP BUFFER INDEX
0D12     C510 0006              317            CLHI  R1,6             HAVE WE REACHED 6 CHARACTERS ?
0D16     203D                   318            BNES  RDCHR            NO, DO ANOTHER READ
0D18     0711                   319  OKIN      XHR   R1,R1            MATCH ROUTINE - CLEAR TABLE INDEX
0D1A     0733                   320  OKIN2     XHR   R3,R3            CLEAR TTYBUF INDEX
0D1C     0841                   321            LHR   R4,R1            SET TABLE INDEX (NEW)
0D1E     4854 0B66              322  LOOKUP    LH    R5,ORG+6(R4)     GET HALFWORD FROM MEMORY
0D22     0219                   323            BMR   R9               IF MINUS, THEN NO MATCH I.E. ERROR
0D24     4553 2FB4              324            CLH   R5,TTYBUF(R3)    COMPARE TO TTYBUF HALFWORD
0D28     4230 0E92              325            BNE   NEXT             NO MATCH, BUMP TO NEXT TABLE ENTRY
0D2C     2642                   326            AIS   R4,2             IF EQUAL, TRY NEXT HALFWORD
0D2E     2632                   327            AIS   R3,2
0D30     C530 0006              328            CLHI  R3,6             HAVE WE FOUND 3 EQUAL HALFWORDS
0D34     203B                   329            BNES  LOOKUP           NO, LOOP
0D36     C510 0158              330  MATCH     CLHI  R1,RUN-ORG-4     OPTION MATCH - CHECK IF RUN CMD
0D3A     4330 0EDA              331            BE    SELTS1           YES, SELECT TEST
0D3E     C500 000D              332            CLHI  R0,X'0D'         NO, CHECK IF CR FOLLOWS OPTION
0D42     0339                   333            BER   R9               IF CR PRINT A "?"
0D44     C510 0118              334  MOVECHK1  CLHI  R1,MOVEOUT-ORG-4 IS THIS THE MVOUT OPTION ?
0D48     4230 0D5A              335            BNE   MOVECHK2         NO, CHECK FOR NEXT OPTION
```

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0D4C    41D0 0E98            336          BAL   R13,HEXASC
0D50    C560 0002            337          CLHI  R6,X'2'              IS IT 2 OR GREATER
0D54    4280 0E36            338          BL    STR1                 NO, THEN STORE VALUE
0D58    0309                 339          BR    R9                   ?
0D5A    C510 0120            340 MOVECHK2 CLHI  R1,MOVEIN-ORG-4      IS THIS THE MVIN OPTION ?
0D5E    4230 0D70            341          BNE   BUFCHK1              NO, CHECK FOR NEXT OPTION
0D62    41D0 0E98            342          BAL   R13,HEXASC
0D66    C560 0002            343          CLHI  R6,X'2'              IS IT 2 OR GREATER
0D6A    4280 0E36            344          BL    STR1                 NO, THEN STORE VALUE
0D6E    0309                 345          BR    R9                   ?
0D70    C510 0128            346 BUFCHK1  CLHI  R1,BUFADR1-ORG-4     IS THIS THE OUTBUF OPTION ?
0D74    4230 0D84            347          BNE   BUFCHK2              NO, CHECK FOR NEXT OPTION
0D78    41D0 0E98            348          BAL   R13,HEXASC           YES, GET ADRS VALUE
0D7C    C460 FFFE            349          NHI   R6,X'FFFE'           MASK FOR 16 BIT ADRS
0D80    4300 0E36            350          B     STR1                 STORE VALUE IN OPT TABLE
0D84    C510 0130            351 BUFCHK2  CLHI  R1,BUFADR2-ORG-4     IS THIS THE INBUF OPTION ?
0D88    4230 0D98            352          BNE   MULTCHK              NO,CHECK NEXT OPTION
0D8C    41D0 0E98            353          BAL   R13,HEXASC           YES, GET ADRS VALUE
0D90    C460 FFFE            354          NHI   R6,X'FFFE'           MASK FOR 16 BIT ADRS
0D94    4300 0E36            355          B     STR1                 STORE VALUE IN OPT TABLE
0D98    C510 0140            356 MULTCHK  CLHI  R1,MULTADR-ORG-4     IS THIS THE STRBUF OPT ?
0D9C    4230 0DAC            357          BNE   CHECKA               NO, CHECK FOR NEXT OPT
0DA0    41D0 0E98            358          BAL   R13,HEXASC           YES, GET ADRS VALUE
0DA4    C460 FFFE            359          NHI   R6,X'FFFE'           MASK FOR 16 BIT ADRS
0DA8    4300 0E36            360          B     STR1                 STORE VALUE IN OPTION TABLE
0DAC    0722                 361 CHECKA   XHR   R2,R2                ZERO COUNTER
0DAE    C512 0068            362 DEVICENZ CLHI  R1,ZZ-ORG-4(R2)      IS THIS THE DEVICE OPT?
0DB2    4230 0DC4            363          BNE   TERMCHK              NO, CHECK NEXT OPT
0DB6    41D0 0E98            364          BAL   R13,HEXASC           YES, GET DEVICE VALUE
0DBA    C560 0004            365          CLHI  R6,X'4'              IS IT GREATER THAN 4?
0DBE    0389                 366          BNLR  R9                   YES, OUTPUT ?
0DC0    4300 0E36            367          B     STR1                 NO, STORE IT
0DC4    2628                 368 TERMCHK  AIS   R2,8                 CHECK NEXT ITEM ON LIST
0DC6    C520 0020            369          CLHI  R2,X'20'             ALL ITEMS CHECK?
0DCA    4380 0DD2            370          BNL   NSELCHNZ             YES, CHECK NEXT OPTION
0DCE    4300 0DAE            371          B     DEVICENZ             NO, CHECK NEXT ITEM
0DD2    C510 0020            372 NSELCHNZ CLHI  R1,NSELCH-ORG-4      IS THIS THE NSELCH OPT?
0DD6    4230 0DEE            373          BNE   TSELCK               NO, CHECK NEXT OPTION
0DDA    41D0 0E98            374          BAL   R13,HEXASC           GET VALUE
0DDE    C560 0005            375          CLHI  R6,X'5'              IS IT LESS THAN 5?
0DE2    0389                 376          BNLR  R9                   NO, OUTPUT ?
0DE4    C560 0000            377          CLHI  R6,X'0'              IS IT ZERO?
0DE8    0339                 378          BER   R9                   OUTPUT A ?
0DEA    4300 0E36            379          B     STR1                 YES, STORE VALUE
0DEE    C510 0148            380 TSELCK   CLHI  R1,TESTSEL-ORG-4     IS IT THE TEST SELCH OPTION?
0DF2    4230 0E08            381          BNE   MMODCHK              NO, CHECK NEXT OPTION
0DF6    41D0 0E98            382          BAL   R13,HEXASC           GET VALUE
0DFA    4560 0B84            383          CLH   R6,NSELCH            IS IT LESS OR = TO NO. OF SELCH
0DFE    4330 0E36            384          BE    STR1                 YES
0E02    4280 0E36            385          BL    STR1                 YES
0E06    0309                 386          BR    R9                   NO, ?
0E08    C510 0138            387 MMODCHK  CLHI  R1,MEMMOD-ORG-4      IS THIS THE MEMORY MODULE OPT?
0E0C    4230 0E1E            388          BNE   BYTECHK              NO,CHECK FOR NEXT OPTION
0E10    41D0 0E98            389          BAL   R13,HEXASC           YES,GET HEX VALUE
0E14    C560 0004            390          CLHI  R6,X'4'              IS VALUE LESS THAN 4
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0E18     4280 0E36          391          BL     STR1                 YES STORE VALUE IN OPT TABLE
0E1C     0309               392          BR     R9                   NO,BAD #
0E1E     C510 0108          393  BYTECHK CLHI   R1,BYTE7-ORG-4       IS THIS BYTE OPT ?
0E22     4230 0E3E          394          BNE    MESSCHK              NO, CHECK FOR TEST OPTION
0E26     41D0 0E98          395          BAL    R13,HEXASC           YES, GET HEX VALUE
0E2A     2761               396          SIS    R6,1                 SUBTRACT 1 TO ADJUST FOR ZERO
0E2C     C560 8000          397          CLHI   R6,X'8000'           IS VALUE LESS THAN X'8000'?
0E30     0389               398          BNLR   R9                   NO, OUTPUT A "?"
0E32     0866               399          LHR    R6,R6                YES, IS VALUE = 0 ?
0E34     0339               400          BZR    R9                   YES, OUTPUT A "?"
0E36     4061 0B64          401  STR1    STH    R6,ORG+4(R1)         NO, STORE VALUE IN OPT TABLE
0E3A     4300 0E5C          402          B      LF1                  OUTPUT AN "*"
0E3E     C510 0150          403  MESSCHK CLHI   R1,MESS-ORG-4        IS IT THE MESSAGE OPTION?
0E42     4230 0E4E          404          BNE    LOKAGN               NO CHECK NEXT OPTION
0E46     41F0 26E8          405          BAL    R15,MESSOUT          OTHERWISE OUTPUT MESSAGE
0E4A     4300 0CDA          406          B      LF                   RETURN FOR ANOTHER ENTRY
0E4E     C510 0000          407  LOKAGN  CLHI   R1,TEST-ORG-4        CHECK IF TEST CMD
0E52     2337               408          BES    TESTST
0E54     41D0 0E98          409          BAL    R13,HEXASC           GET HEX OPERAND
0E58     4061 0B64          410          STH    R6,ORG+4(R1)         STORE IN OPTION TABLE HALFWORD
0E5C     4300 0CDA          411  LF1     B      LF                   GO TO BEGINNING
0E60     0700               412  TESTST  XHR    R0,R0                TEST CMD
0E62     4001 0B64          413          STH    R0,ORG+4(R1)         CLEAR OPTION HALFWORD
0E66     41D0 0E98          414  TST00   BAL    R13,HEXASC           GET HEX OPERAND
0E6A     C560 0008          415          CLHI   R6,8                 8 OR GREATER
0E6E     0389               416          BNLR   R9                   YES, ERROR
0E70     2431               417          LIS    R3,1                 CONVERT FROM BINARY TO
0E72     C560 000F          418  TST01   CLHI   R6,15                UNARY BIT PATTERN LEFT
0E76     2334               419          BES    TST2
0E78     0A33               420          AHR    R3,R3
0E7A     2661               421          AIS    R6,1
0E7C     2205               422          BS     TST01
0E7E     4631 0B64          423  TST2    OH     R3,ORG+4(R1)         OR BIT PATTERN INTO
0E82     4031 0B64          424          STH    R3,ORG+4(R1)         OPTION HALFWORD
0E86     C500 000D          425          CLHI   R0,X'0D'             WHERE WE TERMINATED BY CR ?
0E8A     4230 0E66          426          BNE    TST00                NO, LOOK FOR ANOTHER HEX OPERAND
0E8E     4330 0CDA          427          BE     LF                   YES, GO TO BEGINNING
0E92     2618               428  NEXT    AIS    R1,8                 BUMP TABLE INDEX TO NEXT ENTRY
0E94     4300 0D1A          429          B      OKIN2                RESUME LOOKUP
0E98     41F0 2B80          430  HEXASC  BAL    R15,GETCHR           HEX CONVERT ROUTINE
0E9C     0766               431          XHR    R6,R6                CLEAR BUFFER REGISTER
0E9E     C500 0020          432          CLHI   R0,X'20'             SKIP LEADING SPACES
0EA2     2235               433          BES    HEXASC               GET VALUE
0EA4     C500 0030          434  HEXLP   CLHI   R0,C'0'              CHECK IF VALID HEX CHAR
0EA8     0289               435          BLR    R9                   NO, PRINT?
0EAA     C500 003A          436          CLHI   R0,X'3A'             IS IT A HEX NUMBER ?
0EAE     2188               437          BLS    HEX                  YES, ADD CHAR TO BUFFER
0EB0     C500 0041          438          CLHI   R0,C'A'              NO, IS IT A HEX LETTER ?
0EB4     0289               439          BLR    R9
0EB6     C500 0047          440          CLHI   R0,X'47'
0EBA     0389               441          BNLR   R9                   NO, PRINT A "?"
0EBC     2609               442          AIS    R0,9                 YES, ADJUST A-F TO 10-15
0EBE     C400 000F          443  HEX     NHI    R0,15                ISOLATE 4 BITS
0EC2     9164               444          SLLS   R6,4                 SHIFT LEFT 4
0EC4     0660               445          OHR    R6,R0                OR IN NEW CHARACTER
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0EC6    41F0 2B80         446          BAL    R15,GETCHR         GET NEXT CHARACTER
0ECA    C500 000D         447          CLHI   R0,X'0D'
0ECE    033D              448          BER    R13                EXIT IF CR
0ED0    C500 002C         449          CLHI   R0,X'2C'
0ED4    033D              450          BER    R13                OR COMMA
0ED6    4300 0EA4         451          B      HEXLP              LOOP TO PROCESS IT
                          452   *
                          453   *
                          454   *
0EDA    0788              455   SELTS1 XHR    R8,R8
0EDC    D280 2E71         456          STB    R8,TTYFLG          ZERO TTY OFF FLAG
0EE0    4080 2E98         457          STH    R8,TOTAL           ZERO PASS COUNT
0EE4    4080 2E9A         458          STH    R8,TOTALERR
0EE8    4080 2D22         459          STH    R8,ERRNUM          ZERO ERROR FLAG
0EEC    4830 0C6C         460          LH     R3,BYTE7           GET BYTE VALUE
0EF0    0843              461          LHR    R4,R3
0EF2    2642              462          AIS    R4,2               ADD 2 TO IT
0EF4    4810 0C9C         463          LH     R1,MEMMOD          GET MEMORY MODULE NO.
0EF8    4230 0F20         464          BNZ    MMCHK1             IS IT ZERO? NO,CHECK UPPER LIMITS
0EFC    4820 0C8C         465          LH     R2,BUFADR1         YES,CHECK OUTBUFFER VALUE
0F00    C520 4000         466          CLHI   R2,X'4000'         IS IT GREATER THAN X'4000'
0F04    2387              467          BNLS   MMCHK2             YES,CHECK IN BUFFER OTHERWISE
0F06    41F0 2B9E         468   MMCHK3 BAL    R15,PRINT          PRINT ATTEMPT TO ACCESS PROGRAM MEM
0F0A    2DFC              469          DC     Z(MEMER1)
0F0C    2E13              470          DC     Z(MEMER1E)
0F0E    4300 0CDA         471          B      LF                 RETURN TO OPTIONS
0F12    4820 0C94         472   MMCHK2 LH     R2,BUFADR2         GET INBUF ADRS
0F16    C520 4000         473          CLHI   R2,X'4000'         IS IT GREATER THAN X 4000
0F1A    2383              474          BNLS   MMCHK1             YES,CHECK UPPER LIMIT
0F1C    4300 0F06         475          B      MMCHK3             NO,PRINT ERROR
0F20    4510 2FBE         476   MMCHK1 CLH    R1,ACTTOCMS        COMPARE THE MEM MOD# TO MS ACTUAL AD
0F24    4280 0F66         477          BL     MMCHK8
0F28    2337              478          BES    MMCHK5             OTHERWISE COMPARE LEAST SIG PARTS
0F2A    41F0 2B9E         479   MMCHK6 BAL    R15,PRINT          PRINT ATTEMPT TO ACCESS NON EXISTANT
0F2E    2E14              480          DC     Z(MEMER2)          MEMORY
0F30    2E2D              481          DC     Z(MEMER2E)
0F32    4300 0CDA         482          B      LF                 RETURN TO OPTIONS
0F36    4820 0C8C         483   MMCHK5 LH     R2,BUFADR1         GET OUTBUFFER ADRS
0F3A    0A23              484          AHR    R2,R3              ADD BYTE TO IT
0F3C    4520 2FC0         485          CLH    R2,ACTTOCLS        COMPARE TO LEAST SIG TOC ACTUAL ADRS
0F40    228B              486          BNLS   MMCHK6             IF GREATER PRINT ERROR
0F42    2334              487          BES    MMCHK7             IF EQUAL CHECK INBUF
0F44    0523              488          CLHR   R2,R3              OTHERWISE CHECK FOR WRAP AROUND MEM
0F46    4280 0F2A         489          BL     MMCHK6             YES, PRINT ERROR
0F4A    4820 0C94         490   MMCHK7 LH     R2,BUFADR2         NO,GET INBUF
0F4E    0A24              491          AHR    R2,R4              ADD BYTE + 2 VALUE
0F50    4520 2FC0         492          CLH    R2,ACTTOCLS        COMPARE TO LEAST SIG TOC ACTUAL ADRS
0F54    4380 0F2A         493          BNL    MMCHK6             IF GREATER PRINT ERROR
0F58    4330 0F7E         494          BE     MMCHK4
0F5C    0524              495          CLHR   R2,R4              OTHERWISE CHECK FOR WRAP AROUND MEM
0F5E    4280 0F2A         496          BL     MMCHK6             YES, PRINT ERROR
0F62    4300 0F7E         497          B      MMCHK4
0F66    4820 0C8C         498   MMCHK8 LH     R2,BUFADR1         GET BUFFER ADDRESS #1
0F6A    0A23              499          AHR    R2,R3              ADD BYTE VALUE TO IT
0F6C    0523              500          CLHR   R2,R3              CHECK FOR WRAP AROUND MEMORY
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0F6E    4280 0F2A          501            BL    MMCHK6               PRINT ERROR
0F72    4820 0C94          502            LH    R2,BUFADR2           GET BUFFER ADDRESS #2
0F76    0A24               503            AHR   R2,R4                ADD BYTE + 2 VALUE TO IT
0F78    0524               504            CLHR  R2,R4                CHECK FOR WRAP AROUND MEMORY
0F7A    4280 0F2A          505            BL    MMCHK6               PRINT ERROR
0F7E    4820 0C8C          506  MMCHK4    LH    R2,BUFADR1           GET FIRST BUFFER ADR
0F82    0A23               507            AHR   R2,R3                ADD BYTE VALUE
0F84    4520 0C94          508            CLH   R2,BUFADR2           COMPARE TO SECOND BUFFER ADR
0F88    4330 0F2A          509            BE    MMCHK6               IF EQUAL ERROR
0F8C    4280 0FA6          510            BL    MMCHKA               CHECK MOVE OPTIONS
0F90    4820 0C94          511            LH    R2,BUFADR2           GET SECOND BUFFER ADR AGAIN
0F94    0A24               512            AHR   R2,R4                ADD BYTE + 2 VALUE TO IT
0F96    4520 0C8C          513            CLH   R2,BUFADR1           COMPARE TO FIRST BUFFER ADR
0F9A    4330 0F2A          514            BE    MMCHK6               IF EQUAL ERROR
0F9E    4280 0FBA          515            BL    MMCHKB               IF LESS CHECK MOVE OPTIONS
0FA2    4300 0F2A          516            B     MMCHK6               ELSE ERROR
0FA6    4810 0C7C          517  MMCHKA    LH    R1,MOVEOUT           GET MOVEOUT FLAG
0FAA    4330 0FCA          518            BZ    MMCHKZ               NO, EXIT
0FAE    4810 0C84          519            LH    R1,MOVEIN            GET MOVEIN FLAG
0FB2    4330 0F2A          520            BZ    MMCHK6               NO, ERROR
0FB6    4300 0FCA          521            B     MMCHKZ               ELSE, EXIT
0FBA    4810 0C84          522  MMCHKB    LH    R1,MOVEIN            GET MOVE IN FLAG
0FBE    4330 0FCA          523            BZ    MMCHKZ               NO, EXIT
0FC2    4810 0C7C          524            LH    R1,MOVEOUT           GET MOVEOUT FLAG
0FC6    4330 0F2A          525            BZ    MMCHK6               NO, ERROR
0FCA    4880 0C9C          526  MMCHKZ    LH    R8,MEMMOD            EXIT.
0FCE    D280 305E          527            STB   R8,ACTADUP
                           528  *
                           529  *
0FD2    4880 0B64          530  SELTST    LH    R8,TEST              GET TEST OPTION
0FD6    0711               531            XHR   R1,R1                ZERO TEST NUMBER
0FD8    230D               532            BS    SHIFT                DECODE TEST OPTION
0FDA    0711               533  TSTSEL    XHR   R1,R1                ZERO TEST NUMBER
0FDC    4010 2D22          534            STH   R1,ERRNUM            ZERO ERROR FLAG
0FE0    4880 2E9C          535  TSTSL2    LH    R8,OPTSAV            LOAD CURRENT TEST OPTION
0FE4    D310 2E72          536            LB    R1,SUBTST            LOAD PREVIOUS TEST NUMBER
0FE8    2611               537  BUMP      AIS   R1,1                 INCREMENT TEST NUMBER
0FEA    C510 0008          538            CLHI  R1,8                 HAVE WE REACHED MAX TEST ?
0FEE    4380 10C2          539            BNL   OPTCHK               YES, CHECK FOR CONTIN OPTION
0FF2    9181               540  SHIFT     SLLS  R8,1                 NO, IS NEXT TEST TO BE EXECUTED ?
0FF4    2286               541            BNCS  BUMP                 NO, INCREMENT TEST NUMBER
0FF6    4080 2E9C          542            STH   R8,OPTSAV            YES, SAVE CURRENT TEST NUMBER
0FFA    D210 2E72          543            STB   R1,SUBTST            SAVE CURRENT TEST NUMBER
0FFE    9111               544            SLLS  R1,1                 ESTABLISH BRANCH INDEX
1000    C880 2000          545            LHI   R8,X'2000'           DISABLE INTERRUPTS
1004    95A8               546            EPSR  R10,R8
1006    D3B0 2E70          547            LB    R11,ADDRESS          GET CONSOLE ADR
100A    48C0 2E6A          548            LH    R12,CRTFLG           IS THIS A CRT?
100E    2335               549            BZS   SNXX                 NO
1010    26B1               550            AIS   R11,1                YES, CHANGE ADR
1012    DEB0 2E6F          551            OC    R11,RDCMD            READ
1016    2303               552            BS    SNZZ
1018    DEB0 2E6F          553  SNXX      OC    R11,RDCMD            READ TTY
101C    9DBC               554  SNZZ      SSR   R11,R12              SENSE STATUS
101E    C3C0 0020          555            THI   R12,X'20'            FOR BREAK KEY
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1022   4230 1182        556            BNZ    BREAK               IF SET GET NEXT COMMAND
1026   4880 0C9C        557            LH     R8,MEMMOD           GET MEMORY MODULE NUMBER
102A   D280 305E        558            STB    R8,ACTADUP          STORE AS MOST SIG BITS OF ACTUAL ADR
102E   D280 305F        559            STB    R8,ACTADUP+1
1032   4880 0C8C        560            LH     R8,BUFADR1          LOAD OUTBUF ADRS FROM OPT TABLE
1036   4080 2EA4        561            STH    R8,OUTBUF           STORE ADRS IN MEMORY
103A   4880 0C94        562            LH     R8,BUFADR2          LOAD INBUF ADRS FROM OPT TABLE
103E   4080 2EA6        563            STH    R8,INBUF            STORE ADRS IN MEMORY
1042   4880 0BAC        564            LH     R8,IODEVN1          GET IODEV CODE
1046   4080 2F9C        565            STH    R8,IODEV            STORE IT
104A   4880 0B8C        566            LH     R8,SELCHN1          GET FIRST SELCH DEVICE CODE
104E   4080 2F9E        567            STH    R8,SELCH4           STORE IT
1052   4880 0C0C        568            LH     R8,CYCNUMB1         GET FIRST CYCLN
1056   4080 2FA0        569            STH    R8,CYCNUM           STORE IT
105A   4880 0C2C        570            LH     R8,SECTORN1         GET FIRST SECTOR NUM
105E   4080 2FA2        571            STH    R8,SECTOR           STORE IT
1062   4880 0BCC        572            LH     R8,DEVICEN1         GET FIRST DEVICE VALUE
1066   4080 2FA6        573            STH    R8,DEVICE           STORE IT
106A   4880 0BEC        574            LH     R8,DISFILN1         GET FIRST DIS FILE VALUE
106E   4080 2FA4        575            STH    R8,DISFIL           STORE IT
1072   2480             576            LIS    R8,X'0'
1074   4080 2F98        577            STH    R8,COUNTER          ZERO COUNTER
1078   4881 10B2        578            LH     R8,TST(R1)          LOAD START ADRS OF CURRENT TEST
107C   4830 2F9E        579            LH     R3,SELCH4           LOAD SELCH ADRS
1030   4840 2F9C        580            LH     R4,IODEV            LOAD I/O DEVICE ADRS
1084   4810 2FA6        581            LH     R1,DEVICE           IS I/O DEVICE A TESTER ?
1088   4330 10AC        582            BZ     TESTER              YES, GET TESTER DRIVER ADRS
108C   C510 0001        583            CLHI   R1,1                IS IT THE 2.5-10 MEGA DISC?
1090   4330 10A6        584            BE     DISC                YES
1094   C510 0002        585            CLHI   R1,2                IS IT THE MAG TAPE?
1098   2334             586            BES    TAPDR               YES
109A   C850 1D80        587            LHI    DRIVER,MSDIS        THEN IT IS THE MASS   DISC
109E   0308             588            BR     R8
10A0   C850 1BD8        589  TAPDR     LHI    DRIVER,TAPEDR       MAG TAP DRIVE ADR
10A4   0308             590            BR     R8                  BRANCH TO START OF TEST
10A6   C850 1CBA        591  DISC      LHI    DRIVER,DISCDR
10AA   0308             592            BR     R8
10AC   C850 1B3A        593  TESTER    LHI    DRIVER,TESTDR
10B0   0308             594            BR     R8
10B2   11A0             595  TST       DC     Z(TEST0)
10B4   11F0             596            DC     Z(TEST1)
10B6   1400             597            DC     Z(TEST2)
10B8   144C             598            DC     Z(TEST3)
10BA   1520             599            DC     Z(TEST4)
10BC   16C4             600            DC     Z(TEST5)
10BE   1628             601            DC     Z(TEST6)
10C0   170A             602            DC     Z(TEST7)
10C2   D3B0 2E70        603  OPTCHK    LB     R11,ADDRESS
10C6   48C0 2E6A        604            LH     R12,CRTFLG
10CA   2336             605            BZS    CMD2
10CC   26B1             606            AIS    R11,1
10CE   DEB0 2E6E        607            OC     R11,WRTCMD
10D2   27B1             608            SIS    R11,1
10D4   2303             609            BS     MSGTST
10D6   DEB0 2E6E        610  CMD2      OC     R11,WRTCMD
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10DA  4810 0B6C    MSGTST   LH    R1,NOMSG          IS NOMSG OPT SET ?
10DE  2136                  BNZS  DISTOT            YES, INCREMENT COUNTERS
10E0  DEB0 2E6F             OC    R11,RDCMD         READ
10E4  9DBC                  SSR   R11,R12           NO, IS TTY DU ?
10E6  4310 1108             BNM   CONCHK            NO, CHECK CONTINUE OPT
10EA  2411         DISTOT   LIS   R1,1
10EC  6110 2E98             AHM   R1,TOTAL          YES, INCREMENT TOTAL COUNT
10F0  4870 2E98             LH    R7,TOTAL
10F4  41E0 2B3E             BAL   R14,WRITE         WRITE CURRENT COUNT ON DISPLAY
10F8  DEB0 2E6F             OC    R11,RDCMD         READ
10FC  9DBC                  SSR   R11,R12           IS TTY DU ?
10FE  2315                  BNMS  CONCHK            NO, CHECK CONTINUE OPT
1100  D2B0 2E71             STB   R11,TTYFLG        YES, SET TTY OFF FLAG
1104  4300 0FD2             B     SELTST            SELECT NEXT TEST
1108  4810 0B74    CONCHK   LH    R1,CONTIN         IS THE CONTIN OPT SET ?
110C  4330 114C             BZ    TTYCHK            NO, CHECK TTY FLAG
1110  9DBC                  SSR   R11,R12           YES, IS BREAK KEY ON TTY SET ?
1112  C3C0 0020             THI   R12,X'20'
1116  4330 0FD2             BZ    SELTST
111A  48F0 2E6C             LH    R15,MICROFLG      CONSOLE ON MICRO IO
111E  4230 1132             BNZ   SENSE10           BRANCH IF YES
1122  48F0 2E6A             LH    R15,CRTFLG
1126  4330 1148             BZ    SENSE11
112A  DEB0 2E6F             OC    R11,RDCMD
112E  9BBF                  RDR   R11,R15
1130  230E                  BS    TTYCHK
1132  9BBF         SENSE10  RDR   R11,R15           KNOCK DOWN FIRST BREAK
1134  24F0                  LIS   R15,0
1136  26F1                  AIS   R15,1             DELAY 200 MS
1138  2031                  BNZS  *-2
113A  9DBF                  SSR   R11,R15           DO WE SITLL HAVE BREAK
113C  C3F0 0020             THI   R15,X'20'
1140  4230 1132             BNZ   SENSE10           STAY HERE TILL GONE
1144  4300 114C             B     TTYCHK            CONTINUE WITH PROGRAM
1148  9DBC         SENSE11  SSR   R11,R12           YES, WAIT FOR BREAK = 0
114A  2041                  BOS   SENSE11
114C  D3C0 2E71    TTYCHK   LB    R12,TTYFLG        HAS TTY BEEN TURNED OFF ?
1150  08CC                  LHR   R12,R12
1152  4330 0CD2             BZ    TTYIN             NO, RETURN TO COMMAND MODE
1156  4810 2E98             LH    R1,TOTAL          YES, LOAD TOTAL PASS COUNT
115A  41E0 2B50             BAL   R14,CONVERT       CONVERT TO ASCII CHARS
115E  001C                  DC    X'1C'             SHIFT INDEX
1160  2D84                  DC    Z(TOTALMSG)       STORE INDEX
1162  41F0 2B9E             BAL   R15,PRINT         PRINT TOTAL PASS COUNT
1166  2D82                  DC    Z(TOTMSG)         START ADRS OF MESSAGE
1168  2D8F                  DC    Z(TOTALEND)       END ADRS OF MESSAGE
116A  4810 2E9A             LH    R1,TOTALERR       LOAD TOTAL ERROR COUNT
116E  41E0 2B50             BAL   R14,CONVERT       CONVERT TO ASCII CHARS
1172  001C                  DC    X'1C'             SHIFT INDEX
1174  2D84                  DC    Z(TOTALMSG)       STORE INDEX
1176  41F0 2B9E             BAL   R15,PRINT         PRINT TOTAL ERROR COUNT
117A  2D84                  DC    Z(TOTALMSG)       START ADRS OF MESSAGE
117C  2D97                  DC    Z(ERROREND)       END ADRS OF MESSAGE
117E  4300 0CD2             B     TTYIN             RETURN TO COMMAND MODE
                   *
```

```
                         *
1182    48C0 2E6C        BREAK    LH    R12,MICROFLG        CONSOLE ON MICROBUS
1186    4330 0CD2                 BZ    TTYIN               BRANCH IF NO
118A    9BBC                      RDR   R11,R12             GET RID OF BREAK CHAR
118C    24C0                      LIS   R12,0               CONSTANT FOR 200MS WAIT
118E    26C1                      AIS   R12,1               WAIT 200MS
1190    2031                      BNZS  *-2
1192    9DBC                      SSR   R11,R12             GET NEW STATUS
1194    C3C0 0020                 THI   R12,X'20'           STILL BREAK
1198    4230 1182                 BNZ   BREAK               STAY HEAR UNTIL GONE
119C    4300 0CD2                 B     TTYIN               BREAK GONE GET NEXT INPUT
```

```
               * * * * * * * * * * * * * * * * * * * * * * * * * * * *
               *                                                     *
               *                      T E S T 0                      *
               *                                                     *
               * PURPOSE:                                            *
               *  TO INSURE THAT EVERY ADDRESS FROM ZERO TO X'FFFE'  *
               *  CAN BE WRITTEN INTO THE STARTING AND FINAL ADDRESS *
               *  REGISTERS.                                         *
               *                                                     *
               * ASSUMPTIONS:                                        *
               *  THIS TEST ASSUMES THAT THE PROCESSOR TEST AND      *
               *  THE MEMORY TEST HAVE RUN WITHOUT DETECTING A       *
               *  FAILURE.                                           *
               *                                                     *
               * DESIGN SPECIFICATIONS:                              *
               *  AN OUTPUT COMMAND STOP IS ISSUED TO THE SELCH.     *
               *  A STARTING ADRS OF ZERO AND AN ENDING ADRS OF ZERO *
               *  IS SENT TO THE SELCH. ANOTHER OUTPUT COMMAND STOP  *
               *  IS ISSUED TO THE SELCH. THE FINAL ADRS IS THEN     *
               *  READ AND COMPARED TO THE STARTING ADRS. NEXT THE   *
               *  STARTING ADRS IS INCREMENTED BY ONE AND THE        *
               *  SEQUENCE REPEATED FOR EACH ADRS UNTIL X'FFFE'  IS  *
               *  REACHED.                                           *
               *                                                     *
               * HOW TO RUN THE TEST:                                *
               *  ENTER TEST 0 AND ANY OTHER OPTION INFORMATION VIA  *
               *  THE CONSOLE DEVICE. REFER TO APPENDIX 2 OF         *
               *  06-222M95R01A15 FOR THE OPTION COMMAND INPUT       *
               *  STRUCTURE. AFTER THE DESIRED OPTION INFORMATION    *
               *  IS ESTABLISHED THE TEST IS EXECUTED BY ENTERING    *
               *  THE RUN COMMAND.                                   *
               *                                                     *
               * * * * * * * * * * * * * * * * * * * * * * * * * * * *
11A0  41F0 2B18      TESTO    BAL   R15,TSTNUM          PRINT TEST NUMBER
11A4  41F0 2132               BAL   R15,WSELCH          GET SELCH TO BE TESTED
11A8  0766           ZRO      XHR   R6,R6               SET UP BXLE REGS
11AA  C880 FFFE               LHI   R8,X'FFFE'
11AE  0896           WRTDAT   LHR   R9,R6
11B0  9098                    SRLS  R9,8
11B2  DE30 2E88               OC    SELCH,STOP1         STOP SELCH
11B6  4240 2C72               BO    ERR27               IF FALSE SYNC PRINT ERROR
11BA  9A39                    WDR   SELCH,R9            WRITE START ADRS TO SELCH
11BC  9A36                    WDR   SELCH,R6
11BE  9A39                    WDR   SELCH,R9            WRITE END ADRS TO SELCH
11C0  9A36                    WDR   SELCH,R6
11C2  DE30 2E88               OC    SELCH,STOP1         STOP SELCH
11C6  9B3B                    RDR   SELCH,R11           READ FINAL ADRS
11C8  9B30                    RDR   SELCH,R0
11CA  91B8                    SLLS  R11,8               PUT FINAL ADRS IN ONE REGISTER
11CC  06B0                    OHR   R11,R0
11CE  08A6                    LHR   R10,R6              PUT START ADRS IN ONE REGISTER
11D0  05AB                    CLHR  R10,R11             IS FINAL ADRS = START ADRS ?
11D2  4230 2C92               BNE   ERR33               NO, PRINT ERROR
```

```
11D6    24A1                   731           LIS   R10,1
11D8    087B                   732           LHR   R7,R11
11DA    41E0  2B3E             733           BAL   R14,WRITE          WRITE ADRS TO DISPLAY
11DE    2471                   734           LIS   R7,1
11E0    C160  11AE             735           BXLE  R6,WRTDAT          REPEAT UNTIL R6 = X'FFFF'
11E4    41F0  2252             736           BAL   R15,MULSEL         ANOTHRE SELCH?
11E8    4300  2852             737           B     TSTCHK             NO
11EC    4300  11A8             738           B     ZRO                YES
```

```
                        * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
                        *                                                       *
                        *                       T E S T 1                       *
                        *                                                       *
                        * ASSUMPTIONS:                                          *
                        *  THIS TEST ASSUMES THAT THE SELECTOR CHANNEL HAS      *
                        *  AN I/O DEVICE TO WHICH DATA CAN BE TRANSFERRED.      *
                        *                                                       *
                        * DESIGN SPECIFICATIONS:                                *
                        *  THE OUTPUT BUFFER IS LOADED WITH DATA SELECTED BY    *
                        *  THE USER. THE INPUT BUFFER IS LOADED WITH X'4F82'    *
                        *  AND AN OUTPUT COMMAND STOP IS ISSUED TO THE SELCH.   *
                        *  THE I/O DEVICE THAT THE DATA IS TO BE TRANSFERED     *
                        *  TO IS SET UP. A WRITE BLOCK IS THEN ISSUED TO THE    *
                        *  I/O DEVICE. THE STATUS OF THE I/O DEVICE IS SENSED   *
                        *  UNTIL BUSY = 0. THEN THE DEVICE IS SET UP FOR A      *
                        *  READ OPERATION AND A READ BLOCK IS ISSUED TO IT.     *
                        *  WHEN THE TRANSFER IS COMPLETE THE DATA IN THE        *
                        *  OUTPUT BUFFER IS COMPARED TO THE DATA IN THE INPUT   *
                        *  BUFFER.                                              *
                        *                                                       *
                        * HOW TO RUN THE TEST:                                  *
                        *  ENTER TEST 1 AND ANY OTHER OPTION INFORMATION VIA    *
                        *  THE CONSOLE DEVICE. REFER TO APPENDIX 2 OF           *
                        *  06-222M95R01A15 FOR THE OPTION COMMAND INPUT         *
                        *  STRUCTURE. AFTER THE DESIRED OPTION INFORMATION      *
                        *  IS ESTABLISHED THE TEST IS EXECUTED BY ENTERING      *
                        *  THE RUN COMMAND.                                     *
                        *                                                       *
                        * NOTE: DISCS THAT ARE 40 MEGA BYTE OR GREATER IN       *
                        * SIZE CAN NOT BE TESTED BY TEST 1. A "?" WILL BE       *
                        * SENT TO THE CONSOLE AND THE TEST WILL ABORT           *
                        * UNDER THIS CONDITION.                                 *
                        *                                                       *
                        * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
11F0   41F0 2B18        TEST1    BAL   R15,TSTNUM          PRINT TEST NUMBER
11F4   41F0 2132                 BAL   R15,WSELCH          GET SELCH TO BE TESTED
11F8   48B0 2EA4        TEST1B   LH    R11,OUTBUF          GET OUTBUF ADRS
11FC   48F0 2FA6                 LH    R15,DEVICE          GET DEVICE TYPE
1200   C9F0 0003                 CHI   R15,X'3'            IS IT A MASS STORAGE DISC
1204   4380 0CC8                 BNL   QUESTNZ             YES, ABORT TEST
1208   48A0 0C74                 LH    WORK,IMAGE          LOAD DATA IMAGE
120C   0777                      XHR   R7,R7
120E   2482                      LIS   R8,2                ESTABLISH INCREMENT VALUE
1210   4890 0C6C                 LH    R9,BYTE7            LOAD BXLE LIMIT
1214   41F0 1EDC                 BAL   R15,INDEXBFO        INDEX OUTBUF
1218   0777                      XHR   R7,R7
121A   4890 0C6C                 LH    R9,BYTE7
121E   2692                      AIS   R9,2                INCREASE INBUF SIZE BY 2
1220   C8A0 4F82                 LHI   WORK,X'4F82'        LOAD BACKGROUND PATTERN
1224   48B0 2EA6                 LH    WORK1,INBUF         LOAD ADRS OF INPUT BUFFER
1228   41F0 1EB4                 BAL   R15,INDEXBFI        INDEX INBUF
122C   C8F0 0000                 LHI   R15,0
```

```
1230    40F0 305A              793           STH   R15,TESTZ
1234    41F0 19C8              794  TEST1A   BAL   R15,SELCH1          ENSURE SELCH IS IDLE
1238    01F5                   795           BALR  R15,DRIVER          SETUP I/O DEVICE FOR TRANSFER
123A    0000                   796           DC    0                   FROM MEMORY TO DEVICE NWRITE)
123C    0799                   797           XHR   R9,R9
123E    48F0 2FA6              798           LH    R15,DEVICE          LOAD DEVICE OPTION
1242    C4F0 0001              799           NHI   R15,1               IS I/O DEVICE A DISC ?
1246    4230 1296              800           BNZ   OKW                 YES, TRANSFER ONLY ONE BYTE
124A    4890 0C6C              801           LH    R9,BYTE7            NO, LOAD TRANSFER SIZE IN BYTES
124E    48B0 2EA4              802           LH    WORK1,OUTBUF        GET OUTBUF ADR
1252    41F0 1E7A              803           BAL   R15,ADRTRANO        CONVERT TO PROGRAM ADR
1256    95FF                   804           EPSR  R15,R15             GET PSW
1258    C4F0 00F0              805           NHI   R15,X'00F0'         CHECK BITS 8-11
125C    4330 129E              806           BZ    OKWW                IF ZERO CHECK ENTIRE BUFFER
1260    48B0 2EA4              807  L1       LH    R11,OUTBUF          GET OUTBUF ADR
1264    C810 8000              808           LHI   R1,X'8000'          GET CROSS OVER POINT
1268    051B                   809           CLHR  R1,R11              IS IT GREATER THAN X'8000'
126A    4330 1296              810           BE    OKW
126E    4280 1296              811           BL    OKW                 YES WRITE ONE BLOCK OF DATA
1272    08DB                   812           LHR   R13,R11             NO
1274    0AD9                   813           AHR   R13,R9              ADD BYTE SIZE TO BUFADR
1276    05D1                   814           CLHR  R13,R1              IS IT LESS THAN X'8000'
1278    4280 1296              815           BL    OKW                 YES WRITE ONE BLOCK OF DATA
127C    C8D0 FFFF              816           LHI   R13,X'FFFF'         WRITE DATA TO DEVICE IN 2 PARTS
1280    48B0 2EA4              817           LH    R11,OUTBUF          FROM OUTBUF TO PROG ADR FFFF
1284    41F0 1E7A              818           BAL   R15,ADRTRANO        PROG ADR & SET PSW 8-11
1288    964C                   819           WBR   IODEVS,R12          WRITE DATA
128A    C8F0 0001              820           LHI   R15,1
128E    40F0 305A              821           STH   R15,TESTZ           SET BOUNDARY FLAG
1292    4300 12A4              822           B     CONTW
1296    48B0 2EA4              823  OKW      LH    R11,OUTBUF
129A    41F0 1E7A              824           BAL   R15,ADRTRANO        CONVERT TO PROGRAM ADR
129E    08DC                   825  OKWW     LHR   R13,R12
12A0    0AD9                   826           AHR   R13,R9              1BYTE LONG
12A2    964C                   827           WBR   IODEVS,R12          WRITE ONE BLOCK OF DATA
12A4    41F0 13C4              828  CONTW    BAL   R15,TERMCK          CHECK TERMINATION
12A8    41F0 1F04              829           BAL   R15,BUFCHK          CHECK THAT OUTBUF WAS NOT MODIFIED
12AC    01F5                   830           BALR  R15,DRIVER          SETUP I/O DEVICE FOR TRANSFER
12AE    0001                   831           DC    X'1'                FROM DEVICE TO MEMORY (READ)
12B0    0799                   832           XHR   R9,R9
12B2    48F0 2FA6              833           LH    R15,DEVICE          LOAD DEVICE OPTION
12B6    C4F0 0001              834           NHI   R15,1               IS I/O DEVICE A DISC ?
12BA    4230 130A              835           BNZ   OKR                 YES, TRANSFER ONLY ONE BYTE
12BE    4690 0C6C              836           LH    R9,BYTE7            NO, LOAD TRANSFER SIZE IN BYTES
12C2    48B0 2EA6              837           LH    R11,INBUF           GET INBUF ADR
12C6    41F0 1E70              838           BAL   R15,ADRTRANI        CONVERT TO PROGRAM ADR
12CA    95FF                   839           EPSR  R15,R15             GET PSW
12CC    C4F0 00F0              840           NHI   R15,X'00F0'         CHECK BITS 8-11
12D0    4330 1312              841           BZ    OKRR                IF ZERO CHECK ENTIRE BUFFER
12D4    48B0 2EA6              842  L2       LH    R11,INBUF           GET INBUF ADRS
12D8    C810 8000              843           LHI   R1,X'8000'          GET CROSS OVER POINT
12DC    051B                   844           CLHR  R1,R11              IF GREATER THAN X'8000'
12DE    4330 130A              845           BE    OKR
```

TEST 1

```
12E2    4280 130A           846             BL    OKR               READ ONE BLOCK OF DATA
12E6    08DB                847             LHR   R13,R11           NO
12E8    0AD9                848             AHR   R13,R9            ADD BYTE SIZE TO IT
12EA    05D1                849             CLHR  R13,R1
12EC    4280 130A           850             BL    OKR               WRITE ONE BLOCK OF DATA
12F0    C8D0 FFFF           851             LHI   R13,X'FFFF'       READ DATA FROM DEVICE IN 2 PARTS
12F4    48B0 2EA6           852             LH    R11,INBUF         FROM INBUF TO PROG ADR FFFF
12F8    41F0 1E70           853             BAL   R15,ADRTRANI      INBUF PROGRAM ADR
12FC    974C                854             RBR   IODEVS,R12        READ DATA
12FE    C8F0 0001           855             LHI   R15,1
1302    40F0 305A           856             STH   R15,TESTZ         SET BOUNDARY FLAG
1306    4300 1318           857             B     CONTR
130A    48B0 2EA6           858  OKR        LH    R11,INBUF
130E    41F0 1E70           859             BAL   R15,ADRTRANI      INBUF PROGRAM ADR
1312    08DC                860  OKRR       LHR   R13,R12
1314    0AD9                861             AHR   R13,R9            1BYTE LONG
1316    974C                862             RBR   IODEVS,R12        READ ONE BLOCK OF DATA
1318    41F0 13C4           863  CONTR      BAL   R15,TERMCK
131C    4810 2EA4           864             LH    R1,OUTBUF         GET OUTBUF ADR (ACTUAL)
1320    4820 2EA6           865             LH    R2,INBUF          GET INBUF ADR (ACTUAL)
1324    0777                866             XHR   R7,R7             SET UP INDEX PARAMETERS
1326    2482                867             LIS   R8,2
1328    4890 0C6C           868             LH    R9,BYTE7
132C    2692                869             AIS   R9,2
132E    C170 1336           870  LOADA      BXLE  R7,LOAD1          LOOP BYTES
1332    4300 1390           871             B     TSTCHK1
1336    08B1                872  LOAD1      LHR   R11,R1            PLACE OUTBUF ADR INTO R11
1338    41F0 1E7A           873             BAL   R15,ADRTRANO      OUTBUF PROGRAM ADR
133C    48DC 0000           874             LH    R13,0(R12)        GET CONTENTS OF THIS PROGRAM ADR
1340    40C0 3056           875             STH   R12,SAVET1
1344    08B2                876             LHR   R11,R2            PLACE INBUF ADR INTO R11
1346    41F0 1E70           877             BAL   R15,ADRTRANI      INBUF PROGRAM ADR
134A    48EC 0000           878             LH    R14,0(R12)        GET CONTENTS OF THIS PROGRAM ADR
134E    40C0 3058           879             STH   R12,SAVET2
1352    48F0 2FA6           880             LH    R15,DEVICE        LOAD DEVICE OPTION
1356    C5F0 0001           881             CLHI  R15,1             IS DEVICE A DISC ?
135A    2138                882             BNES  CLR               NO,CHECK ALL OF DATA BUFFER
135C    90D8                883             SRLS  R13,8
135E    90E8                884             SRLS  R14,8
1360    05DE                885             CLHR  R13,R14
1362    4230 2C8A           886             BNE   ERR32             NO, PRINT ERROR
1366    4300 1390           887             B     TSTCHK1           YES, CHECK FOR NEXT TEST
136A    05DE                888  CLR        CLHR  R13,R14           IS OUTBUF = INBUF?
136C    4230 1378           889             BNE   ODDCHK1           CHECK FOR ODD BYTE
1370    0A18                890             AHR   R1,R8             BUMP OUTBUF
1372    0A28                891             AHR   R2,R8             BUMP INBUF
1374    4300 132E           892             B     LOADA
1378    48F0 305A           893  ODDCHK1    LH    R15,TESTZ         EXAMINE BOUNDARY FLAG
137C    4230 13A8           894             BNZ   TS1END
1380    0579                895             CLHR  R7,R9             WAS AN EVEN NUMBER OF BYTES TRAN?
1382    4230 2C8A           896             BNE   ERR32             NO, PRINT ERROR
1386    90D8                897             SRLS  R13,8
1388    90E8                898             SRLS  R14,8
```

```
138A   05DE              899            CLHR   R13,R14
138C   4230 2C8A         900            BNE    ERR32              YES, PRINT ERROR
1390   41F0 22DA         901  TSTCHK1   BAL    R15,ENDBYTE        CHECK END BYTE
1394   41F0 1FF0         902  TSTCHKZ   BAL    R15,MVCHK          CHECK MOVE BUFFER OPTIONS
1398   4300 11F8         903            B      TEST1B
139C   41F0 2252         904            BAL    R15,MULSEL         ANOTHER SELCH?
13A0   4300 2852         905            B      TSTCHK             NO
13A4   4300 11F8         906            B      TEST1B             YES
                         907  *
13A8   48F0 3056         908  TS1END    LH     R15,SAVET1         EXAMINE MEMORY ADR
13AC   C5F0 8002         909            CLHI   R15,X'8002'        LESS THAN 8002?
13B0   4280 1394         910            BL     TSTCHKZ            THEN NEXT TEST
13B4   48F0 3058         911            LH     R15,SAVET2         EXAMINE MEMORY ADR
13B8   C5F0 8002         912            CLHI   R15,X'8002'        LESS THAN 8002?
13BC   4280 1394         913            BL     TSTCHKZ            THEN NEXT TEST
13C0   4300 2C8A         914            B      ERR32              ELSE ERROR
                         915  *
                         916  *
13C4   40C0 303C         917  TERMCK    STH    R12,SAVEA
13C8   9D4C              918            SSR    IODEVS,STAT
13CA   C3C0 00C0         919            THI    STAT,X'C0'         CHECK FOR CORRECT GENERAL STATUS
13CE   4230 2C82         920            BNZ    ERR31
13D2   48A0 2FA6         921            LH     WORK,DEVICE        LOAD DEVICE OPTION
13D6   C5A0 0001         922            CLHI   WORK,1             IS DEVICE A DISC ?
13DA   233C              923            BES    DISCK1             YES, CHECK FOR CORRECT DISC STATUS
13DC   C3C0 0020         924            THI    STAT,X'20'         NO, CHECK FOR CORRECT TAPE STATUS
13E0   4330 13EC         925            BZ     TERMEX
13E4   48C0 303C         926            LH     R12,SAVEA
13E8   4300 1234         927            B      TEST1A
13EC   48C0 303C         928  TERMEX    LH     R12,SAVEA
13F0   030F              929            BR     R15
13F2   C3C0 0030         930  DISCK1    THI    STAT,X'30'
13F6   4230 2C82         931            BNZ    ERR31
13FA   48C0 303C         932            LH     R12,SAVEA
13FE   030F              933            BR     R15
```

```
                        * * * * * * * * * * * * * * * * * * * * * * * * * * * *
                        *                                                     *
                        *                        T E S T 2                    *
                        *                                                     *
                        * PURPOSE:                                            *
                        *  TO CHECK THE ADDRESS REGISTERS ARE FUNCTIONING     *
                        *  CORRECTLY.                                         *
                        *                                                     *
                        * ASSUMPTIONS:                                        *
                        *  THIS TEST ASSUMES THAT TEST 0 HAS RUN WITHOUT      *
                        *  DETECTING A FAILURE.                               *
                        *                                                     *
                        * DESIGN SPECIFICATIONS:                              *
                        *  AN OUTPUT COMMAND IS ISSUED TO THE SELCH,          *
                        *  4   WRITE DATA INSTRUCTIONS ARE ISSUED TO THE      *
                        *  SELCH TO LOAD THE STARTING AND FINAL ADRS. AN      *
                        *  OUTPUT COMMAND STOP IS AGAIN ISSUED TO THE SELCH   *
                        *  AND THE FINAL ADRS IS READ. THE FINAL ADRS READ    *
                        *  IS THEN COMPARED TO THE EXPECTED ADRS. THE         *
                        *                                                     *
                        * HOW TO RUN THE TEST:                                *
                        *  ENTER TEST 2 AND ANY OTHER OPTION INFORMATION VIA  *
                        *  THE CONSOLE DEVICE. REFER TO APPENDIX 2 OF         *
                        *  06-222M95R01A15 FOR THE OPTION COMMAND INPUT       *
                        *  STRUCTURE. AFTER THE DESIRED OPTION INFORMATION    *
                        *  IS ESTABLISHED THE TEST IS EXECUTED BY ENTERING    *
                        *  THE RUN COMMAND.                                   *
                        *                                                     *
                        * * * * * * * * * * * * * * * * * * * * * * * * * * * *
1400   41F0 2B18        TEST2    BAL   R15,TSTNUM          PRINT TEST NUMBER
1404   41F0 2132                 BAL   R15,WSELCH          GET SELCH TO BE TESTED
1408   DE30 2E88        TEST2A   OC    SELCH,STOP          STOP = X'08'
140C   4240 2C72                 BO    ERR27               IF FALSE SYNC PRINT ERROR
1410   D300 2E8B                 LB    R0,DATA1            DATA1 = X'AB'
1414   D320 2E8C                 LB    R2,DATA2            DATA2 = X'CD'
1418   9A30                      WDR   SELCH,R0            WRITE START ADRS TO SELCH
141A   9A32                      WDR   SELCH,R2
141C   9A30                      WDR   SELCH,R0            WRITE END ADRS TO SELCH
141E   9A32                      WDR   SELCH,R2
1420   DE30 2E88                 OC    SELCH,STOP          STOP SELCH
1424   9B37                      RDR   SELCH,R7            READ FINAL ADRS
1426   9B38                      RDR   SELCH,R8            ADRS SHOULD = ABCD
1428   0570                      CLHR  R7,R0               DOES R7 = AB ?
142A   2139                      BNES  ERR01               NO, PRINT ERROR
142C   0582                      CLHR  R8,R2               YES, DOES R8 = CD ?
142E   2137                      BNES  ERR01               NO, PRINT ERROR
1430   41F0 2252                 BAL   R15,MULSEL          ANOTHER SELCH?
1434   4300 2852                 B     TSTCHK              NO
1438   4300 1408                 B     TEST2A              YES
143C   08A0             ERR01    LHR   R10,R0
143E   91A8                      SLLS  R10,8
1440   06A2                      OHR   R10,R2
1442   08B7                      LHR   R11,R7
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1444   91B8                 988           SLLS  R11,8
1446   06B8                 989           OHR   R11,R8
1448   4300 2BE0            990           B     ERR1
```

```
                     * * * * * * * * * * * * * * * * * * * * * * * * * * * *
                     *                                                      *
                     *                      T E S T 3                       *
                     *                                                      *
                     * PURPOSE:                                             *
                     *  TO CHECK DATA TRANSMISSION, BETWEEN THE SELECTOR   *
                     *  CHANNEL AND AN I/O DEVICE UNDER STATUS CONTROL.     *
                     *                                                      *
                     * ASSUMPTIONS:                                         *
                     *  THIS TEST ASSUMES THAT TEST 2 HAS RUN WITHOUT       *
                     *  DETECTING A FAILURE.                                *
                     *                                                      *
                     * DESIGN SPECIFICATIONS:                               *
                     *  THE OUTPUT BUFFER IS LOADED WITH DATA SELECTED BY  *
                     *  THE USER. THE INPUT BUFFER IS LOADED WITH X'4F82'  *
                     *  AND AN OUTPUT COMMAND STOP IS ISSUED TO THE SELCH. *
                     *  THE I/O DEVICE SELECTED BY THE USER IS SET UP AND  *
                     *  THE STARTING AND FINAL ADRS ARE SENT TO THE SELCH  *
                     *  AN OUTPUT COMMAND GO IS SENT TO THE SELCH AND THE  *
                     *  PROGRAM PERFORMS BACKGROUND TESTING UNTIL BUSY      *
                     *  EQUALS ZERO. THE E ELCH IS THEN ISSUED AN OUTPUT    *
                     *  COMMAND STOP. THE FINAL ADDRESS IS READ FROM THE    *
                     *  SELCH AND COMPARED TO THE EXPECTED ADRS. THE SELCH *
                     *  ISSUED AND OUTPUT COMMAND STOP AND THE I/O DEVICE   *
                     *  SELECTED BY THE USER  IS SET UP FOR A WRITE         *
                     *  OPERATION. THE STARTING AND FINAL ADRS ARE SENT TO *
                     *  THE  SELCH AND AN OUTPUT COMMAND GO, READ IS        *
                     *  ISSUED. THE PROGRAM LOOPS UNTIL  SELCH BUSY =0,     *
                     *  THEN THE FINAL ADRS IS READ AND COMPARED TO THE     *
                     *  EXPECTED ADRS. IF THE FINAL ADRS IS CORRECT THE     *
                     *  INPUT BUFFER IS COMPARED TO THE OUTPUT BUFFER.      *
                     *                                                      *
                     * HOW TO RUN THE TEST:                                 *
                     *  ENTER TEST 3 AND ANY OTHER OPTION INFORMATION VIA   *
                     *  THE CONSOLE DEVICE. REFER TO APPENDIX 2 OF          *
                     *  06-222M95R01A15 FOR THE OPTION COMMAND INPUT        *
                     *  STRUCTURE. AFTER THE DESIRED OPTION INFORMATION     *
                     *  IS ESTABLISHED THE TEST IS EXECUTED BY ENTERING     *
                     *  THE RUN COMMAND.                                    *
                     *                                                      *
                     * * * * * * * * * * * * * * * * * * * * * * * * * * * *
144C   41F0 2B18     TEST3    BAL   R15,TSTNUM          PRINT TEST NUMBER
1450   41F0 2132              BAL   R15,WSELCH          GET SELCH TO BE TESTED
1454   48A0 0C74     TEST3A   LH    WORK,IMAGE          LOAD DATA IMAGE
1458   48B0 2EA4              LH    WORK1,OUTBUF        LOAD ADRS OF OUTPUT BUFFER
145C   0777                   XHR   R7,R7
145E   2482                   LIS   R8,2
1460   4890 0C6C              LH    R9,BYTE7            LOAD BXLE LIMIT
1464   41F0 1EDC              BAL   R15,INDEXBFO        INDEX OUTBUF
1468   0777                   XHR   R7,R7
146A   4890 0C6C              LH    R9,BYTE7
146E   2692                   AIS   R9,2                INCREASE BUFFER SIZE BY 2
1470   C8A0 4F82              LHI   WORK,X'4F82'        LOAD BACKGROUND PATTERN
```

TEST 3

```
1474   48B0 2EA6          1045          LH    WORK1,INBUF        LOAD ADRS OF INPUT BUFFER
1478   41F0 1EB4          1046          BAL   R15,INDEXBFI       INDEX INBUF
147C   41F0 19C8          1047          BAL   R15,SELCH1         ENSURE SELCH IS IDLE
1480   01F5               1048          BALR  R15,DRIVER         SETUP I/O DEVICE FOR TRANSFER
1482   0000               1049          DC    0                  FROM MEMORY TO DEVICE (WRITE)
1484   41F0 1A02          1050          BAL   R15,SELCH2O        SETUP SELCH FOR TRANSFER
1488   2EA4               1051          DC    Z(OUTBUF)
148A   41F0 1ACA          1052          BAL   R15,SELCH5         WAIT FOR SELCH TO TERMINATE
148E   41F0 1A50          1053          BAL   R15,SELCH3         CHECK SELCH TERMINATION
1492   41F0 1F04          1054          BAL   R15,BUFCHK         CHECK THAT OUTBUF WAS NOT MODIFIED
1496   41F0 19C8          1055          BAL   R15,SELCH1         ENSURE SELCH IS IDLE
149A   01F5               1056          BALR  R15,DRIVER         SETUP I/O DEVICE FOR TRANSFER
149C   0001               1057          DC    X'1'               FROM DEVICE TO MEMORY (READ)
149E   41F0 19F8          1058          BAL   R15,SELCH2I        SETUP SELCH FOR TRANSFER
14A2   2EA6               1059          DC    Z(INBUF)
14A4   41F0 1ACA          1060          BAL   R15,SELCH5         WAIT FOR SELCH TO TERMINATE
14A8   41F0 1A50          1061          BAL   R15,SELCH3         CHECK SELCH TERMINATION
14AC   4810 2EA4          1062          LH    R1,OUTBUF          GET OUTBUF ADR (ACTUAL)
14B0   4820 2EA6          1063          LH    R2,INBUF           GET INBUF ADR (ACTUAL)
14B4   0777               1064          XHR   R7,R7              SET UP INDEX PARAMETERS
14B6   2482               1065          LIS   R8,2
14B8   4890 0C6C          1066          LH    R9,BYTE7
14BC   2692               1067          AIS   R9,2
14BE   C170 14C6          1068  LOADB   BXLE  R7,LOAD2           LOOP N BYTES
14C2   4300 1508          1069          B     TSTCHK2
14C6   08B1               1070  LOAD2   LHR   R11,R1             PLACE OUTBUF ADR INTO R11
14C8   41F0 1E7A          1071          BAL   R15,ADRTRANO       OUTBUF PROGRAM ADR
14CC   48DC 0000          1072          LH    R13,0(R12)         GET CONTENTS OF THIS PROGRAM ADR
14D0   08B2               1073          LHR   R11,R2             PLACE INBUF ADR INTO R11
14D2   41F0 1E70          1074          BAL   R15,ADRTRANI       INBUF PROGRAM ADR
14D6   48EC 0000          1075          LH    R14,0(R12)         GET CONTENTS OF THIS PROGRAM ADR
14DA   05DE               1076          CLHR  R13,R14            COMPARE CONTENTS
14DC   2135               1077          BNES  ODDCK2             CHECK FOR ODD BYTE
14DE   0A18               1078          AHR   R1,R8              BUMP OUTBUF
14E0   0A28               1079          AHR   R2,R8              BUMP INBUF
14E2   4300 14BE          1080          B     LOADB
14E6   0579               1081  ODDCK2  CLHR  R7,R9              EVEN NUMBER OF BYTES TRANSF?
14E8   4230 2C3A          1082          BNE   ERR15              ERROR
14EC   48B0 2EA4          1083          LH    R11,OUTBUF         GET OUTBUF ADR (ACTUAL)
14F0   2773               1084          SIS   R7,3               BUFFER INDEX -3
14F2   0AB7               1085          AHR   R11,R7             ADD TO OUTBUF ADR
14F4   41F0 1E7A          1086          BAL   R15,ADRTRANO       OUTBUF PROGRAM ADR
14F8   D3FC 0000          1087          LB    R15,0(R12)         GET DATA
14FC   C4D0 FF00          1088          NHI   R13,X'FF00'        MASK OFF LEAST SIG OF CURRENT HW
1500   0ADF               1089          AHR   R13,R15            ADD PREVIOUS HW TO CURRENT HW
1502   05DE               1090          CLHR  R13,R14            COMPARE ?
1504   4230 2C3A          1091          BNE   ERR15              NO,PRINT ERROR
1508   41F0 22DA          1092  TSTCHK2 BAL   R15,ENDBYTE        CHECK END BYTE
150C   41F0 1FF0          1093          BAL   R15,MVCHK          CHECK MOVE OPTIONS
1510   4300 1454          1094          B     TEST3A
1514   41F0 2252          1095          BAL   R15,MULSEL         ANOTHER SELCH?
1518   4300 2852          1096          B     TSTCHK             NO
151C   4300 1454          1097          B     TEST3A             YES
```

```
                        * * * * * * * * * * * * * * * * * * * * * * * * * * * *
                        *                                                     *
                        *                      T E S T 4                      *
                        *                                                     *
                        * PURPOSE:                                            *
                        *  TO CHECK DATA TRANSMISSIONS, BETWEEN THE SELECTOR  *
                        *  CHANNEL AND AN I/O DEVICE UNDER EXTERNAL INTERRUPT *
                        *  CONTROL.                                           *
                        *                                                     *
                        * ASSUMPTIONS:                                        *
                        *  THIS TEST ASSUMES THAT TEST 2 HAS RUN WITHOUT      *
                        *  DETECTING A FAILURE.                               *
                        *                                                     *
                        * DESIGN SPECIFICATIONS:                              *
                        *  THIS TEST IS IDENTICAL TO TEST 3 WITH THE          *
                        *  EXCEPTION THAT, WHEN THE GO COMMAND IS ISSUED TO   *
                        *  THE  SELCH, THE PROGRAM WILL PERFORM BACKGROUND    *
                        *  TESTING UNTIL THE  SELCH INTERRUPTS OR UNTIL THE   *
                        *  PROGRAM TIMES OUT.                                 *
                        *                                                     *
                        *                                                     *
                        * HOW TO RUN THE TEST:                                *
                        *  ENTER TEST 4 AND ANY OTHER OPTION INFORMATION VIA  *
                        *  THE CONSOLE DEVICE. REFER TO APPENDIX 2 OF         *
                        *  06-222M95R01A15 FOR THE OPTION COMMAND INPUT       *
                        *  STRUCTURE. AFTER THE DESIRED OPTION INFORMATION    *
                        *  IS ESTABLISHED THE TEST IS EXECUTED BY ENTERING    *
                        *  THE RUN COMMAND.                                   *
                        *                                                     *
                        * * * * * * * * * * * * * * * * * * * * * * * * * * * *
1520   41F0 2B18        TEST4    BAL   R15,TSTNUM          PRINT TEST NUMBER
1524   41F0 2132                 BAL   R15,WSELCH          GET SELCH TO BE TESTED
1528   48A0 0C74        TEST4A   LH    WORK,IMAGE          LOAD DATA IMAGE
152C   48B0 2EA4                 LH    WORK1,OUTBUF        LOAD ADRS OF OUTPUT BUFFER
1530   0777                      XHR   R7,R7
1532   2482                      LIS   R8,2
1534   4890 0C6C                 LH    R9,BYTE7
1538   41F0 1EDC                 BAL   R15,INDEXBFO        INDEX OUTBUF
153C   0777                      XHR   R7,R7
153E   4890 0C6C                 LH    R9,BYTE7
1542   2692                      AIS   R9,2                INC BUFFER SIZE BY 2
1544   C8A0 4F82                 LHI   WORK,X'4F82'        LOAD BACKGROUND PATTERN
1548   48B0 2EA6                 LH    WORK1,INBUF         LOAD ADRS OF INPUT BUFFER
154C   41F0 1EB4                 BAL   R15,INDEXBFI        INDEX INBUF
1550   C880 1990                 LHI   R8,SELINT
1554   4080 0046                 STH   R8,X'46'
1558   41F0 19C8                 BAL   R15,SELCH1          ENSURE SELCH IS IDLE
155C   01F5                      BALR  R15,DRIVER          SETUP I/O DEVICE FOR TRANSFER
155E   0000                      DC    X'0'                FROM MEMORY TO DEVICE (WRITE)
1560   41F0 1A02                 BAL   R15,SELCH20         SETUP SELCH FOR TRANSFER
1564   2EA4                      DC    Z(OUTBUF)
1566   C200 2EC0                 LPSW  WAIT                WAIT FOR SELCH TO INTERRUPT
                        *
```

TEST 4

```
156A   41F0 1A50         1152          BAL   R15,SELCH3          CHECK SELCH TERMINATION
156E   41F0 1F04         1153          BAL   R15,BUFCHK
1572   41F0 19C8         1154          BAL   R15,SELCH1          ENSURE SELCH IS IDLE
1576   01F5              1155          BALR  R15,DRIVER          SETUP I/O DEVICE FOR TRANSFER
1578   0001              1156          DC    X'1'                FROM DEVICE TO MEMORY (READ)
157A   41F0 19F8         1157          BAL   R15,SELCH2I         SETUP SELCH FOR TRANSFER
157E   2EA6              1158          DC    Z(INBUF)
1580   C200 2EC0         1159          LPSW  WAIT                WAIT FOR SELCH TO INTERRUPT
                         1160  *
1584   41F0 1A50         1161          BAL   R15,SELCH3          CHECK SELCH TERMINATION
1588   C880 2A64         1162  RESET1  LHI   R8,EXTINT
158C   4080 0046         1163          STH   R8,X'46'
1590   4810 2EA4         1164          LH    R1,OUTBUF           GET OUTBUF ADR (ACTUAL)
1594   4820 2EA6         1165          LH    R2,INBUF            GET INBUF ADR (ACTUAL)
1598   0777              1166          XHR   R7,R7               SET UP INDEX PARAMETERS
159A   2482              1167          LIS   R8,2
159C   4890 0C6C         1168          LH    R9,BYTE7
15A0   2692              1169          AIS   R9,2
15A2   C170 15AA         1170  LOADC   BXLE  R7,LOAD3
15A6   4300 15EC         1171          B     TSTCHK3
15AA   08B1              1172  LOAD3   LHR   R11,R1              PLACE OUTBUF ADR INTO R11
15AC   41F0 1E7A         1173          BAL   R15,ADRTRANO        OUTBUF PROGRAM ADR
15B0   48DC 0000         1174          LH    R13,0(R12)          GET CONTENTS OF THIS PROGRAM ADR
15B4   08B2              1175          LHR   R11,R2              PLACE INBUF ADR INTO R11
15B6   41F0 1E70         1176          BAL   R15,ADRTRANI        INBUF PROGRAM ADR
15BA   48EC 0000         1177          LH    R14,0(R12)          GET CONTENTS OF THIS PROGRAM ADR
15BE   05DE              1178          CLHR  R13,R14             COMPARE CONTENTS
15C0   2135              1179          BNES  ODDCK3              CHECK FOR ODD BYTE
15C2   0A18              1180          AHR   R1,R8               BUMP OUTBUF
15C4   0A28              1181          AHR   R2,R8               BUMP INBUF
15C6   4300 15A2         1182          B     LOADC
15CA   0579              1183  ODDCK3  CLHR  R7,R9               EVEN NUMBER OF BYTES TRANSF?
15CC   4230 2C42         1184          BNE   ERR16               ERROR
15D0   48B0 2EA4         1185          LH    R11,OUTBUF          GET OUTBUF ADR (ACTUAL)
15D4   2773              1186          SIS   R7,3                BUFFER INDEX -3
15D6   0AB7              1187          AHR   R11,R7              ADD TO OUTBUF ADR
15D8   41F0 1E7A         1188          BAL   R15,ADRTRANO        OUTBUF PROGRAM ADR
15DC   D3FC 0000         1189          LB    R15,0(R12)          GET DATA
15E0   C4D0 FF00         1190          NHI   R13,X'FF00'         MASK OFF LEAST SIG OF CURRENT HW
15E4   0ADF              1191          AHR   R13,R15             ADD PREVIOUS HW TO CURRENT HW
15E6   05DE              1192          CLHR  R13,R14             COMPARE ?
15E8   4230 2C42         1193          BNE   ERR16               NO, PRINT ERROR
15EC   41F0 22DA         1194  TSTCHK3 BAL   R15,ENDBYTE         CHECK END BYTE
15F0   41F0 1FF0         1195          BAL   R15,MVCHK           CHECK MOVE BUFFER OPTIONS
15F4   4300 1528         1196          B     TEST4A
15F8   41F0 2252         1197          BAL   R15,MULSEL          ANOTHER SELCH?
15FC   4300 2852         1198          B     TSTCHK              NO
1600   4300 1528         1199          B     TEST4A              YES
```

SCOPE LOOPS

```
                         * * * * * * * * * * * * * * * * * * * * * * * * * * * *
                         *                                                     *
                         *                      T E S T 5                      *
                         *                                                     *
                         * PURPOSE:                                            *
                         *  TC PRCVIDE A SCOPE LOOP WHICH TRANSFERS DATA FROM  *
                         *  MEMORY TO AN I/O DEVICE CONTINUOUSLY.              *
                         *                                                     *
                         * ASSUMPTIONS:                                        *
                         *  THIS TEST ASSUMES THAT A DISC, MAG TAPE OR SELCH   *
                         *  TESTER, IS ON THE SELECTOR CHANNEL BUS.            *
                         *                                                     *
                         * DESIGN SPECIFICATIONS:                              *
                         *  THE OUTPUT BUFFER IS LOADED WITH DATA SELECTED BY  *
                         *  THE USER. THE INPUT BUFFER IS LOADED WITH X'4F82'  *
                         *  AND AN OUTPUT COMMAND STOP IS ISSUED TO THE  SELCH.*
                         *  THE I/O DEVICE IS SET UP FOR A READ OPERATION AND  *
                         *  THE STARTING AND FINAL ADRS ARE SENT TO THE  SELCH.*
                         *  THE  SELCH IS ISSUED AN OUTPUT COMMAND GO AND THE  *
                         *  PROGRAM LOOPS UNTIL  SELCH BUSY = 0 . WHEN BUSY = 0*
                         *  THE SEQUENCE IS REPEATED AGAIN.                    *
                         *                                                     *
                         * HOW TO RUN THE TEST:                                *
                         *  ENTER TEST 5 AND ANY OTHER OPTION INFORMATION VIA  *
                         *  THE CONSOLE DEVICE. REFER TO APPENDIX 2 OF         *
                         *  06-222M95R01A15 FOR THE OPTION COMMAND INPUT       *
                         *  STRUCTURE. AFTER THE DESIRED OPTION INFORMATION    *
                         *  IS ESTABLISHED THE TEST IS EXECUTED BY ENTERING    *
                         *  THE RUN COMMAND. THE TEST WILL CONTINUE UNTIL THE  *
                         *  BREAK KEY ON THE CONSOLE DEVICE IS DEPRESSED OR AN *
                         *  ERROR CONDITION IS DETECTED IN THE I/O DEVICE.     *
                         *                                                     *
                         * * * * * * * * * * * * * * * * * * * * * * * * * * * *
1604    41F0 2B18        TEST5    BAL   R15,TSTNUM          PRINT TEST NUMBER
1608    41F0 2132                 BAL   R15,WSELCH          GET SELCH TO BE TESTED
160C    24F0                      LIS   R15,X'0'            RESET TEST FLAG
160E    40F0 2F6E                 STH   R15,WTEST           STORE IT
1612    07AA             TEST5A   XHR   WORK,WORK           ZERO FUNCTION CODE
1614    C8B0 2EA4                 LHI   WORK1,OUTBUF        LOAD BUFFER ADRS LOC
1618    C8F0 1A02                 LHI   R15,SELCH20         GET SELCH OUTBUF ADR
161C    40F0 169C                 STH   R15,CMD+4           STORE IN ROUTINE
1620    C8F0 167E                 LHI   R15,XR              LOAD LOOP ADRS
1624    4300 1652                 B     SLOOP               BRANCH TO SCOPE LOOP
                         * * * * * * * * * * * * * * * * * * * * * * * * * * * *
                         *                                                     *
                         *                      T E S T 6                      *
                         *                                                     *
                         * PURPOSE:                                            *
                         *  TO PROVIDE A SCOPE LOOP WHICH TRANSFERS DATA FROM  *
                         *  AN I/O DEVICE TO MEMORY CONTINUOUSLY.              *
                         *                                                     *
                         * ASSUMPTIONS:                                        *
                         *  THIS TEST ASSUMES THAT A DISC, MAG TAPE OR SELCH   *
```

SCOPE LOOPS

```
                    *  TESTER, IS ON THE SELECTOR CHANNEL BUS.              *
                    *                                                       *
                    * DESIGN SPECIFICATIONS:                                *
                    *  THE OUTPUT BUFFER IS LOADED WITH DATA SELECTED BY    *
                    *  THE USER. THE INPUT BUFFER IS LOADED WITH X'4F82'    *
                    *  AND AN OUTPUT COMMAND STOP IS ISSUED TO THE ESELCH.*
                    *  THE I/O DEVICE IS SET UP FOR A WRITE OPERATION AND *
                    *  THE STARTING AND FINAL ADRS ARE SENT TO THE  SELCH.*
                    *  THE  SELCH IS ISSUED AN OUTPUT COMMAND GO AND THE  *
                    *  PROGRAM LOOPS UNTIL  SELCH BUSY = 0. WHEN BUSY = 0 *
                    *  THE SEQUENCE IS REPEATED AGAIN.                      *
                    *                                                       *
                    * HOW TO RUN THE TEST:                                  *
                    *  ENTER TEST 6 AND ANY OTHER OPTION INFORMATION VIA    *
                    *  THE CONSOLE DEVICE. REFER TO APPENDIX 2 OF           *
                    *  06-222M95R01A15 FOR THE OPTION COMMAND INPUT         *
                    *  STRUCTURE. AFTER THE DESIRED OPTION INFORMATION      *
                    *  IS ESTABLISHED THE TEST IS EXECUTED BY ENTERING      *
                    *  THE RUN COMMAND. THE TEST WILL CONTINUE UNTIL THE  *
                    *  BREAK KEY ON THE CONSOLE DEVICE IS DEPRESSED OR AN *
                    *  ERROR CONDITION IS DETECTED IN THE I/O DEVICE.       *
                    *                                                       *
                    * * * * * * * * * * * * * * * * * * * * * * * * * * * *
1628  41F0 2B18     TEST6    BAL   R15,TSTNUM           PRINT TEST NUMBER
162C  41F0 2132              BAL   R15,WSELCH           GET SELCH TO BE TESTED
1630  24F1                   LIS   R15,1                SET TEST FLAG
1632  40F0 2F6E              STH   R15,WTEST            STORE VALUE
1636  48A0 2FA6     TEST6A   LH    WORK,DEVICE          LOAD DEVICE OPTION
163A  C5A0 0002              CLHI  WORK,2               IS I/O DEV A MAG TAPE ?
163E  2332                   BES   CONT2                YES, LET FUNCTION = 2
1640  24A1                   LIS   WORK,1               NO, LET FUNCTION = 1
1642  C8B0 2EA6     CONT2    LHI   WORK1,INBUF          LOAD BUFFER ADRS LOC
1646  C8F0 19F8              LHI   R15,SELCH2I          ET SELCH INBUF ADR
164A  40F0 169C              STH   R15,CMD+4            STORE IN ROUTINE
164E  C8F0 1692              LHI   R15,CONT1            LOAD LOOP ADRS
                    *
                    *
                    *
1652  40F0 16B2     SLOOP    STH   R15,BRANCH+2         STORE LOOP ADRS ****
1656  40A0 1698              STH   WORK,CMD             STORE FUNCTION CODE
165A  40B0 169E              STH   WORK1,BUFADR         STORE BUFFER ADRS LOC
165E  D3B0 2E70              LB    R11,ADDRESS
1662  DEB0 2E6E              OC    R11,WRTCMD
1666  0777                   XHR   R7,R7
1668  4070 0B74              STH   R7,CONTIN
166C  2482                   LIS   R8,2
166E  4890 0C6C              LH    R9,BYTE7
1672  C8A0 4F82              LHI   WORK,X'4F82'         LOAD BACKGROUND PATTERN
1676  48B0 2EA6              LH    R11,INBUF            LOAD ADRS OF INPUT BUFFER
167A  41F0 1EB4              BAL   R15,INDEXBFI         INDEX INBUF
167E  0777          XR       XHR   R7,R7
1680  2482                   LIS   R8,2
1682  4890 0C6C              LH    R9,BYTE7
```

SCOPE LOOPS

```
1686    48A0 0C74          1307          LH    WORK,IMAGE          LOAD DATA TO BE OUTPUT TO DEVICE
168A    48B0 2EA4          1308          LH    R11,OUTBUF          LOAD ADRS OF OUTPUT BUFFER
168E    41F0 1EDC          1309          BAL   R15,INDEXBFO        INDEX OUTBUF
1692    DE30 2E88          1310  CONT1   OC    SELCH,STOP1         STOP THE SELCH
1696    01F5               1311          BALR  R15,DRIVER          SETUP I/O DEVICE FOR TRANSFER
1698    0000               1312  CMD     DC    0
169A    41F0 1A02          1313          BAL   R15,SELCH20         SETUP SELCH FOR TRANSFER
169E    0000               1314  BUFADR  DC    0
16A0    9D3C               1315  LOOP    SSR   SELCH,STAT          IS SELCH BUSY ?
16A2    2081               1316          BCS   LOOP                YES, SENSE STATUS AGAIN
16A4    D3B0 2E70          1317          LB    R11,ADDRESS         GET CONSOLE ADDRESS
16A8    0711               1318          XHR   R1,R1
16AA    9DBC               1319          SSR   R11,R12             NO, IS TTY BREAK SET ?
16AC    C3C0 0020          1320          THI   R12,X'20'
16B0    4330 0000          1321  BRANCH  BZ    R0                  NO, CONTINUE SCOPE LOOP ****
16B4    48F0 2E6C          1322          LH    R15,MICROFLG        CONSOLE ON MICRO BUSS
16B8    4330 16D2          1323          BZ    BRANCH2             BRANCH IF NOT
16BC    9BBC               1324  BRANCH1 RDR   R11,R12             KNOCK DOWN BREAK
16BE    24C0               1325          LIS   R12,0               CONSTANT FOR 200 MS DELAY
16C0    26C1               1326          AIS   R12,1               WAIT 200 MS
16C2    2031               1327          BNZS  *-2
16C4    9DBC               1328          SSR   R11,R12             BREAK STILL THERE
16C6    C3C0 0020          1329          THI   R12,X'20'
16CA    4230 16BC          1330          BNZ   BRANCH1             STAY HERE AND WAIT
16CE    4300 16EA          1331          B     SENSE3A
16D2    48F0 2E6A          1332  BRANCH2 LH    R15,CRTFLG
16D6    2338               1333          BZS   SENSE3
16D8    DEB0 2E6F          1334          OC    R11,RDCMD
16DC    9BBF               1335          RDR   R11,R15
16DE    41F0 22A4          1336          BAL   R15,RTN2            RESET THE DEVICE
16E2    4300 16EE          1337          B     LOOPZZ
16E6    9DBC               1338  SENSE3  SSR   R11,R12             YES, WAIT FOR BREAK = 0
16E8    2041               1339          BOS   SENSE3
16EA    41F0 22A4          1340  SENSE3A BAL   R15,RTN2            RESET THE DEVICE
16EE    C510 1FB2          1341  LOOPZZ  CLHI  R1,MVCHKA           IS BREAK FROM TEST 7?
16F2    4380 0CD2          1342          BNL   TTYIN               YES, GO TO COMMAND MODE
16F6    41F0 2252          1343          BAL   R15,MULSEL          ANOTHER SELCH?
16FA    4300 0FE0          1344          B     TSTSL2              SELECT NEXT TEST
16FE    48F0 2F6E          1345          LH    R15,WTEST           CHECK TEST OPTION
1702    4330 1612          1346          BZ    TEST5A              TEST 5
1706    4300 1636          1347          B     TEST6A              ELSE TEST 6
```

```
                    * * * * * * * * * * * * * * * * * * * * * * * * * * * *
                    *                                                     *
                    *                       T E S T 7                     *
                    *                                                     *
                    * PURPOSE:                                            *
                    *  TO CHECK DATA TRANSMISSION BETWEEN THE SELECTOR    *
                    *  CHANNEL AND AN I/O DEVICE UNDER IMMEDIATE          *
                    *  INTERRUPT CONTROL. ALL SELECTOR CHANNELS AND       *
                    *  CORRESPONDING I/O DEVICES CAN OPERATE              *
                    *  SIMULTANEOUSLY IN A SYSTEM LIKE ENVIROMENT.        *
                    *                                                     *
                    * ASSUMPTIONS:                                        *
                    *  THIS TEST ASSUMES THAT TESTS 0,1,2,3 AND 4 HAVE    *
                    *  RUN WITHOUT DETECTING A FAILURE.                   *
                    *                                                     *
                    * DESIGN SPECIFICATIONS:                              *
                    *  THIS TEST IS SIMILIAR TO TEST 3 AND 4; HOWEVER,    *
                    *  THE SELECTOR CHANNEL OPERATES UNDER IMMEDIATE      *
                    *  INTERRUPT CONTROL AND MORE THAN ONE SELECTOR       *
                    *  CHANNEL CAN OPERATE SIMULTANEOUSLY.                *
                    *  IN THE TEST AN OUTPUT BUFFER AND AN INPUT          *
                    *  BUFFER ARE SELECTED FOR EACH SELECTOR              *
                    *  CHANNEL. WRITE COMMANDS ARE ISSUED TO ALL          *
                    *  I/O DEVICES AND SELECTOR CHANNELS. THE             *
                    *  PROGRAM THEN WAITS IN A BACKGROUND TEST FOR        *
                    *  A SELECTOR CHANNEL TO INTERRUPT. A READ            *
                    *  COMMAND IS SUBSEQUENTLY ISSUED TO THE I/O          *
                    *  DEVICE AND SELECTOR CHANNEL FOLLOWING THE          *
                    *  INTERRUPTION. THE PROGRAM WAITS IN THE             *
                    *  BACKGROUND FOR ALL SELECTOR CHANNELS TO            *
                    *  COMPLETE THE END OF WRITE MODE. THE PROGRAM        *
                    *  AGAIN WAITS IN THE BACKGROUND TEST FOR ALL         *
                    *  SELECTOR CHANNELS TO INTERRUPT UPON COMPLETION     *
                    *  OF THE READ MODE.                                  *
                    *                                                     *
                    * HOW TO RUN THE TEST:                                *
                    *  ENTER TEST 7 AND ANY OTHER OPTION INFROMATION VIA  *
                    *  THE CONSOLE DEVICE. REFER TO APPENDIX 2 OF         *
                    *  06-222M95R01A15 FOR THE COMMAND INPUT STRUCTURE.   *
                    *  AFTER THE DESIRED OPTION INFORMATION IS            *
                    *  ESTABLISHED THE TEST IS EXECUTED BY ENTERING THE   *
                    *  RUN COMMAND.                                       *
                    *                                                     *
                    * * * * * * * * * * * * * * * * * * * * * * * * * * * *
170A   41F0 2B18    TEST7     BAL   R15,TSTNUM          PRINT TEST NUMBER
170E   41F0 2598              BAL   R15,SELINTA         SET UP INTERRUPT TABLE
1712   41F0 21D0              BAL   R15,WSELCHZ         SELECT SELCH
1716   07DD         TEST7A    XHR   R13,R13             ZERO COUNTER AGAIN
1718   4810 2EA4              LH    R1,OUTBUF           GET OUTBUF ADR
171C   4820 2EA6              LH    R2,INBUF            GET INBUF ADR
1720   45D0 2F02    TEST7B    CLH   R13,NNSELCH         GET NUMBER OF SELCH
1724   4380 177C              BNL   TEST7AA
1728   91D1                   SLLS  R13,1               MULTIPLE BY 2
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172A   401D 2F0C            1402          STH   R1,OUTBUFS(R13)     STORE THIS OUTBUF ADR
172E   402D 2F04            1403          STH   R2,INBUFS(R13)      STORE THIS INBUF ADR
1732   48A0 0C74            1404          LH    R10,IMAGE           GET IMAGE VALUE
1736   08B1                 1405          LHR   R11,R1              GET OUTBUF ADDRESS
1738   0777                 1406          XHR   R7,R7               SET UP INDEX PARAMETERS
173A   2482                 1407          LIS   R8,2
173C   4890 0C6C            1408          LH    R9,BYTE7
1740   41F0 1EDC            1409          BAL   R15,INDEXBFO        INDEX OUTBUF
1744   0777                 1410          XHR   R7,R7
1746   4890 0C6C            1411          LH    R9,BYTE7
174A   C8A0 4F82            1412          LHI   R10,X'4F82'         GET BACKGROUND PATTERN
174E   08B2                 1413          LHR   R11,R2              GET INBUF ADDRESS
1750   41F0 1EB4            1414          BAL   R15,INDEXBFI        INDEX INBUF
1754   41F0 19C8            1415          BAL   R15,SELCH1          INDLE THIS SELCH
1758   41F0 239E            1416          BAL   R15,DRIVERM         SET PARAMETER VALUES
175C   01F5                 1417          BALR  R15,DRIVER          INITIALIZE DRIVER
175E   0000                 1418          DC    X'0'                WRITE TO DEVICE
1760   41F0 2332            1419          BAL   R15,SELCH2M         GENERATE WRITE COMMAND
1764   90D1                 1420          SRLS  R13,1               DIVIDE BY 2
1766   26D1                 1421          AIS   R13,1               INCREMENT COUNTER
1768   40D0 2F98            1422          STH   R13,COUNTER
176C   4A10 0C6C            1423          AH    R1,BYTE7            NEW ADDRESS OF OUFBUF
1770   4A20 0C6C            1424          AH    R2,BYTE7            NEW ADDRESS OF INBUF
1774   2611                 1425          AIS   R1,1
1776   2621                 1426          AIS   R2,1
1778   4300 1720            1427          B     TEST7B
177C   48A0 0B8C            1428 TEST7AA  LH    R10,SELCHN1         GET FIRST SELCH DEVICE ADR
1780   48B0 0B94            1429          LH    R11,SELCHN2         GET SECOND SELCH DEVICE ADR
1784   48C0 0B9C            1430          LH    R12,SELCHN3         GET THIRD SELCH DEVICE ADR
1788   48D0 0BA4            1431          LH    R13,SELCHN4         GET FOURTH SELCH DEVICE ADR
178C   4860 0BAC            1432          LH    R6,IODEVN1          GET FIRST DEVICE ADR
1790   4870 0BB4            1433          LH    R7,IODEVN2          GET SECOND DEVICE ADR
1794   4880 0BBC            1434          LH    R8,IODEVN3          GET THIRD DEVICE ADR
1798   4890 0BC4            1435          LH    R9,IODEVN4          GET FOURTH DEVICE ADR
179C   2420                 1436          LIS   R2,0
179E   4020 2F9A            1437          STH   R2,COMPARE
17A2   4020 2F76            1438          STH   R2,SELCNTA
17A6   4020 2F78            1439          STH   R2,SELCNTB
17AA   4020 2F7A            1440          STH   R2,SELCOUNT
17AE   4020 2F7C            1441          STH   R2,SLCOUNT
17B2   2430                 1442          LIS   R3,0
17B4   4023 2F7E            1443 TEST7BZ  STH   R2,SELCTA(R3)       ZERO COUNTER OF EACH SELCH
17B8   4023 2F86            1444          STH   R2,SELCTAZ(R3)
17BC   4023 2F90            1445          STH   R2,SELDEV1(R3)      ZERO DEVICE CODE OF EACH SELCH
17C0   2632                 1446          AIS   R3,2
17C2   C530 0008            1447          CLHI  R3,8
17C6   4280 17B4            1448          BL    TEST7BZ
17CA   4810 0CAC            1449          LH    R1,TESTSEL          TEST SELCH NUMBER
17CE   4230 1812            1450          BNZ   TEST7AX             ONLY ONE
17D2   4810 0B84            1451          LH    R1,NSELCH           GET NUMBER OF SELCH
17D6   C510 0001            1452          CLHI  R1,1                1 ?
17DA   4330 1806            1453          BE    TEST7A1             NO
17DE   C510 0002            1454          CLHI  R1,2                2 ?
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17E2   4330 17FE        1455          BE    TEST7A2           NO
17E6   C510 0003        1456          CLHI  R1,3              3 ?
17EA   4330 17F6        1457          BE    TEST7A3           NO
17EE   DE90 2FE5        1458          OC    R9,RDWTDV+3       START FOURTH DEVICE
17F2   DED0 2F75        1459          OC    R13,SELCHS+3      START FOURTH SELCH
17F6   DE80 2FE4        1460  TEST7A3 OC    R8,RDWTDV+2       START THIRD DEVICE
17FA   DEC0 2F74        1461          OC    R12,SELCHS+2      START THIRD SELCH
17FE   DE70 2FE3        1462  TEST7A2 OC    R7,RDWTDV+1       START SECOND DEVICE
1802   DEB0 2F73        1463          OC    R11,SELCHS+1      START SECOND SELCH
1806   DE60 2FE2        1464  TEST7A1 OC    R6,RDWTDV         START FIRST DEVICE
180A   DEA0 2F72        1465          OC    R10,SELCHS        START FIRST SELCH
180E   C200 2ED0        1466          LPSW  TEST7PSA          WAIT FOR IMMEDIATE INTER
1812   2711             1467  TEST7AX SIS   R1,1              SELECT PROPER SELCH
1814   9113             1468          SLLS  R1,3              MULTIPLE BY 8
1816   4861 0BAC        1469          LH    R6,IODEVN1(R1)    USE THIS DEVICE
181A   48A1 0B8C        1470          LH    R10,SELCHN1(R1)   USE THIS SELCH
181E   9013             1471          SRLS  R1,3
1820   DE61 2FE2        1472          OC    R6,RDWTDV(R1)     OUT PUT COMMAND TO DEVICE
1824   DEA1 2F72        1473          OC    R10,SELCHS(R1)    OUTPUT COMMAND TO SELCH
1828   C200 2ED0        1474          LPSW  TEST7PSA          WAIT FOR IMMEDIATE INTERRUPT
                        1475  *
                        1476  *
182C   41F0 214E        1477  TEST7Z  BAL   R15,SELTZ         TEST ALL SELCH?
1830   4300 183C        1478          B     TEST7DZ           NO, TEST ONLY ONE SELCH
1834   41F0 2174        1479          BAL   R15,SSEL          SEARCH FOR SELCH
1838   4300 2CCA        1480          B     ERR41             DID NOT FIND SELCH
183C   41F0 1A50        1481  TEST7DZ BAL   R15,SELCH3        CHECK THIS SELCH TERMINATION
1840   41F0 1F04        1482          BAL   R15,BUFCHK        CHECK BUFFER
1844   41F0 19C8        1483          BAL   R15,SELCH1        ENSURE THIS SELCH IS IDLE
1848   41F0 239E        1484          BAL   R15,DRIVERM       SET UP IO DEVICE PARAMETERS
184C   01F5             1485          BALR  R15,DRIVER        SET UP IO DEVICE FOR TRANSFER
184E   0001             1486          DC    X'1'              FROM DEVICE TO MEMORY(READ)
1850   41F0 2332        1487          BAL   R15,SELCH2M       COMPOSE COMMAND WORD FOR THE SELCH
1854   48F0 2F98        1488          LH    R15,COUNTER       GET COUNTER NUMBER
1858   91F1             1489          SLLS  R15,1             MULTIPLE BY TWO
185A   2411             1490          LIS   R1,1
185C   6110 2F76        1491          AHM   R1,SELCNTA        ADD 1 TO THE NO. OF SELCH IN READ
1860   241F             1492          LIS   R1,X'F'           SET VALUE OF F
1862   401F 2F7E        1493          STH   R1,SELCTA(R15)    TO THIS SELCH TO INDICATE START OF RE
1866   90F1             1494          SRLS  R15,1             DIVIDE BY 2
1868   DE4F 2FE2        1495          OC    IODEVS,RDWTDV(R15)  START THIS DEVICE
186C   DE3F 2F72        1496          OC    SELCH,SELCHS(R15)   OUTPUT READ COMMAND FOR THIS SELCH
1870   4820 2F02        1497          LH    R2,NNSELCH        GET NUMBER OF SELCH
1874   4520 2F76        1498          CLH   R2,SELCNTA        DID ALL SELCH ENTER READ STATUS
1878   4330 18A4        1499          BE    TEST7EZ           YES, CHECK ALL SELCH FOR TERMINATION
187C   0799             1500          XHR   R9,R9             NO, FIND SELCH THAT DID READ
187E   48F0 2F7A        1501  TEST7D0 LH    R15,SELCOUNT      GET NO. OF SELCH IN END OF WRITE
1882   40F0 2F8E        1502          STH   R15,STORE         STORE IT
1886   41F0 2174        1503          BAL   R15,SSEL          SEARCH FOR SELCH INTERRUPT
188A   4300 1892        1504          B     TEST7DD           NOT FOUND  DELAY
188E   4300 183C        1505          B     TEST7DZ           FOUND SELCH  READ FROM IT
1892   C590 0008        1506  TEST7DD CLHI  R9,X'08'          GET NO. OF SELCH
1896   4330 2CC2        1507          BE    ERR40
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189A   2691              1508            AIS    R9,1
189C   41F0 28D8         1509            BAL    R15,DELAYM          NO, SET DELAY
18A0   4300 187E         1510            B      TEST7D0
18A4   0799              1511   TEST7EZ  XHR    R9,R9
18A6   4090 2F7E         1512            STH    R9,SELCTA           ZERO END OF WRITE STATUS
18AA   4090 2F80         1513            STH    R9,SELCTB
18AE   4090 2F82         1514            STH    R9,SELCTC
18B2   4090 2F84         1515            STH    R9,SELCTD
18B6   41F0 214E         1516            BAL    R15,SELTZ           TEST ALL SELCH?
18BA   4300 18E8         1517            B      TEST7EQ             TEST ONLY ONE SELCH
18BE   48F0 2F7C         1518   TEST7ED  LH     R15,SLCOUNT         GET NO. OF SELCH IN END OF READ
18C2   40F0 2F8E         1519            STH    R15,STORE           STORE IT
18C6   41F0 2174         1520            BAL    R15,SSEL            SEARCH FOR SELCH INTERRUPT
18CA   4300 18F0         1521            B      TEST7EA             NOT FOUND  DELAY
18CE   2481              1522   TEST7EY  LIS    R8,1                FOUND SELCH  INC COUNTER
18D0   6180 2F78         1523            AHM    R8,SELCNTB          NO. OF SELCH IN END OF READ
18D4   41F0 1A50         1524            BAL    R15,SELCH3          CHECK TERMINATION
18D8   4880 2F02         1525            LH     R8,NNSELCH          GET NUMBER OF SELCH
18DC   4580 2F78         1526            CLH    R8,SELCNTB          WERE ALL SELCH CHECKED?
18E0   4330 190A         1527            BE     TEST7GC             YES, EXIT
18E4   4300 18BE         1528            B      TEST7ED             NO, CHECK ANOTHER
18E8   48F0 2F7C         1529   TEST7EQ  LH     R15,SLCOUNT         GET SELCH IN END OF READ
18EC   40F0 2F9A         1530            STH    R15,COMPARE         STORE IT
18F0   C590 0008         1531   TEST7EA  CLHI   R9,X'08'            GET NO. OF SELCH
18F4   4330 2CD2         1532            BE     ERR42
18F8   2691              1533            AIS    R9,1
18FA   41F0 28E2         1534            BAL    R15,DELAYN          NO, SET DELAY
18FE   48F0 0CAC         1535            LH     R15,TESTSEL         TEST ALL SELCH?
1902   4230 18F0         1536            BNZ    TEST7EA             NO, ONLY ONE
1906   4300 18BE         1537            B      TEST7ED             YES
190A   C200 2ED4         1538   TEST7GC  LPSW   TEST7PSB            DISABLE INTERRUPTS
                         1539   *
                         1540   *
190E   07AA              1541   TEST7GA  XHR    R10,R10             ZERO COUNTER
1910   4860 2F02         1542            LH     R6,NNSELCH          GET NUMBER OF SELCH
1914   9161              1543            SLLS   R6,1                MULTIPLE BY 2
1916   05A6              1544   TEST7GB  CLHR   R10,R6              DO WE HAVE PROPER NUMBER OF SELCH
1918   4380 197A         1545            BNL    TSTCHK7
191C   481A 2F0C         1546            LH     R1,OUTBUFS(R10)     GET THIS OUTBUF ADR
1920   482A 2F04         1547            LH     R2,INBUFS(R10)      GET THIS INBUF ADR
1924   0777              1548            XHR    R7,R7               SET UP INDEX PARAMETERS
1926   2482              1549            LIS    R8,2
1928   4890 0C6C         1550            LH     R9,BYTE7
192C   2692              1551            AIS    R9,2
192E   C170 1936         1552   LOAD7A   BXLE   R7,LOAD7C
1932   4300 1974         1553            B      LOAD7D
1936   08B1              1554   LOAD7C   LHR    R11,R1              GET ACTUAL ADR OF OUTBUF
1938   41F0 1E7A         1555            BAL    R15,ADRTRANO        OUTBUF PROGRAM ADR
193C   48DC 0000         1556            LH     R13,0(R12)          GET CONTENTS OF THIS PROGRAM ADR
1940   08B2              1557            LHR    R11,R2              GET ACTUAL ADR OF INBUF
1942   41F0 1E70         1558            BAL    R15,ADRTRANI        INBUF PROGRAM ADR
1946   48EC 0000         1559            LH     R14,0(R12)          GET CONTENTS OF THIS PROGRAM ADR
194A   05DE              1560            CLHR   R13,R14             COMPARE CONTENT
```

TEST 7

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194C   2135                       BNES  ODDCK7          IF NON EQUAL CHECK FOR ODD BYTE
194E   0A18                       AHR   R1,R8           IF EQUAL CHECK NEXT INBUF & OUTBUF
1950   0A28                       AHR   R2,R8
1952   4300 192E                  B     LOAD7A
1956   0579             ODDCK7    CLHR  R7,R9           LAST BUFFER LOCATION?
1958   4230 2CE2                  BNE   ERR44           NO, ERROR
195C   08B1                       LHR   R11,R1          GET OUTBUF ADR (ACTUAL)
195E   2773                       SIS   R7,3            BUFFR INDEX -3
1960   0AB7                       AHR   R11,R7          ADD TO OUTBUF ADR
1962   41F0 1E7A                  BAL   R15,ADRTRANO    OUTBUF PROGRAM ADR
1966   D3FC 0000                  LB    R15,0(R12)      GET DATA BYTE
196A   C4D0 FF00                  NHI   R13,X'FF00'     MASK OFF LEAST SIG PART OF HW
196E   0ADF                       AHR   R13,R15         ADD PREVIOUS HW TO CURRENT HW
1970   4230 2CE2                  BNE   ERR44           NO, ERROR
1974   26A2             LOAD7D    AIS   R10,2           INCREMENT COUNTER BY 2
1976   4300 1916                  B     TEST7GB         GO BACK
197A   41F0 1FB2        TSTCHK7   BAL   R15,MVCHKA      CHECK MOVE OPTION
197E   41F0 21D0                  BAL   R15,WSELCHZ     SELECT SELCH
1982   4810 0B6C                  LH    R1,NOMSG        MESSAGE ^
1986   2133                       BNZS  TEST7EX         NO
1988   41F0 2560                  BAL   R15,OUTSELAD    YES, OUTPUT INTERRUPTS
198C   4300 2852        TEST7EX   B     TSTCHK
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                                1584  *
                                1585  *
                                1586  * SELCH EXTERNAL INTERRUPT SERVICE ROUTINE
                                1587  *
                                1588  *
1990    D000 2F14               1589  SELINT    STM   R0,SAVEZ0            SAVE REGISTERS
1994    9F2C                    1590            ACKR  R2,STAT              ACKNOWLEDGE INTERRUPT
1996    48D0 2F98               1591            LH    R13,COUNTER          GET COUNTER VALUE
199A    91D3                    1592            SLLS  R13,3                MULTIPLE BY 8
199C    48ED 0B8C               1593            LH    R14,SELCHN1(R13)     GET THIS SELCH ADR
19A0    052E                    1594            CLHR  R2,R14               ERROR IF NOT SELCH
19A2    2133                    1595            BNES  SELXX
19A4    C200 2EB4               1596            LPSW  ENABLE1
19A8    48ED 0BAC               1597  SELXX     LH    R14,IODEVN1(R13)     GET THIS I/O ADDRESS
19AC    052E                    1598            CLHR  R2,R14               IS IT THIS ADD ?
19AE    4330 19BC               1599            BE    SXX                  YES EXIT
19B2    48ED 0BEC               1600            LH    R14,DISFILN1(R13)    IS IT THE DRIVE ?
19B6    052E                    1601            CLHR  R2,R14
19B8    4230 2C5A               1602            BNE   ERR19                NO, ERROR
19BC    D100 2F14               1603  SXX       LM    R0,SAVEZ0            RESTORE REGISTERS
19C0    C200 0040               1604            LPSW  X'40'                RETURN TO PROGRAM
                                1605  *
                                1606  *
19C4    430F 000A               1607  INTRTN    B     10(R15)              RETURN TO TEST
                                1608  *
                                1609  *
                                1610  * RESET SELCH & INSURE IT IS IDLE
                                1611  *
                                1612  *
19C8    D0E0 3016               1613  SELCH1    STM   R14,SAVE2            SAVE RETURN ADDRESS
19CC    48E0 2F98               1614            LH    R14,COUNTER          GET COUNTER VALUE TO INDEX
19D0    91E3                    1615            SLLS  R14,3                MULTIPLE BY 8
19D2    483E 0B8C               1616            LH    SELCH,SELCHN1(R14)   GET NEW SELCH DEVICE ADR
19D6    0766                    1617            XHR   R6,R6
19D8    2471                    1618            LIS   R7,1
19DA    4880 2EA0               1619            LH    R8,DVAL
19DE    DE30 2E88               1620            OC    SELCH,STOP1          STOP SELCH
19E2    4240 2C72               1621            BO    ERR27                IF FALSE SYNC PRINT ERROR
19E6    9D3C                    1622  SENSE1    SSR   SELCH,STAT           IS SELCH BUSY = 0 ?
19E8    2184                    1623            BCS   TIMER                NO, GO TO TIME
19EA    D1E0 3016               1624            LM    R14,SAVE2            RESTORE RETURN ADDRESS
19EE    030F                    1625            BR    R15                  YES, RETURN
19F0    C160 19E6               1626  TIMER     BXLE  R6,SENSE1            REPEAT UNTIL BXLE REACHES LIMIT
19F4    4300 2BE8               1627            B     ERR5                 PRINT ERROR
                                1628  *
                                1629  * SETUP SELCH FOR TRANSFER
                                1630  *
19F8    D090 3016               1631  SELCH2I   STM   R9,SAVE2             SAVE REGISTERS
19FC    2491                    1632            LIS   R9,1                 SET INBUF FLAG
19FE    4300 1A08               1633            B     SELCH20+6
1A02    D090 3016               1634  SELCH20   STM   R9,SAVE2             SAVE REGISTERS
1A06    2490                    1635            LIS   R9,X'0'              SET OUTBUF FLAG
1A08    48AF 0000               1636            LH    WORK,0(R15)          LOAD LOC OF BUFFER ADRS
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1A0C    48AA 0000           1637          LH    WORK,0(WORK)        LOAD BUFFER ADRS
1A10    48D0 2F98           1638          LH    R13,COUNTER         GET COUNTER VALUE
1A14    91D1                1639          SLLS  R13,1               MULTIPLE BY 2
1A16    40AD 2E50           1640          STH   WORK,STARTADR(R13)  STORE START ADRS OF TRANSFER
1A1A    DA3D 2E50           1641          WD    SELCH,ADRS1(R13)    SEND START ADRS
1A1E    DA3D 2E51           1642          WD    SELCH,ADRS2(R13)
1A22    48E0 0C6C           1643          LH    R14,BYTE7           LOAD # OF BYTES TO BE TRANSF
1A26    0AAE                1644          AHR   WORK,R14            ADD # TO START ADRS
1A28    40AD 2E58           1645          STH   WORK,ENDADRS(R13)   STORE END ADRS OF TRANSFER
1A2C    DA3D 2E58           1646          WD    SELCH,ADRS3(R13)    SEND END ADRS
1A30    DA3D 2E59           1647          WD    SELCH,ADRS4(R13)
1A34    48D0 305C           1648          LH    R13,RDWT            GET READ/WRITE STATUS
1A38    D3CD 2E89           1649          LB    R12,GO(R13)         LOAD READ OR WRITE COMMAND
1A3C    D3D9 305E           1650          LB    R13,ACTADUP(R9)     GET MOST SIG BIRS OF ADR
1A40    C4D0 0003           1651          NHI   R13,X'3'            USE ONLY LAST 2 BITS
1A44    0ACD                1652          AHR   R12,R13             ADD THIS VALUE TO BITS6-7 OF COMMAND
1A46    9E3C                1653          OCR   SELCH,R12           START SELCH
1A48    D190 3016           1654          LM    R9,SAVE2            RESTORE REGISTERS
1A4C    430F 0002           1655          B     2(R15)              RETURN
                            1656  *
                            1657  * TEST SELCH TERMINATION
                            1658  *
1A50    D0B0 3016           1659  SELCH3  STM   R11,SAVE2           SAVE RETURN ADDRESS
1A54    48E0 2F98           1660          LH    R14,COUNTER         GET COUNTER VALUE TO INDEX
1A58    91E3                1661          SLLS  R14,3               MULTIPLE BY 8
1A5A    483E 0B8C           1662          LH    SELCH,SELCHN1(R14)  GET NEW SELCH DEVICE ADR
1A5E    DE30 2E88           1663          OC    SELCH,STOP          STOP SELCH
1A62    9D3C                1664  SELCH3Z SSR   SELCH,STAT          SENSE I/O DEV STAT THROUGH SELCH
1A64    C3C0 00C1           1665          THI   STAT,X'C1'          DID I/O DEV TERM ABNORMALLY ?
1A68    4230 2BF0           1666          BNZ   ERR6                YES, PRINT ERROR
1A6C    48FE 0BCC           1667          LH    R15,DEVICEN1(R14)   NO LOAD DEVICE OPT
1A70    C3F0 0001           1668          THI   R15,1               IS I/O DEVICE A DISC?
1A74    4230 1AA4           1669          BNZ   DISCHK              YES, CHECK ADDITIONAL STATUS
1A78    C3C0 0020           1670          THI   STAT,X'20'          NO, IS EOT BIT SET ?
1A7C    4330 1AAC           1671          BZ    RDADRS              NO, READ FINAL ADRS
1A80    48FE 0BAC           1672          LH    R15,IODEVN1(R14)    GET DEVICE ADR
1A84    DEF0 2E7F           1673          OC    R15,REWIND          REWIND TAPE
1A88    9DFE                1674  SELCH3X SSR   R15,R14             SENSE STATUS
1A8A    4210 2C12           1675          BM    ERR10               ERROR
1A8E    C3E0 0010           1676          THI   R14,X'10'           TEST FOR NO MOTION
1A92    4330 1A88           1677          BZ    SELCH3X
1A96    D3A0 2E72           1678  SELCH3Q LB    WORK,SUBTST         YES, REPEAT TEST
1A9A    91A1                1679          SLLS  WORK,1
1A9C    48AA 10B2           1680          LH    WORK,TST(WORK)
1AA0    26A4                1681          AIS   WORK,4
1AA2    030A                1682          BR    WORK
1AA4    C3C0 0030           1683  DISCHK  THI   STAT,X'30'          DID DISC TERM ABNORMALLY ?
1AA8    4230 2BF0           1684          BNZ   ERR6                YES, PRINT ERROR
1AAC    90E2                1685  RDADRS  SRLS  R14,2               DIVIDE COUNTER VALUE BY 2
1AAE    DB3E 2E60           1686          RD    SELCH,BYTE11(R14)   READEND ADRS
1AB2    DB3E 2E61           1687          RD    SELCH,BYTE21(R14)
1AB6    48AE 2E58           1688          LH    WORK,ENDADRS(R14)   LOAD EXPECTED END ADRS
1ABA    48BE 2E60           1689          LH    WORK1,BYTE(R14)     LOAD END ADRS READ
```

```
1ABE   05AB                       CLHR  WORK,WORK1          WAS ALL DATA TRANSFERED ?
1AC0   4230 2C02                  BNE   ERR8                NO, PRINT ERROR
1AC4   D1B0 3016                  LM    R11,SAVE2           RESTORE RETURN ADDRESS
1AC8   030F                       BR    R15                 YES, RETURN
                          *
                          *
                          *
1ACA   D0E0 3016          SELCH5  STM   R14,SAVE2           SAVE REGISTERS
1ACE   95FF                       EPSR  R15,R15             GET PSW 0-15
1AD0   40F0 2F70                  STH   R15,SPSW            STORE IT
1AD4   C4F0 FF0F                  NHI   R15,X'FF0F'         ZERO BITS 8-11
1AD8   95EF                       EPSR  R14,R15             USE THIS PSW
1ADA   2471                       LIS   R7,1
1ADC   4880 2EA0                  LH    R8,DVAL
1AE0   4890 0CA4                  LH    R9,MULTADR          LOAD ADRS SPECIFIED BY STRBUF OPT
1AE4   9D3C               SENSE7  SSR   SELCH,STAT          SENSE SELCH STATUS
1AE6   2187                       BCS   TIMER1              IS BUSY = 0 ?
1AE8   48F0 2F70                  LH    R15,SPSW            GET PSW 0-15 BITS
1AEC   95EF                       EPSR  R14,R15             USE THIS PSW
1AEE   D1E0 3016                  LM    R14,SAVE2           RESTORE REGISTERS
1AF2   030F                       BR    R15                 YES, RETURN
1AF4   C3C0 00F7          TIMER1  THI   STAT,X'F7'          NO, ARE ANY OTHER BITS SET ?
1AF8   4230 2C62                  BNZ   ERR25               YES, PRINT ERROR
1AFC   4800 0B7C                  LH    R0,BKGRND           NO, IS BKGRND OPT = 0 ?
1B00   4330 1B2E                  BZ    STRMLT              YES, STORE MULTIPLE
1B04   9001                       SRLS  R0,1                NO, IS BKGRND OPT = 1 ?
1B06   233A                       BZS   FLTPT               YES, FLOATING POINT
1B08   4069 0000          STORE8  STH   R6,0(R9)            NO, STORE A HALFWORD IN MEMORY
1B0C   4809 0000                  LH    R0,0(R9)            LOAD A HALFWORD FROM MEMORY
1B10   0560                       CLHR  R6,R0               IS DATA READ = DATA STORED ?
1B12   4330 1B32                  BE    BXLO                YES, CONTINUE
1B16   4300 2C9A                  B     ERR35               NO, PRINT ERROR
1B1A   6800 2EA2          FLTPT   LE    R0,FLTPVAL          SET UP FLOATING POINT REGS
1B1E   2820                       LER   R2,R0
1B20   2840                       LER   R4,R0
1B22   2A02                       AER   R0,R2               ADD
1B24   2B02                       SER   R0,R2               SUBTRACT
1B26   2904                       CER   R0,R4               COMPARE
1B28   2335                       BES   BXLO
1B2A   4300 2CA2                  B     ERR36
1B2E   D009 0000          STRMLT  STM   R0,0(R9)            STORE ALL REGISTERS
1B32   C160 1AE4          BXLO    BXLE  R6,SENSE7           REPEAT UNTIL R6 > R8
1B36   4300 2C0A                  B     ERR9
                          *
                          *
                          *
                          *
                          *
                          * SELCH TESTER DRIVER
                          *
                          * FUNCTION CODE: 0 =WRITE OPERATION
                          *                1 = READ OPERATION
                          *
```

```
                  *
1B3A   D0E0 3036  TESTDR   STM   R14,SAVE8           SAVE RETURN ADDRESS
1B3E   48EF 0000           LH    R14,0(R15)          LOAD FUNCTION CODE
1B42   40E0 305C           STH   R14,RDWT
1B46   4230 1BA4           BNZ   CMD1                IF 1 READ
1B4A   48E0 2F98           LH    R14,COUNTER         GET COUNTER VALUE
1B4E   91E1                SLLS  R14,1
1B50   C5F0 170A           CLHI  R15,TEST7           WAS SUBROUTINE CALLED FROM TEST7?
1B54   4280 1B6E           BL    OUTADR              NO
1B58   48B0 0CAC           LH    R11,TESTSEL         TEST THIS SELCH
1B5C   2335                BZS   TDX                 TEST ALL
1B5E   48B0 2F0C           LH    R11,OUTBUFS         GET OUTBUF IF ONLY ONE SELCH
1B62   4300 1B72           B     OUTADR+4
1B66   48BE 2F0C  TDX      LH    R11,OUTBUFS(R14)    YES, THEN USE BUFFER SAVE ADR
1B6A   4300 1B72           B     OUTADR+4            CONTINUE
1B6E   48B0 2EA4  OUTADR   LH    R11,OUTBUF          GET OUTBUFADR
1B72   41F0 1E7A           BAL   R15,ADRTRANO        OUTBUF PROGRAM ADR
1B76   0777                XHR   R7,R7               SET UP BXLE PARAMETERS
1B78   2482                LIS   R8,2
1B7A   4890 0C6C           LH    R9,BYTE7
1B7E   07AA                XHR   R10,R10             ZERO FIRST PATTERN OF SELCH TESTER
1B80   2692                AIS   R9,2
1B32   C170 1B8A  BXLEB    BXLE  R7,BXLEC            LOOP N BYTES
1B86   4300 1BA4           B     CMD1
1B8A   40AC 0000  BXLEC    STH   R10,0(R12)          STORE IT HERE
1B8E   CAA0 0101           AHI   R10,X'101'          INC BY X'101'
1B92   2382                BNCS  BXLEA
1B94   07AA                XHR   R10,R10             OR ZERO
1B96   0AC8       BXLEA    AHR   R12,R8              INC MEMMORY BY HW
1B98   228B                BNCS  BXLEB               CROSSED 32KB BOUNDRY?
1B9A   41F0 1E58           BAL   R15,ADRTRANA        YES, CALCULATE NEW PSW 8-11
1B9E   0800                LHR   R0,R0
1BA0   4300 1B82           B     BXLEB
1BA4   DE40 2E86  CMD1     OC    IODEVS,CLEAR        CLEAR = X'02'
1BA8   4240 2C7A           BO    ERR30               IF FALSE SYNC PRINT ERROR
1BAC   D840 2E4C           WH    IODEVS,ZERO         START COUNTER WITH ZERO
1BB0   D1E0 3036           LM    R14,SAVE8           RESTORE REGISTERS
1BB4   48E0 305C           LH    R14,RDWT            GET READ WRITE STATUS
1BB8   C5F0 170A           CLHI  R15,TEST7           IS THIS FROM TEST7?
1BBC   2384                BNLS  CMD1X               YES, STORE COMMAND WORD
1BBE   DE40 2E87           OC    R4,INC              START DEVICE
1BC2   2307                BS    CMD1Z               RETURN
1BC4   48F0 2F98  CMD1X    LH    R15,COUNTER         GET COUNTER VALUE
1BC8   D390 2E87           LB    R9,INC              GET COMMAND WORD
1BCC   D29F 2FE2           STB   R9,RDWTDV(R15)      STORE IT
1BD0   D1E0 3036  CMD1Z    LM    R14,SAVE8           RESTORE REGISTERS
1BD4   430F 0002           B     2(R15)              RETURN
                  *
                  *
                  * MAG TAPE DRIVER
                  *
                  * FUNCTION CODE: 0 =WEOF & WRT OPERATION
                  *                1 =SKIP & READ OPERATION
```

```
                          1796  *                2 =READ ONLY OPERATION
                          1797  *
                          1798  *
1BD8   D0D0 3036          1799  TAPEDR   STM   R13,SAVE8          SAVE REGISTERS
1BDC   48EF 0000          1800           LH    R14,0(R15)         GET FUNCTION CODE
1BE0   40E0 305C          1801           STH   R14,RDWT           SAVE IT
1BE4   9D4C               1802  SENSE2   SSR   IODEVS,STAT        SENSE MAG TAPE STATUS
1BE6   4210 2C12          1803           BM    ERR10              IF DU ERROR
1BEA   C3C0 0020          1804           THI   STAT,X'20'         IS EOT SET ?
1BEE   4330 1C20          1805           BZ    DECODE             NO, DECODE FUNCTION
1BF2   DE40 2E85          1806           OC    IODEVS,CLEAR1      YES, CLEAR MAG TAPE
1BF6   4240 2C7A          1807           BO    ERR30              IF FALSE SYNC ERROR
1BFA   41A0 1C9E          1808           BAL   WORK,NMTNCK        WAIT FOR NOMOTION = 1
1BFE   9D4C               1809           SSR   IODEVS,STAT        SENSE STATUS AGAIN
1C00   C3C0 0020          1810           THI   STAT,X'20'         IS EOT SET ?
1C04   4230 1C20          1811           BNZ   DECODE             THIS IS BEGINING OF TAPE
1C08   DE40 2E7F          1812           OC    IODEVS,REWIND      REWIND TAPE
1C0C   4240 2C7A          1813           BO    ERR30              IF FALSE SYNC ERROR
1C10   9D4C               1814  WAITREW  SSR   IODEVS,STAT        SENSE STATUS
1C12   4210 2C12          1815           BM    ERR10              ERROR IF DEVICE UNAVILABLE
1C16   C3C0 0010          1816           THI   STAT,X'10'         TEST NO MOTION
1C1A   4230 1A96          1817           BNZ   SELCH3Q            RESTART TEST
1C1E   2207               1818           BS    WAITREW            WAIT  FOR END OF REWIND
1C20   DE40 2E85          1819  DECODE   OC    IODEVS,CLEAR1      CLEAR MAG TAPE
1C24   4240 2C7A          1820           BO    ERR30              IF FALSE SYNC ERROR
1C28   41A0 1C9E          1821           BAL   WORK,NMTNCK        WAIT FOR NOMOTION
1C2C   08EE               1822  DECOD1   LHR   R14,R14            CHECK FUNCTION CODE
1C2E   4330 1C70          1823           BZ    WEOF               WR ITE END OF FILE IF ZERO
1C32   90E1               1824           SRLS  R14,1
1C34   213C               1825           BNZS  RDCMD1             NO, READ ONLY
1C36   24E1               1826           LIS   R14,1
1C38   DE40 2E81          1827           OC    IODEVS,SKPFILR     YES, POSITION TAPE TO READ A RECORD
1C3C   4240 2C7A          1828           BO    ERR30              IF FALSE SYNC PRINT ERROR
1C40   41A0 1C9E          1829           BAL   WORK,NMTNCK        WAIT FOR NOMOTION = 1
1C44   DE40 2E80          1830           OC    IODEVS,SKPFILF     SKIP OVER FILE MARK
1C48   41A0 1C9E          1831           BAL   WORK,NMTNCK        WAIT FOR NOMOTION =  1
1C4C   D1D0 3036          1832  RDCMD1   LM    R13,SAVE8          RESTORE REGISTERS
1C50   C5F0 170A          1833           CLHI  R15,TEST7          IS THIS FROM TEST7 ?
1C54   2384               1834           BNLS  RDCMDX             YES, STORE COMMAND WORD
1C56   DE40 2E82          1835           OC    IODEVS,READ1       START READ
1C5A   2307               1836           BS    RDCMDZ             RETURN
1C5C   48F0 2F98          1837  RDCMDX   LH    R15,COUNTER        GET COUNTER VALUE
1C60   D390 2E82          1838           LB    R9,READ1           GET COMMAND WORD
1C64   D29F 2FE2          1839           STB   R9,RDWTDV(R15)     STORE IT
1C68   D1D0 3036          1840  RDCMDZ   LM    R13,SAVE8          RESTORE REGISTERS
1C6C   430F 0002          1841           B     2(R15)             RETURN
1C70   DE40 2E84          1842  WEOF     OC    IODEVS,WRTEOF      WRITE END OF FILE
1C74   4240 2C7A          1843           BO    ERR30              IF FALSE SYNC PRINT ERROR
1C78   41A0 1C9E          1844           BAL   WORK,NMTNCK        WAIT FOR NOMOTION = 1
1C7C   D1D0 3036          1845  WRT      LM    R13,SAVE8          RESTORE REGISTERS
1C80   C5F0 170A          1846           CLHI  R15,TEST7          IS THIS FROM TEST7 ?
1C84   2385               1847           BNLS  WRTX               YES, STORE COMMAND WORD
1C86   DE40 2E83          1848           OC    IODEVS,WRITE1      START WRITE COMMAND
```

```
1C8A   4300 1C68                      B      RDCMDZ              RETURN
1C8E   48F0 2F98           WRTX       LH     R15,COUNTER         GET COUNTER VALUE
1C92   D390 2E83                      LB     R9,WRITE1           GET COMMAND WORD
1C96   D29F 2FE2                      STB    R9,RDWTDV(R15)      STORE IT
1C9A   4300 1C68                      B      RDCMDZ              RETURN
                           *
                           *
                           *
                           *
1C9E   C890 FFF0           NMTNCK     LHI    R9,X'FFF0'          LOAD DELAY VALUE
1CA2   0777                NMTCK1     XHR    R7,R7
1CA4   2481                           LIS    R8,1
1CA6   9D4C                SENSE8     SSR    IODEVS,STAT         IS MAG TAPE DU ?
1CA8   4210 2C12                      BM     ERR10               YES, PRINT ERROR
1CAC   C3C0 0010                      THI    STAT,X'10'          NO, IS NOMOTION SET ?
1CB0   023A                           BNZR   WORK                YES, RETURN TO DRIVER
1CB2   C170 1CA6                      BXLE   R7,SENSE8           REPEAT UNTIL TIME OUT
1CB6   43C0 2C6A                      B      ERR26               PRINT ERROR
                           *
                           *
                           * DISC DRIVER
                           * FUNCTION CODE: 0 = WRITE OPERATION
                           *                1 = READ OPERATION
                           *
                           *
                           *
1CBA   D0F0 3036           DISCDR     STM    R14,SAVE8           SAVE RETURN ADDRESS
1CBE   48EF 0000                      LH     R14,0(R15)          LOAD FUNCTION CODE
1CC2   40E0 305C                      STH    R14,RDWT            STORE IT
1CC6   4860 2FA4                      LH     R6,DISFIL           LOAD DISC FILE ADRS
1CCA   4890 2FA0                      LH     R9,CYCNUM           LOAD CYLINDER NUMBER
1CCE   9489                           EXBR   R8,R9
1CD0   4870 2FA2                      LH     R7,SECTOR
1CD4   C470 001F                      NHI    R7,X'1F'            ONLY 5 BITS
1CD8   48E0 2EFC                      LH     R14,HEAD            GET HEAD VALUE
1CDC   C4E0 0001                      NHI    R14,X'1'            ONLY 1 BIT
1CE0   91E5                           SLLS   R14,5               BIT 2
1CE2   067E                           OHR    R7,R14              COMBINE SECT & HEAD
1CE4   9477                           EXBR   R7,R7
1CE6   9071                           SRLS   R7,1
1CE8   2383                           BNCS   SHIFT7
1CEA   C670 1000                      OHI    R7,X'1000'
1CEE   9077                SHIFT7     SRLS   R7,7
1CF0   DE40 2E88           RESET      OC     R4,RESETC           RESET EVERYTHING
1CF4   4240 2C7A                      BO     ERR30               IF FALSE SYNC PRINT ERROR
1CF8   9D4C                DSD5       SSR    R4,R12              CHECK DISC CONTROLLER STATUS
1CFA   C3C0 0002                      THI    R12,X'02'           IS CONTROLLER IDLE SET ?
1CFE   2233                           BZS    DSD5                NO, WAIT FOR CONTROLLER IDLE
1D00   9D6C                WFILE      SSR    R6,R12              SENSE DISC FILE STATUS
1D02   2348                           BFFS   4,8                 IF EX SET CHECK FUNCTION CODE
1D04   C3C0 0010                      THI    R12,X'10'           IS ADRS INTERLOCK SET ?
1D08   2034                           BNZS   WFILE               YES, WAIT FOR ADRS INTERLOCK = 0
1D0A   C3C0 0040                      THI    R12,X'40'           NO, IS WRITE CHECK SET ?
```

```
1D0E    4230 2C1A          1902             BNZ   ERR11              YES, PRINT ERROR
1D12    08EE               1903             LHR   R14,R14            NO, IS THIS A WRITE OPERATION?
1D14    2136               1904             BNZS  WFILE2             NO, CHECK FILE STATUS
1D16    C3C0 0080          1905             THI   R12,X'80'          YES, IS WRITE PROTECT SET ?
1D1A    2333               1906             BZS   WFILE2             NO, EXECUTE WRITE OPERATION
1D1C    4300 2C32          1907             B     ERR14              YES, PRINT ERROR
1D20    9D6C               1908  WFILE2     SSR   R6,R12             SENSE DISC FILE STATUS
1D22    4210 2C22          1909             BM    ERR12              ABORT IF DISC NOT READY
1D26    2389               1910             BNCS  SEEK               SEEK IF RSRW = 0
1D28    4320 1D00          1911             BNP   WFILE              BRANCH IF SEEK INC = 0
1D2C    9A68               1912             WDR   R6,R8              WRITE CYLINDER NUMBER TO FILE
1D2E    9A69               1913             WDR   R6,R9
1D30    DE60 2E49          1914             OC    R6,RESTOC          RESTORE DISC FILE TO ZERO
1D34    41E0 1D72          1915             BAL   R14,WSEEKC         WAIT FOR SEEK COMPLETE
1D38    9A68               1916  SEEK       WDR   R6,R8              WRITE CYLINDER NUMBER TO FILE
1D3A    9A69               1917             WDR   R6,R9
1D3C    DE60 2E48          1918             OC    R6,SEEKC           SEEKC = X'C2'
1D40    41E0 1D72          1919             BAL   R14,WSEEKC         WAIT FOR SEEK COMPLETE
1D44    9A68               1920  REREAD     WDR   R6,R8              WRITE CYLINDER NUMBER
1D46    9A69               1921             WDR   R6,R9
1D48    9A47               1922             WDR   R4,R7              WRITE HEAD & SECTOR TO CONTROLLER
1D4A    D1E0 3036          1923             LM    R14,SAVE8          RESTORE REGISTERS
1D4E    48E0 305C          1924             LH    R14,RDWT           GET READ WRITE STATUS
1D52    C5F0 170A          1925             CLHI  R15,TEST7          IS THIS FROM TEST7 ?
1D56    2384               1926             BNLS  DISX               YES, STORE COMMAND
1D58    DE4E 2E48          1927             OC    R4,DRWC(R14)       START DEVICE
1D5C    2307               1928             BS    DISZ               RETURN
1D5E    48F0 2F98          1929  DISX       LH    R15,COUNTER        GET COUNTER VALUE
1D62    D39E 2E48          1930             LB    R9,DRWC(R14)       GET COMMAND VALUE
1D66    D29F 2FE2          1931             STB   R9,RDWTDV(R15)     STORE IT
1D6A    D1E0 3036          1932  DISZ       LM    R14,SAVE8          RESTORE REGISTERS
1D6E    430F 0002          1933             B     2(R15)             RETURN
                           1934  *
                           1935  * WAIT FOR SEEK COMPLETE
                           1936  *
1D72    9D4C               1937  WSEEKC     SSR   R4,R12             WAIT FOR CONTROLLER IDLE
1D74    2221               1938             BNPS  WSEEKC
1D76    9D6C               1939  WSEEK1     SSR   R6,R12             CHECK DISC FILE STATUS
1D78    4270 2C2A          1940             BTC   7,ERR13
1D7C    2083               1941             BCS   WSEEK1             EXCEPT FOR NRSRW
1D7E    030E               1942             BR    R14                RETURN TO DISC DRIVER
                           1943  *
                           1944  *
                           1945  * MASS STORAGE DISC
                           1946  * FUNCTION CODE: 0 = WRITE        1 = READ
                           1947  *
                           1948  *
1D80    D0D0 3036          1949  MSDIS      STM   R13,SAVE8          SAVE REGISTERS
1D84    48EF 0000          1950             LH    R14,0(R15)         GET READ/WRITE STATUS
1D88    40E0 305C          1951             STH   R14,RDWT           STORE IT
1D8C    4860 2FA4          1952             LH    R6,DISFIL          GET DRIVE ADR = R6
1D90    4870 2FA2          1953             LH    R7,SECTOR          GET SECTOR NUMBER
1D94    C470 003F          1954             NHI   R7,X'3F'           ONLT 6 BITS
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SUBROUTINES

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1D98    4890 2FA0           1955            LH     R9,CYCNUM            GET CYLINDER NUMBER
1D9C    C490 03FF           1956            NHI    R9,X'3FF'            ONLY 10 BITS
1DA0    08EE                1957            LHR    R14,R14              GET WRITE/READ STATUS
1DA2    4230 1DAE           1958            BNZ    MS1                  DO NOT RESET FOR READ
1DA6    DE40 2E88           1959            OC     R4,RESETC            CLEAR CONTROLLER
1DAA    4240 2C7A           1960            BO     ERR30                ERROR IF FALSE SYNC
1DAE    9D4C                1961  MS1       SSR    R4,R12               SENSE CONTROL STATUS
1DB0    2221                1962            BFBS   2,1                  WAIT CONTROL IDLE
1DB2    DE60 2E88           1963            OC     R6,RESETC            CLEAR DRIVE
                            1964  *
1DB6    41F0 1E20           1965            BAL    R15,FRSSR            READY FILE
1DBA    9869                1966            WHR    R6,R9                WRITE CYL NO TO DRIVE
1DBC    DE60 2E90           1967            OC     R6,CYLCMD            SET CYL NO
1DC0    9D4C                1968            SSR    R4,R12               SENSE CONTROLLER STATUS
1DC2    2221                1969            BFBS   2,1
1DC4    C3C0 0080           1970            THI    R12,X'80'
1DC8    4230 2C32           1971            BNZ    ERR14                UNRECOVERABLE ERROR
1DCC    DE60 2E92           1972            OC     R6,SEEKMC            SEEK COMMAND TO DRIVE
1DD0    41F0 1E20           1973            BAL    R15,FRSSR            READY FILE
1DD4    08CC                1974            LHR    R12,R12              SENSE STATUS
1DD6    4230 2CEA           1975            BNZ    ERR45                ERROR
1DDA    DE60 2E87           1976            OC     R6,INC               RESET 40 MEGA X'04'
1DDE    9D4C                1977            SSR    R4,R12               SENSE CONTROL
1DE0    2221                1978            BFBS   2,1                  WAIT FOR IDLE CONTROL
1DE2    41F0 1E4A           1979            BAL    R15,WDFT             WRITE HEAD TO DRIVE
1DE6    48F0 2EFC           1980            LH     R15,HEAD             GET HEAD NUMBER
1DEA    91FA                1981            SLLS   R15,10               SHIFT 10 PLACES
1DEC    06F9                1982            OHR    R15,R9
1DEE    9A47                1983            WDR    R4,R7                WRITE 1 HW TO CONTR
1DF0    984F                1984            WHR    R4,R15               WRITE 2 & 3 HW TO CONTR
1DF2    41F0 1E4A           1985            BAL    R15,WDFT             WRITE HEAD TO DRIVE
1DF6    D1D0 3036           1986            LM     R13,SAVE8            RESTORE REGISTERS
1DFA    48E0 305C           1987            LH     R14,RDWT             GET READ/WRITE STATUS
1DFE    C5F0 170A           1988            CLHI   R15,TEST7            IS THIS FROM TEST7 ?
1E02    4380 1E0C           1989            BNL    MSDISX               YES, SAVE COMMAND WORD
1E06    DE4E 2E8E           1990            OC     R4,MSDRW(R14)        NO, OUTPUT COMMAND
1E0A    2307                1991            BS     MSDISZ               RETURN
1E0C    48F0 2F98           1992  MSDISX    LH     R15,COUNTER          GET COUNTER VALUE
1E10    D39E 2E8E           1993            LB     R9,MSDRW(R14)        GET COMMAND WORD
1E14    D29F 2FE2           1994            STB    R9,RDWTDV(R15)       STORE IT
1E18    D1D0 3036           1995  MSDISZ    LM     R13,SAVE8            RESTORE REGISTERS
1E1C    430F 0002           1996            B      2(R15)               RETURN
                            1997  *
                            1998  * READY FILE TO SEEK,READ OR WRITE
                            1999  *
1E20    C8D0 7FFF           2000  FRSSR     LHI    R13,X'7FFF'          TIMER VALUE
1E24    9D4C                2001  FRSSR0    SSR    R4,R12               SENSE CONTROL STATUS
1E26    4320 1E24           2002            BFC    2,FRSSR0             WAIT FOR CONTROL IDLE
1E2A    2408                2003  FRSRRX    LIS    R0,X'08'             OUTPUT COMMAND FOR 40 MEGA
1E2C    9E60                2004            OCR    R6,R0                RESET GATE ATTENTION
1E2E    9D4C                2005  FRSSRZ    SSR    R4,R12               SENSE CONTROL STATUS AGAIN
1E30    4320 1E2E           2006            BFC    2,FRSSRZ             WAIT FOR IDLE
1E34    9D6C                2007            SSR    R6,R12               SENSE DRIVE STATUS
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SUBROUTINES

```
1E36    03FF                  2008            BFCR  15,R15                EXIT ON COMPLETE COND
1E38    C3C0 0003             2009            THI   R12,X'03'
1E3C    4230 2CF2             2010            BNZ   ERR46                 UNRECOVERABLE ERROR
1E40    27D1                  2011            SIS   R13,1                 DECREMENT
1E42    4330 2CDA             2012            BZ    ERR43                 TIME OUT ERROR
1E46    4300 1E2E             2013            B     FRSSRZ
                              2014  *
                              2015  * WRITE HEAD NUMBER TO DRIVE
                              2016  *
1E4A    D860 2EFC             2017  WDFT      WH    R6,HEAD               WRITE HEAD NUMBER TO DRIVE
1E4E    DE60 2E91             2018            OC    R6,HEDCMD             OUTPUT COMMAND
1E52    9D4C                  2019            SSR   R4,R12                SENSE CONTROLLER
1E54    2221                  2020            BFBS  2,1
1E56    030F                  2021            BR    R15
                              2022  *
                              2023  *
                              2024  *
                              2025  *
                              2026  *
                              2027  *         SUBROUTINE      TRANSLATE ACTUAL ADR TO PROGRAM ADR & PSW8-11
                              2028  *
                              2029  *         ON ENTRY "ACTADUP" CONTAINS THE TWO MOST SIG BIT OF THE ACTUAL
                              2030  *         ADDRESS, R11 CONTAINS LEAST SIG BITS
                              2031  *
                              2032  *         ON EXIT  R12 CONTAINS THE PROGRAM ADDRESS AND THE PSW BITS8-11
                              2033  *         ARE MODIFIED
                              2034  *
                              2035  *
1E58    D0D0 3024             2036  ADRTRANA STM   R13,SAVE3             SAVE REGISTER
1E5C    2460                  2037            LIS   R6,X'0'               OUTBUF ADR TRAN
1E5E    0AB7                  2038            AHR   R11,R7                ADD INDEX VALUE TO INITIAL ACTUAL AD
1E60    4300 1E80             2039            B     ADRTRANX
1E64    D0D0 3024             2040  ADRTRANB STM   R13,SAVE3             SAVE REGISTERS
1E68    2461                  2041            LIS   R6,1                  INBUF ADR TRAN
1E6A    0AB7                  2042            AHR   R11,R7                ADD INDEX VALUE TO INITIAL ACT ADR
1E6C    4300 1E80             2043            B     ADRTRANX
1E70    D0D0 3024             2044  ADRTRANI STM   R13,SAVE3             SAVE REGISTERS
1E74    2461                  2045            LIS   R6,1                  INBUF ADR TRAN
1E76    4300 1E80             2046            B     ADRTRANX
1E7A    D0D0 3024             2047  ADRTRANO STM   R13,SAVE3             SAVE REGISTERS
1E7E    2460                  2048            LIS   R6,X'0'               OUTBUF ADR TRAN
1E80    08CB                  2049  ADRTRANX LHR   R12,R11               PUT ACTUAL ADR IN R12
1E82    95DD                  2050            EPSR  R13,R13               GET CURRENT PSW
1E84    C4D0 FF0F             2051            NHI   R13,X'FF0F'           ZERO BITS 8-11
1E88    D3F6 305E             2052            LB    R14,ACTADUP(R6)       GET MS BITS OF ACTUAL ADR
1E8C    C4E0 0003             2053            NHI   R14,3                 USE ONLY FIRST TWO BITS
1E90    4330 1EA8             2054            BZ    ADRTRANQ
1E94    D3FE 1EB0             2055            LB    R15,XADRTRAN(R14)     FIND POTENTIAL VALUE OF PSW 8-11
1E98    CAC0 8000             2056            AHI   R12,X'8000'           ADD 8000 TO ACTUAL ADR
1E9C    4EF0 2E4C             2057            ACH   R15,ZERO              INC PSW8-11 IF CARRY GENERATED
1EA0    C6C0 8000             2058            OHI   R12,X'8000'           CONVERT TO PROGRAM ADR
1EA4    91F4                  2059            SLLS  R15,4                 PLACE IN BITS 8-11
1EA6    06DF                  2060            OHR   R13,R15               ADD TO CURRENT PSW HALFWORD
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SUBROUTINES

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1EA8   95FD              2061 ADRTRANQ EPSR  R15,R13             NEW PSW
1EAA   D1D0 3024         2062          LM    R13,SAVE3           RESTORE REGISTER
1EAE   030F              2063          BR    R15                 EXIT
                         2064 *
                         2065 *
1EB0   0001 0305         2066 XADRTRAN DB    0,1,3,5
                         2067 *        SUBROUTINE      STORES DATA IN A BUFFER VIA INDEXING
                         2068 *
                         2069 *        ON ENTRY: R7    INDEX VALUE
                         2070 *                  R8    INCREMENT VALUE
                         2071 *                  R9    FINAL VALUE
                         2072 *                  R10   DATA TO BE STORED
                         2073 *                  R11   INITIAL ACTUAL ADR LEAST SIG BITS
                         2074 *                  R12   PROGRAM ADR (CURRENT)
                         2075 *
                         2076 *
1EB4   40F0 302A         2077 INDEXBFI STH   R15,SAVE4           SAVE REGISTER
1EB8   41F0 1E70         2078          BAL   R15,ADRTRANI        INBUF PROGRAM ADR
1EBC   2692              2079          AIS   R9,2
1EBE   C170 1EC8         2080 INDEXBF3 BXLE  R7,INDEXBF4         LOOP N BYTES
1EC2   48F0 302A         2081          LH    R15,SAVE4           RESTOREREGISTER
1EC6   030F              2082          BR    R15                 RETURN
1EC8   40AC 0000         2083 INDEXBF4 STH   R10,0(R12)          STORE DATA IN CURRENT PROG ADR
1ECC   0AC8              2084          AHR   R12,R8              INCREMENT PROG ADR
1ECE   4380 1EBE         2085          BNC   INDEXBF3            CARRY GENERATED?
1ED2   41F0 1E64         2086          BAL   R15,ADRTRANB        YES, ADD INDEX VALUE TO INITIAL ADR
1ED6   0700              2087          XHR   R0,R0               AND CONVERT TO PROG ADR
1ED8   4300 1EBE         2088          B     INDEXBF3
                         2089 *
1EDC   40F0 302A         2090 INDEXBFO STH   R15,SAVE4           SAVE REGISTER
1EE0   41F0 1E7A         2091          BAL   R15,ADRTRANO        OUTBUF PROGRAM ADR
1EE4   2692              2092          AIS   R9,2
1EE6   C170 1EF0         2093 INDEXBF1 BXLE  R7,INDEXBF2         LOOP FOR N BYTES
1EEA   48F0 302A         2094          LH    R15,SAVE4           RESTORE REGISTERS
1EEE   030F              2095          BR    R15                 EXIT
1EF0   40AC 0000         2096 INDEXBF2 STH   R10,0(R12)          STORE DATA IN CURRENT PROG ADR
1EF4   0AC8              2097          AHR   R12,R8              INCREMENT PROG ADR
1EF6   4380 1EE6         2098          BNC   INDEXBF1            CARRY GENERATED ?
1EFA   41F0 1E58         2099          BAL   R15,ADRTRANA        YES, ADD INDEX VALUE TO INITIAL ADR
1EFE   0700              2100          XHR   R0,R0               ADR AND CONVERT TO PROG ADR
1F00   4300 1EE6         2101          B     INDEXBF1
                         2102 *
1F04   D0E0 3036         2103 BUFCHK   STM   R14,SAVE8           SAVE RETURN ADDRESS
1F08   48E0 2F98         2104          LH    R14,COUNTER         GET COUNTER VALUE FOR INDEX
1F0C   91E1              2105          SLLS  R14,1               MULTIPE BY 2
1F0E   0777              2106          XHR   R7,R7
1F10   2482              2107          LIS   R8,2
1F12   4890 0C6C         2108          LH    R9,BYTE7
1F16   C5F0 170A         2109          CLHI  R15,TEST7           IS THIS THE BUFFER TEST OF TEST7
1F1A   4380 1F26         2110          BNL   BUFCKD              YES, USE OUTBUFS
1F1E   48B0 2EA4         2111          LH    WORK1,OUTBUF        NO, USE OUTBUF
1F22   4300 1F36         2112          B     BUFCKE
1F26   48B0 0CAC         2113 BUFCKD   LH    R11,TESTSEL         TEST THIS SELCH
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1F2A    2334             2114          BZS    BUFCKF              TEST ALL SELCH
1F2C    48B0 2F0C        2115          LH     WORK1,OUTBUFS       OUTBUF SAVE IF ONLY ONE
1F30    2303             2116          BS     BUFCKE
1F32    48BE 2F0C        2117  BUFCKF  LH     WORK1,OUTBUFS(R14)
1F36    48D0 0C74        2118  BUFCKE  LH     R13,IMAGE
1F3A    91E2             2119          SLLS   R14,2               MULTIPE IT BY 4
1F3C    480E 0BCC        2120          LH     R0,DEVICEN1(R14)    GET DEVICE VALUE
1F40    4330 1F76        2121          BZ     TSTPAT
1F44    41F0 1E7A        2122          BAL    R15,ADRTRANO        OUTBUF PROGRAM ADR
1F48    D1E0 3036        2123          LM     R14,SAVE8           GET VALUE AGAIN
1F4C    2692             2124          AIS    R9,2
1F4E    C170 1F58        2125  BUFCKA  BXLE   R7,BUFCKB           LOOP N BYTES
1F52    D1E0 3036        2126          LM     R14,SAVE8           RESTORE REGISTERS
1F56    030F             2127          BR     R15                 EXIT
1F58    48EC 0000        2128  BUFCKB  LH     R14,0(R12)          GET VALUE FROM THIS LOCATION
1F5C    05DE             2129          CLHR   R13,R14             COMPARE TO IMAGE
1F5E    4230 2CAA        2130          BNE    ERR37               NO,ERROR
1F62    0AC8             2131          AHR    R12,R8              INC LOCATION BY 2
1F64    4380 1F4E        2132          BNC    BUFCKA              32KB BOUNDARY CROSSED?
1F68    41F0 1E58        2133          BAL    R15,ADRTRANA        YES,CALCULATE NEW PROGRAM ADR
1F6C    D1E0 3036        2134          LM     R14,SAVE8           GET VALUE AGAIN
1F70    0800             2135          LHR    R0,R0               ZERO CARRY
1F72    4300 1F4E        2136          B      BUFCKA
1F76    07DD             2137  TSTPAT  XHR    R13,R13
1F78    41F0 1E7A        2138          BAL    R15,ADRTRANO        OUTBUF ADR TRAN
1F7C    D1E0 3036        2139          LM     R14,SAVE8           GET VALUE AGAIN
1F80    2692             2140          AIS    R9,2
1F82    C170 1F8C        2141  BUFCKC  BXLE   R7,BUFCK5           LOOP N BYTES
1F86    D1E0 3036        2142          LM     R14,SAVE8           RESTORE REGISTERS
1F8A    030F             2143          BR     R15                 EXIT
1F8C    48EC 0000        2144  BUFCK5  LH     R14,0(R12)
1F90    05DE             2145          CLHR   R13,R14
1F92    4230 2CAA        2146          BNE    ERR37               NO,ERROR
1F96    CAD0 0101        2147          AHI    R13,X'101'          CONTINUE SELCH TESTER PATTERN
1F9A    2382             2148          BNCS   BXLE1               INC BY X'101'
1F9C    07DD             2149          XHR    R13,R13             ZERO
1F9E    0AC8             2150  BXLE1   AHR    R12,R8              INC LOCATION BY 2
1FA0    4380 1F82        2151          BNC    BUFCKC              32KB BOUNDRY CROSSED?
1FA4    41F0 1E58        2152          BAL    R15,ADRTRANA        YES, CALCULATE NEW PROGRAM ADR
1FA8    D1E0 3036        2153          LM     R14,SAVE8           GET VALUE AGAIN
1FAC    0800             2154          LHR    R0,R0
1FAE    4300 1F82        2155          B      BUFCKC
                         2156  *
                         2157  *
                         2158  *
1FB2    D0D0 3016        2159  MVCHKA  STM    R13,SAVE2           SAVE REGISTERS
1FB6    2411             2160          LIS    R1,1                SET SELCH FLAG
1FB8    4810 2F0C        2161          LH     R1,OUTBUFS          SET OUTBUF VALUE
1FBC    4010 2EA4        2162          STH    R1,OUTBUF
1FC0    4810 2F04        2163          LH     R1,INBUFS           SET INBUF VALUE
1FC4    4010 2EA6        2164          STH    R1,INBUF
1FC8    48D0 0C6C        2165          LH     R13,BYTE7           GET BYTE VALUE
1FCC    26D1             2166          AIS    R13,1
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1FCE   C3D0 0001         2167           THI    R13,X'01'          CHECK FOR ODD NO.
1FD2   2332              2168           BZS    MVCHKB             EVEN
1FD4   26D1              2169           AIS    R13,1              ELSE MAKE EVEN
1FD6   48E0 2F02         2170  MVCHKB   LH     R14,NNSELCH        GET NUMBER OF SELCH
1FDA   40D0 3060         2171           STH    R13,INCBUF         INC BUFFER VALUE
1FDE   27E1              2172  MVCHKAA  SIS    R14,1
1FE0   2334              2173           BZS    MVCHKYY
1FE2   61D0 3060         2174           AHM    R13,INCBUF         INCREMENT BUFFER
1FE6   2204              2175           BS     MVCHKAA
1FE8   48D0 3060         2176  MVCHKYY  LH     R13,INCBUF         GET INCREMENT VALUE
1FEC   4300 2018         2177           B      MVCHKXX
1FF0   D0D0 3016         2178  MVCHK    STM    R13,SAVE2          SAVE RETURN ADDRESS
1FF4   48D0 0C6C         2179           LH     R13,BYTE7          GET BYTE VALUE
1FF8   C5D0 04FF         2180           CLHI   R13,X'4FF'         LOW LIMIT ON BYTE SIZE
1FFC   4280 200C         2181           BL     MVCHK8             NOT LESS THAN 4FF BYTES
2000   26D1              2182           AIS    R13,1              ELSE ADD 1
2002   C3D0 0001         2183           THI    R13,X'01'          AND MAKE EVEN
2006   2335              2184           BZS    MVCHK9
2008   26D1              2185           AIS    R13,1
200A   2303              2186           BS     MVCHK9
200C   C8D0 0500         2187  MVCHK8   LHI    R13,X'500'
2010   40D0 3060         2188  MVCHK9   STH    R13,INCBUF         SET INC BUFFER
2014   48D0 0C6C         2189           LH     R13,BYTE7          GET BYTE VALUE
2018   08ED              2190  MVCHKXX  LHR    R14,R13
201A   26E2              2191           AIS    R14,2              ADD 2
201C   4810 0C7C         2192           LH     R1,MOVEOUT         IS MOVEOUT OPTION SET?
2020   2137              2193           BNZS   MVCHK1             YES, CHECK BUFFER LIMITS
2022   4810 0C84         2194           LH     R1,MOVEIN          NO, IS MOVE INBUF OPTION SET ?
2026   433F 0004         2195           BZ     4(R15)             NO, CHECK FOR NEXT TEST
202A   4300 206C         2196           B      MVCHK2             YES, CHECK BUFFER LIMITS
202E   4810 2EA4         2197  MVCHK1   LH     R1,OUTBUF          LOAD CURRENT OUTBUF ADRS
2032   4A10 3060         2198           AH     R1,INCBUF          INCREMENT ADR
2036   4010 2EA4         2199           STH    R1,OUTBUF          STORE NEW OUTBUF ADRS
203A   4A10 3060         2200           AH     R1,INCBUF          ADD BUFFER Z VALUE TO IT
203E   4510 2FC0         2201           CLH    R1,ACTTOCLS        COMPARE TO LEAST SIG PART OF ACT ADR
2042   2338              2202           BES    MVCHK3             NO,CONTINUE
2044   2187              2203           BLS    MVCHK3             NO, CONTINUE
2046   D320 305E         2204           LB     R2,ACTADUP         GET CURRENT MS OF ACTUAL ADR
204A   4520 2FBE         2205           CLH    R2,ACTTOCMS        COMPARE TO TOC MS BITS
204E   4380 20C2         2206           BNL    MVEXIT             IF EQUAL OR GR EXIT
2052   4820 3060         2207  MVCHK3   LH     R2,INCBUF          ADD INCREMENT VALUE
2056   4A20 3060         2208           AH     R2,INCBUF          ADD BUFFER Z VALUE TOO
205A   0512              2209           CLHR   R1,R2              HAS ADDRESS WRAPPED AROUND TOC?
205C   4280 20CA         2210           BL     MVCHK6             IF LESS CHECK FOR NEW MEMORY MODULE
2060   4870 2EA4         2211           LH     R7,OUTBUF          LOAD CURRENT START ADRS OF OUTBUF
2064   4810 0C84         2212           LH     R1,MOVEIN          NO, IS MOVE INBUF OPTION SET ?
2068   4330 20A2         2213           BZ     BRKCHK             NO, CHECK FOR BREAK KEY
206C   4810 2EA6         2214  MVCHK2   LH     R1,INBUF           YES, LOAD CURRENT INBUF ADRS
2070   4A10 3060         2215           AH     R1,INCBUF          INCREMENT ADRS
2074   4010 2EA6         2216           STH    R1,INBUF           STORE NEW BUF ADR
2078   0A1E              2217           AHR    R1,R14             ADD BUFFER SIZE TO START ADR
207A   4510 2FC0         2218           CLH    R1,ACTTOCLS        COMPARE TO LEAST SIG PART OF ACT ADR
207E   4280 2092         2219           BL     MVCHK4             NO
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2082   4330 2092           BE    MVCHK4            NO
2086   D320 305F           LB    R2,ACTADUP+1      GET INBUF MS BITS
208A   4520 2FBE           CLH   R2,ACTTOCMS       COMPARE TO MS OF TOC
208E   4380 20C2           BNL   MVEXIT            IF EQUAL OR GR EXIT
2092   4820 3060   MVCHK4  LH    R2,INCBUF         GET INC VALUE
2096   0A2E                AHR   R2,R14            ADD BYTE + 2 VALUE
2098   0512                CLHR  R1,R2             HAS BDR WRAPPED AROUND TOC?
209A   4280 20CA           BL    MVCHK6            IF LESS CHECK FOR NEW MEMORY MODULE
209E   4870 2EA6           LH    R7,INBUF          NO, LOAD CURRENT START ADRS OF INBUF
20A2   D0B0 3040   BRKCHK  STM   R11,SAVEF         SAVE REGISTERS
20A6   D3B0 2E70           LB    R11,ADDRESS       LOAD ADRS OF CONSOLE DEVICE
20AA   DEB0 2E6F           OC    R11,RDCMD         READ
20AE   9DBC                SSR   R11,R12           SENSE CONSOLE DEVICE STATUS
20B0   C3C0 0020           THI   R12,X'20'         IS BREAK KEY SET ?
20B4   4230 16B4           BNZ   BRANCH+4          YES, CHECK FOR NEXT TEST
20B8   D1B0 3040           LM    R11,SAVEF         RESTORE REGISTERS
20BC   08EF                LHR   R14,R15
20BE   4300 2B3E           B     WRITE
20C2   D1D0 3016   MVEXIT  LM    R13,SAVE2         RESTORE RETURN ADDRESS
20C6   430F 0004           B     4(R15)            NO, TRY NEXT TEST
20CA   4810 0C7C   MVCHK6  LH    R1,MOVEOUT        CHECK MOVEOUT OPTION
20CE   4330 210E           BZ    MVCHK7            NO, CHECK MOVEIN OPTION
20D2   D310 305E           LB    R1,ACTADUP        GET CURRENT MS OF ACTUAL ADR
20D6   C410 0003           NHI   R1,X'3'           ADD ONE TO IT
20DA   2611                AIS   R1,1
20DC   4820 2FBE           LH    R2,ACTTOCMS       GET TOC MS BITS
20E0   0521                CLHR  R2,R1             COMPARE TO CURRENT MS+1
20E2   4280 20C2           BL    MVEXIT
20E6   D210 305E           STB   R1,ACTADUP
20EA   C810 0000           LHI   R1,X'0000'        NO TRY NEW MEMORY MODULE
20EE   4010 2EA4           STH   R1,OUTBUF         SET OUTBUF TO X'0000
20F2   4810 0C84           LH    R1,MOVEIN
20F6   4330 20A2           BZ    BRKCHK
20FA   D310 305E           LB    R1,ACTADUP        GET OUTBUF MS BIT ADR
20FE   D210 305F           STB   R1,ACTADUP+1      STORE IT IN INBUF MS BT  ADR
2102   4810 3060           LH    R1,INCBUF
2106   4010 2EA6           STH   R1,INBUF          AND INBUF TO X'500'
210A   4300 20A2           B     BRKCHK
210E   D310 305F   MVCHK7  LB    R1,ACTADUP+1      GET INBUF MOST BITS
2112   C410 0003           NHI   R1,X'3'
2116   2611                AIS   R1,1              INCREMENT VALUE
2118   4820 2FBE           LH    R2,ACTTOCMS       GET TOC NS BITS
211C   0521                CLHR  R2,R1             COMPARE MS + 1
211E   4280 20C2           BL    MVEXIT            IF LESS EXIT
2122   D210 305F           STB   R1,ACTADUP+1      OTHERWISE USE NEW VALUE
2126   C810 0000           LHI   R1,X'0000'
212A   4010 2EA6           STH   R1,INBUF          AND ZERO INBUF ADR
212E   4300 20A2           B     BRKCHK
                   *
                   *
                   *
2132   40F0 3016   WSELCH  STH   R15,SAVE2         SAVE REGISTER
2136   48E0 0CAC           LH    R14,TESTSEL       GET SELCH TO BE TESTED
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213A   033F             2273          BZR    R15                 TEST ALL IF ZERO
213C   27E1             2274          SIS    R14,1
213E   033F             2275          BZR    R15                 TEST ONLY FIRST SELCH
2140   40E0 2F98        2276          STH    R14,COUNTER         GET COUNTER VALUE
2144   41F0 239E        2277          BAL    R15,DRIVERM         SET UP PARAMETRES
2148   48F0 3016        2278          LH     R15,SAVE2           RESTORE REGISTER
214C   03CF             2279          BR     R15                 RETURN
                        2280   *
                        2281   *
                        2282   *
214E   D0E0 302C        2283   SELTZ  STM    R14,SAVE5           SAVE REGISTERS
2152   48E0 0CAC        2284          LH     R14,TESTSEL         GET NUMBER OF SELCH TO BE TESTED
2156   4330 216C        2285          BZ     SELTZ1              TEST ALL SELCH
215A   27E1             2286          SIS    R14,1               ELSE TEST ONE SELCH
215C   40E0 2F98        2287          STH    R14,COUNTER         SET COUNTER VALUE
2160   91E3             2288          SLLS   R14,3               MULTIPLE BY 8
2162   483E 0B8C        2289          LH     SELCH,SELCHN1(R14)  GET SELCH DEVICE ADR
2166   D1F0 302C        2290          LM     R14,SAVE5           RESTORE REGISTERS
216A   030F             2291          BR     R15                 RETURN
216C   D1E0 302C        2292   SELTZ1 LM     R14,SAVE5           RESTORE REGISTERS
2170   430F 0004        2293          B      4(R15)              RETURN HERE
                        2294   *
                        2295   *
                        2296   *
2174   D0B0 302C        2297   SSEL   STM    R11,SAVE5           SAVE REGISTERS
2178   07EE             2298          XHR    R14,R14             ZERO
217A   07FF             2299          XHR    R15,R15             ZERO
217C   48CE 2F90        2300   SSL1   LH     R12,SELDEV1(R14)    GET SELCH ADR FOR INT TABLE
2180   48DF 0B8C        2301          LH     R13,SELCHN1(R15)    GET SELCH ADR AVAILABLE
2184   48B0 2F8E        2302          LH     R11,STORE           GET COUNTER VALUE
2188   40B0 2F9A        2303          STH    R11,COMPARE         STORE IT
218C   05CD             2304          CLHR   R12,R13             COMPARE SELCH ADR
218E   4330 21A4        2305          BE     SSL3                IF EQUAL IDENTIFY SELCH
2192   26F8             2306   SSL2   AIS    R15,8               IF NOT CONTINUE SEARCH
2194   26E2             2307          AIS    R14,2
2196   C5E0 0008        2308          CLHI   R14,X'08'
219A   4280 217C        2309          BL     SSL1
219E   D1B0 302C        2310          LM     R11,SAVE5           RESTORE REGISTERS
21A2   030F             2311          BR     R15                 EXIT DID NOT FIND SELCH
21A4   90F2             2312   SSL3   SRLS   R15,2               DIVIDE BY 4
21A6   48BF 2F7E        2313          LH     R11,SELCTA(R15)     LOAD STATUS OF THIS SELCH
21AA   C5B0 000F        2314          CLHI   R11,X'F'            CHECK FOR END OF WRITE
21AE   4230 21B8        2315          BNE    SSL4                IF END OF WRITE CHECK FOR SELCH AGAIN
21B2   91F2             2316          SLLS   R15,2               MULTIPLE BY 4
21B4   4300 2192        2317          B      SSL2
21B8   083D             2318   SSL4   LHR    SELCH,R13           SELCH ADR
21BA   C8D0 AAAA        2319          LHI    R13,X'AAAA'
21BE   40DE 2F90        2320          STH    R13,SELDEV1(R14)    TAG THIS SELCH
21C2   90F1             2321          SRLS   R15,1               DIVIDE BY 2
21C4   40F0 2F98        2322          STH    R15,COUNTER         SET COUNTER
21C8   D1B0 302C        2323          LM     R11,SAVE5           RESTORE REGISTERS
21CC   430F 0004        2324          B      4(R15)              RETURN HERE WITH SELCH VALUE
                        2325   *
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                                2326  *
                                2327  *
 21D0   4810 0CAC               2328  WSELCHZ  LH    R1,TESTSEL          GET SELCH TO BE TESTED
 21D4   2336                    2329           BZS   WSAA                TEST ALL SELCH
 21D6   2421                    2330           LIS   R2,1                TEST ONLY ONE SELCH
 21D8   2711                    2331           SIS   R1,1
 21DA   4010 2F98               2332           STH   R1,COUNTER          SET COUNTER VALUE
 21DE   2306                    2333           BS    WSBB
 21E0   4820 0B84               2334  WSAA     LH    R2,NSELCH           GET NUMBER OF SELCH
 21E4   0711                    2335           XHR   R1,R1
 21E6   4010 2F98               2336           STH   R1,COUNTER          ZERO COUNTER
 21EA   4020 2F02               2337  WSBB     STH   R2,NNSELCH          SET NUMBER OF SELCH TO BE USED
 21EE   C5F0 197A               2338           CLHI  R15,TSTCHK7         IS THIS CALL FROM END OF 7?
 21F2   4380 1716               2339           BNL   TEST7A              YES, RETEST SELCH
 21F6   4810 0C84               2340           LH    R1,MOVEIN           GET MOVE IN BUFFER OPTION
 21FA   4230 2206               2341           BNZ   WSCC
 21FE   4810 0C7C               2342           LH    R1,MOVEOUT          GET MOVE OUT BUFFER OPTION
 2202   4230 220C               2343           BNZ   WSDD
 2206   24D0                    2344  WSCC     LIS   R13,0
 2208   24E2                    2345           LIS   R14,2
 220A   2303                    2346           BS    WSEE
 220C   24D2                    2347  WSDD     LIS   R13,2
 220E   24E0                    2348           LIS   R14,0
 2210   0799                    2349  WSEE     XHR   R9,R9               ZERO R 9
 2212   481D 2EA4               2350           LH    R1,OUTBUF(R13)      GET THIS BUFFER ADR
 2216   4590 2F02               2351  WSFF     CLH   R9,NNSELCH          PROPER NUMBEROF SELCH?
 221A   238D                    2352           BNLS  WSGG                YES, EXIT
 221C   4A10 0C6C               2353           AH    R1,BYTE7            ADD BYTE VALUE
 2220   2611                    2354           AIS   R1,1                PLUS 1
 2222   0821                    2355           LHR   R2,R1
 2224   C420 0001               2356           NHI   R2,X'1'             SENSE LAST BIT
 2228   2332                    2357           BZS   WSHH                IF EVEN CONTINUE
 222A   2611                    2358           AIS   R1,1                ELSE INCREMENT
 222C   2691                    2359  WSHH     AIS   R9,1                INCREMENT COUNTER
 222E   401E 2EA4               2360           STH   R1,OUTBUF(R14)      STORE THIS BUFFER ADR
 2232   220E                    2361           BS    WSFF
 2234   48E0 2EA4               2362  WSGG     LH    R14,OUTBUF          GET OUTPUT BUFFER ADR
 2238   4B1D 2EA4               2363           SH    R1,OUTBUF(R13)      CALCULATE TOTAL SIZE OF BUFFER
 223C   0AE1                    2364           AHR   R14,R1              ADD SIZE TO IT
 223E   05E1                    2365           CLHR  R14,R1              WRAP AROUND?
 2240   4280 0CC8               2366           BL    QUESTNZ             YES DO NOT TEST
 2244   48E0 2EA6               2367           LH    R14,INBUF           GET INPUT BUFFER ADR
 2248   0AE1                    2368           AHR   R14,R1              ADD SIZE TO IT
 224A   05E1                    2369           CLHR  R14,R1              WRAP AROUND?
 224C   4280 0CC8               2370           BL    QUESTNZ             YES DO NOT TEST
 2250   030F                    2371           BR    R15                 RETURN
                                2372  *
                                2373  *
                                2374  *
 2252   D0D0 3016               2375  MULSEL   STM   R13,SAVE2           SAVE REGISTE2S
 2256   41F0 22A4               2376           BAL   R15,RTN2            CLEAR THIS DEVICE
 225A   48E0 0CAC               2377           LH    R14,TESTSEL         GET SELCH TO BE TESTED
 225E   4230 229E               2378           BNZ   MULX                GO TO NEXT TEST
```

SUBROUTINES

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2262   48E0 0B84          2379          LH    R14,NSELCH         GET NO. OF SELCH
2266   48D0 2F98          2380          LH    R13,COUNTER        GET COUNTER VALUE
226A   26D1               2381          AIS   R13,1
226C   05DE               2382          CLHR  R13,R14            ALL SELCH TESTED
226E   4380 229E          2383          BNL   MULX               YES, NEXT TEST
2272   40D0 2F98          2384          STH   R13,COUNTER        NEW COUNTER VALUE
2276   41F0 239E          2385          BAL   R15,DRIVERM        SET UP PARAMETERS
227A   48E0 0C8C          2386          LH    R14,BUFADR1
227E   40F0 2EA4          2387          STH   R14,OUTBUF
2282   48E0 0C94          2388          LH    R14,BUFADR2
2286   40E0 2EA6          2389          STH   R14,INBUF
228A   48E0 0C9C          2390          LH    R14,MEMMOD
228E   D2E0 305E          2391          STB   R14,ACTADUP
2292   D2E0 305F          2392          STB   R14,ACTADUP+1
2296   D1D0 3016          2393          LM    R13,SAVE2          RESTORE REGISTE2S
229A   430F 0004          2394          B     4(R15)
229E   D1D0 3016          2395 MULX     LM    R13,SAVE2          RESTORE REGISTERS
22A2   030F               2396          BR    R15                RETURN
                          2397 *
                          2398 *
                          2399 *
22A4   D0D0 2F14          2400 RTN2     STM   R13,SAVEZ0         SAVE REGISTERS
22A8   DE30 2E88          2401          OC    SELCH,STOP1        IDLE SELCH
22AC   48F0 2FA6          2402          LH    R15,DEVICE         GET DEVICE TYPE
22B0   4330 22C4          2403          BZ    LOOPE1             SELCH TESTER?
22B4   C4F0 0001          2404          NHI   R15,1              NO, DISC?
22B8   4230 22CC          2405          BNZ   LOOPE2             YES, CLEAR DISC
22BC   DE40 2E85          2406          OC    IODEVS,CLEAR1      NO, CLEAR MAG TAPE
22C0   4300 22D0          2407          B     LOOPEZ             EXIT
22C4   DE40 2E86          2408 LOOPE1   OC    IODEVS,CLEAR       CLEAR TESTER
22C8   4300 22D0          2409          B     LOOPEZ             EXIT
22CC   DE40 2E88          2410 LOOPE2   OC    IODEVS,RESETC      CLEAR DISC
22D0   4240 2C7A          2411 LOOPEZ   BO    ERR30              ERROR IF FALSE SYNC
22D4   D1D0 2F14          2412          LM    R13,SAVEZ0         RESTORE REGISTERS
22D8   030F               2413          BR    R15                RETURN
                          2414 *
                          2415 *
                          2416 *
22DA   40F0 3016          2417 ENDBYTE  STH   R15,SAVE2          SAVE REGISTER
22DE   48B0 0C6C          2418          LH    R11,BYTE7          GET BYTE VALUE
22E2   C3B0 0001          2419          THI   R11,X'1'           IS IT EVEN
22E6   4330 2308          2420          BZ    ENDBY1             YES THEN ADD 2
22EA   26B1               2421          AIS   R11,1              NO THEN ADD 1
22EC   4AB0 2EA6          2422 ENDBY2   AH    R11,INBUF          THIS IS LAST ADR OF INBUF
22F0   41F0 1E70          2423          BAL   R15,ADRTRANI       INBUF ADR TRAN
22F4   48EC 0000          2424          LH    R14,0(R12)         GET DATA FROM THIS LOCATION
22F8   C8D0 4F82          2425          LHI   R13,X'4F82'
22FC   05DE               2426          CLHR  R13,R14            COMPARE THIS VALUE
22FE   4230 2CB2          2427          BNE   ERR38              IF NOT EQUAL ERROR
2302   48F0 3016          2428          LH    R15,SAVE2          RESTORE REGISTER
2306   030F               2429          BR    R15                RETURN
2308   26B2               2430 ENDBY1   AIS   R11,2              ADD 2
230A   4300 22EC          2431          B     ENDBY2
```

```
                          2432  *
                          2433  *
                          2434  *
2 30E   4000 2D22         2435  PRTERR   STH   R0,ERRNUM
2312    41F0 26D4         2436           BAL   R15,SELADRT
2316    41F0 2B9E         2437           BAL   R15,PRINT
231A    2D18              2438           DC    Z(ERRMSG)
231C    2D29              2439           DC    Z(ENDZ)
231E    4300 276A         2440           B     INCERR
                          2441  *
                          2442  *
                          2443  *
2322    4000 2D22         2444  PRTERRZ  STH   R0,ERRNUM
2326    41F0 2B9E         2445           BAL   R15,PRINT
232A    2D18              2446           DC    Z(ERRMSG)
232C    2D25              2447           DC    Z(END)
232E    4300 276A         2448           B     INCERR
                          2449  *
                          2450  * FORM SELCH COMMAND
                          2451  *
2332    D090 3016         2452  SELCH2M  STM   R9,SAVE2              SAVE REGISTERS
2336    48B0 2F98         2453           LH    R11,COUNTER           GET COUNTER VALUE
233A    91B1              2454           SLLS  R11,1                 MULTIPLE BY 2
233C    08CB              2455           LHR   R12,R11
233E    48D0 0CAC         2456           LH    R13,TESTSEL           TEST THIS SELCH
2342    2332              2457           BZS   SELCHXX               TEST ALL SELCH
2344    07CC              2458           XHR   R12,R12               OR ONLY ONE
2346    48D0 305C         2459  SELCHXX  LH    R13,RDWT              GET READ/WRITE STATUS
234A    4230 235C         2460           BNZ   SELCH2X               WRITE
234E    48FC 2F0C         2461           LH    R15,OUTBUFS(R12)      GET THIS OUTBUF ADR
2352    40FB 2E50         2462           STH   R15,STARTADR(R11)     NO, READ GET OUTBUF ADR
2356    2490              2463           LIS   R9,X'0'               SET OUTBUF FLAG
2358    4300 2366         2464           B     SELCH2Y               CONTINUE
235C    48FC 2F04         2465  SELCH2X  LH    R15,INBUFS(R12)       GET THIS INBUF ADR
2360    40FB 2E50         2466           STH   R15,STARTADR(R11)     WRITE INBUF ADR
2364    2491              2467           LIS   R9,1                  SET INBUF FLAG
2366    DA3B 2E50         2468  SELCH2Y  WD    SELCH,ADRS1(R11)      WRITE BEGINNING ADDRESS TO THE SELCH
236A    DA3B 2E51         2469           WD    SELCH,ADRS2(R11)
236E    48E0 0C6C         2470           LH    R14,BYTE7             GET BYTE SIZE
2372    48AB 2E50         2471           LH    R10,STARTADR(R11)
2376    0AAE              2472           AHR   R10,R14               ADD IT TO START ADDRESS
2378    40AB 2E58         2473           STH   R10,ENDADRS(R11)      THIS IS THE FINAL ADDRESS
237C    DA3B 2E58         2474           WD    SELCH,ADRS3(R11)      WRITE END ADDRESS TO THE SELCH
2380    DA3B 2E59         2475           WD    SELCH,ADRS4(R11)
2384    D3CD 2E89         2476           LB    R12,GO(R13)           GET READ OR WRITE COMMAND
2388    D3D9 305E         2477           LB    R13,ACTADUP(R9)       GET MS BITS OF MEMORY
238C    C4D0 0003         2478           NHI   R13,X'3'              COMPOSE COMMAND WORD
2390    0ACD              2479           AHR   R12,R13
2392    90B1              2480           SRLS  R11,1                 DIVIDE BY 2
2394    D2CB 2F72         2481           STB   R12,SELCHS(R11)       SAVE COMMAND
2398    D190 3016         2482           LM    R9,SAVE2              RESTORE REGISTERS
239C    030F              2483           BR    R15                   RETURN
                          2484  *
                          * SET UP THE DRIVER
                          *
239E    D0D0 304A         DRIVERM STM    R13,SAVEG           SAVE REGISTERS
23A2    48E0 2F98                 LH     R14,COUNTER         GET COUNTER VALUE
23A6    91E3                      SLLS   R14,3               MULTIPLE BY 8
23A8    483E 0B8C                 LH     SELCH,SELCHN1(R14)  GET SELCH VALUE
23AC    48DE 0BCC                 LH     R13,DEVICEN1(R14)   GET ITS DEVICE VALUE
23B0    40D0 2FA6                 STH    R13,DEVICE          USE IT
23B4    C5D0 0001                 CLHI   R13,1               IS IT A DISC
23B8    4330 23E2                 BE     DRIVER1             YES
23BC    C5D0 0002                 CLHI   R13,2               IS IT A TAPE DRIVE
23C0    4330 2410                 BE     DRIVER2             YES
23C4    C5D0 0003                 CLHI   R13,3               IS THIS A MASS STORE DISC?
23C8    4330 23DA                 BE     DRIVER3             YES
23CC    C850 1B3A                 LHI    DRIVER,TESTDR       THEN IT IS THE SELCH TESTER
23D0    484E 0BAC                 LH     IODEVS,IODEVN1(R14) GET ITS DEVICE CODE
23D4    D1D0 304A                 LM     R13,SAVEG           RESTORE REGISTER
23D8    030F                      BR     R15                 RETURN
23DA    C850 1D80         DRIVER3 LHI    DRIVER,MSDIS        MASS STORAGE DISC
23DE    4300 23E6                 B      DRIVER1+4
23E2    C850 1CBA         DRIVER1 LHI    DRIVER,DISCDR       IT IS THE DISC
23E6    484E 0BAC                 LH     IODEVS,IODEVN1(R14) GET ITS DEVICE CODE
23EA    48DE 0C0C                 LH     R13,CYCNUMB1(R14)   GET ITS CYLINDER NUMBER
23EE    40D0 2FA0                 STH    R13,CYCNUM
23F2    48DE 0C2C                 LH     R13,SECTORN1(R14)   GET ITS SECTOR NUMBER
23F6    40D0 2FA2                 STH    R13,SECTOR
23FA    48DE 0BEC                 LH     R13,DISFILN1(R14)   GET ITS FILE NUMBER
23FE    40D0 2FA4                 STH    R13,DISFIL
2402    48DE 0C4C                 LH     R13,HEAD1(R14)      GET HEAD NUMBER
2406    40D0 2EFC                 STH    R13,HEAD
240A    D1D0 304A                 LM     R13,SAVEG           RESTORE REGISTER
240E    030F                      BR     R15                 RETURN
2410    C850 1BD8         DRIVER2 LHI    DRIVER,TAPEDR       IT IS A TAPE DRIVE
2414    484E 0BAC                 LH     IODEVS,IODEVN1(R14) GET ITS DEVICE CODE
2418    D1D0 304A                 LM     R13,SAVEG           RESTORE REGISTER
241C    030F                      BR     R15                 RETURN
                          *
                          * SELCH IMMEDIATE INTERRUPT ROUTINE
                          *
241E                      SELCHAA DS     4                   SAVE CURRENT PSW
2422    0000                      DC     X'0000'             DISABLE INTERRUPTS
2424    D000 2F14                 STM    R0,SAVEZ0           SAVE REGISTERS
2428    4810 0B8C                 LH     R1,SELCHN1          GET SELCH ADR
242C    4010 2F90                 STH    R1,SELDEV1          STORE IT
2430    DE10 2E88                 OC     R1,STOP             STOP THIS SELCH
2434    4240 2C72                 BO     ERR27               ERROR IF FALSE SYN
2438    2421                      LIS    R2,1
243A    6120 2F86                 AHM    R2,SELCTAZ          SET THIS SELCH FLAG
243E    4520 2F86                 CLH    R2,SELCTAZ          DID THE SELCH FINISH WRITING
2442    4230 246A                 BNE    SELCHAA2            NO, THEN READ TERMINATION
2446    6120 2F7A                 AHM    R2,SELCOUNT         INCREMENT SELCH COUNTER
244A    4830 2F7A                 LH     R3,SELCOUNT         GET COUNT
244E    D213 2F44                 STB    R1,SAVEQ(R3)
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2452    C530 0001          2538  SELCHAA0 CLHI  R3,1              IS THIS THE FIRST SELCH TO INTER.?
2456    4330 2462          2539           BE    SELCHAA1          YES
245A    D100 2F14          2540           LM    R0,SAVEZ0         NO,RESTORE REGISTERS
245E    C200 241E          2541           LPSW  SELCHAA           RETURN TO THE PROGRAM
2462    D100 2F14          2542  SELCHAA1 LM    R0,SAVEZ0         RESTORE REGISTERS
2466    C200 2ECC          2543           LPSW  TEST7PS           GO BACK TO TEST
246A    6120 2F7C          2544  SELCHAA2 AHM   R2,SLCOUNT        SET WRITE FINISH FLAG
246E    4300 245A          2545           B     SELCHAA0+8
                           2546  *
                           2547  *
2472                       2548  SELCHBB  DS    4                 SAVE CURRENT PSW
2476    0000               2549           DC    X'0000'           DISABLE INTERRUPTS
2478    D000 2F14          2550           STM   R0,SAVEZ0         SAVE REGISTERS
247C    4810 0B94          2551           LH    R1,SELCHN2        GET SELCH ADR
2480    4010 2F92          2552           STH   R1,SELDEV2        STORE IT
2484    DE10 2E88          2553           OC    R1,STOP           STOP THIS SELCH
2488    4240 2C72          2554           BO    ERR27             ERROR IF FALSE SYN
248C    2421               2555           LIS   R2,1
248E    6120 2F88          2556           AHM   R2,SELCTBZ        SET THIS SELCH FLAG
2492    4520 2F88          2557           CLH   R2,SELCTBZ        DID THE SELCH FINISH WRITING
2496    4230 24B6          2558           BNE   SELCHBB2          NO THEN READ TERMINATION
249A    6120 2F7A          2559           AHM   R2,SELCOUNT       INCREMENT SELCH COUNTER
249E    4830 2F7A          2560           LH    R3,SELCOUNT       GET COUNT
24A2    D213 2F44          2561           STB   R1,SAVEQ(R3)
24A6    C530 0001          2562  SELCHBB0 CLHI  R3,1              IS THIS THE FIRST SELCH TO INTER?
24AA    4330 2462          2563           BE    SELCHAA1          YES
24AE    D100 2F14          2564           LM    R0,SAVEZ0         NO,RESTORE REGISTERS
24B2    C200 2472          2565           LPSW  SELCHBB           RETURN TO THE PROGRAM
24B6    6120 2F7C          2566  SELCHBB2 AHM   R2,SLCOUNT        SET WRITE FINISH FLAG
24BA    4300 24AE          2567           B     SELCHBB0+8
                           2568  *
                           2569  *
24BE                       2570  SELCHCC  DS    4                 SAVE CURRENT PSW
24C2    0000               2571           DC    X'0000'           DISABLE INTERRUPTS
24C4    D000 2F14          2572           STM   R0,SAVEZ0         SAVE REGISTERS
24C8    4810 0B9C          2573           LH    R1,SELCHN3        GET SELCH ADR
24CC    4010 2F94          2574           STH   R1,SELDEV3        STORE IT
24D0    DE10 2E88          2575           OC    R1,STOP           STOP THIS SELCH
24D4    4240 2C72          2576           BO    ERR27             ERROR IF FALSE SYN
24D8    2421               2577           LIS   R2,1
24DA    6120 2F8A          2578           AHM   R2,SELCTCZ        SET THIS SELCH FLAG
24DE    4520 2F8A          2579           CLH   R2,SELCTCZ        DID THE SELCH FINISH WRITING
24E2    4230 2502          2580           BNE   SELCHCC2          NO THEN READ TERMINATION
24E6    6120 2F7A          2581           AHM   R2,SELCOUNT       INCREMENT SELCH COUNTER
24EA    4830 2F7A          2582           LH    R3,SELCOUNT       GET COUNT
24EE    D213 2F44          2583           STB   R1,SAVEQ(R3)
24F2    C530 0001          2584  SELCHCC0 CLHI  R3,1              IS THIS THE FIRST SELCH TO INTER?
24F6    4330 2462          2585           BE    SELCHAA1          YES
24FA    D100 2F14          2586           LM    R0,SAVEZ0         NO, RESTORE REGISTERS
24FE    C200 24BE          2587           LPSW  SELCHCC           GO BACK TO THE PROGRAM
2502    6120 2F7C          2588  SELCHCC2 AHM   R2,SLCOUNT        SET WRITE FINISH FLAG
2506    4300 24FA          2589           B     SELCHCC0+8
                           2590  *
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                         *
                         *
250A                     SELCHDD  DS    4                 SAVE CURRENT PSW
250E   0000                       DC    X'0000'           DISABLE INTERRUPTS
2510   D000 2F14                  STM   R0,SAVEZ0         SAVE REGISTERS
2514   4810 0BA4                  LH    R1,SELCHN4        GET SELCH ADR
2518   4010 2F96                  STH   R1,SELDEV4        STORE IT
251C   DE10 2E88                  OC    R1,STOP           STOP THIS SELCH
2520   4240 2C72                  BO    ERR27             ERROR IF FALSE SYN
2524   2421                       LIS   R2,1
2526   6120 2F8C                  AHM   R2,SELCTDZ        SET THIS SELCH FLAG
252A   4520 2F8C                  CLH   R2,SELCTDZ        DID THE SELCH FINISH WRITING
252E   4230 254E                  BNE   SELCHDD2          NO THEN READ TERMINATION
2532   6120 2F7A                  AHM   R2,SELCOUNT       INCREMENT SELCH COUNTER
2536   4830 2F7A                  LH    R3,SELCOUNT       GET COUNT
253A   D213 2F44                  STB   R1,SAVEQ(R3)
253E   C530 0001         SELCHDD0 CLHI  R3,1              IS THIS THE FIRST SELCH TO INTER?
2542   4330 2462                  BE    SELCHAA1          YES
2546   D100 2F14                  LM    R0,SAVEZ0         NO, RESTORE REGISTERS
254A   C200 250A                  LPSW  SELCHDD           GO BACK TO THE PROGRAM
254E   6120 2F7C         SELCHDD2 AHM   R2,SLCOUNT        SET WRITE FINISH FLAG
2552   4300 2546                  B     SELCHDD0+8
                         *
                         *
                         *
2556                     SELCHFF  DS    4                 SAVE CURRENT PSW
255A   0000                       DC    X'0000'           DISABLE INTERRUPTS
255C   4300 2CBA                  B     ERR39             ERROR WRONG INTERRUPT
                         *
                         *
                         *
2560   D090 2F36         OUTSELAD STM   R9,SAVEM
2564   2491                       LIS   R9,1
2566   D319 2F44         OUTSEL00 LB    R1,SAVEQ(R9)
256A   08A9                       LHR   R10,R9
256C   91A2                       SLLS  R10,2
256E   C8EA 2EEC                  LHI   R14,SELCHDC(R10)
2572   40E0 257C                  STH   R14,OUTSELZZ
2576   41E0 2B50                  BAL   R14,CONVERT
257A   0004                       DC    X'4'
257C   2EEC              OUTSELZZ DC    Z(SELCHDC)
257E   48B0 0B84                  LH    R11,NSELCH
2582   2691                       AIS   R9,1
2584   05B9                       CLHR  R11,R9
2586   4380 2566                  BNL   OUTSEL00
258A   41F0 2B9E                  BAL   R15,PRINT
258E   2ED8                       DC    Z(SDCBEG)
2590   2EFB                       DC    Z(SDCEND)
2592   D190 2F36                  LM    R9,SAVEM
2596   030F                       BR    R15
                         *
                         * SET UP X'D0' INTERRUPT TABLE
                         *
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2598    40F0 2F34           2644  SELINTA  STH   R15,SAVEL             SAVE REGISTER
259C    C810 00D0           2645           LHI   R1,X'D0'
25A0    2422                2646           LIS   R2,2
25A2    C830 02CE           2647           LHI   R3,X'2CE'
25A6    C840 2556           2648           LHI   R4,SELCHFF
25AA    4041 0000           2649  XAA      STH   R4,0(R1)
25AE    C110 25AA           2650           BXLE  R1,XAA
25B2    4810 0B84           2651           LH    R1,NSELCH             GET # OF SELCH
25B6    C510 0001           2652           CLHI  R1,1                  IS IT 1?
25BA    4330 2604           2653           BE    SELINT1               YES
25BE    C510 0002           2654           CLHI  R1,2                  2?
25C2    4330 25F2           2655           BE    SELINT2               YES
25C6    C510 0003           2656           CLHI  R1,3                  3?
25CA    4330 25E0           2657           BE    SELINT3               YES
25CE    4810 0BA4           2658           LH    R1,SELCHN4            GET FOURTH SELCH DEVICE CODE
25D2    9111                2659           SLLS  R1,1                  MULTIPLE IT BY 2
25D4    CA10 00D0           2660           AHI   R1,X'D0'
25D8    C820 250A           2661           LHI   R2,SELCHDD            GET INTERRUPT ADR
25DC    4021 0000           2662           STH   R2,0(R1)              STORE IT IN TABLE
25E0    4810 0B9C           2663  SELINT3  LH    R1,SELCHN3            GET THIRD SELCH DC
25E4    9111                2664           SLLS  R1,1                  MULTIPLE IT BY 2
25E6    CA10 00D0           2665           AHI   R1,X'D0'
25EA    C820 24BE           2666           LHI   R2,SELCHCC            GET INTERRUPT ADR
25EE    4021 0000           2667           STH   R2,0(R1)              STORE IT IN TABLE
25F2    4810 0B94           2668  SELINT2  LH    R1,SELCHN2            GET SECOND SELCH DC
25F6    9111                2669           SLLS  R1,1                  MULTIPLE IT BY2
25F8    CA10 00D0           2670           AHI   R1,X'D0'
25FC    C820 2472           2671           LHI   R2,SELCHBB            GET INTERRUPT ADR
2600    4021 0000           2672           STH   R2,0(R1)              STORE IT IN TABLE
2604    4810 0B8C           2673  SELINT1  LH    R1,SELCHN1            GET FIRST SELCH DC
2608    9111                2674           SLLS  R1,1                  MULTIPLE IT BY2
260A    CA10 00D0           2675           AHI   R1,X'D0'
260E    C820 241E           2676           LHI   R2,SELCHAA            GET INTERRUPT ADR
2612    4021 0000           2677           STH   R2,0(R1)              STORE IT IN TABLE
2616    07BB                2678           XHR   R11,R11
2618    C8A0 2020           2679  SELINTZ  LHI   R10,X'2020'           SET SPACE VALUES TO MESSAGE
261C    40AB 2EEC           2680           STH   R10,SELCHDC(R11)
2620    40AB 2EF4           2681           STH   R10,SELCHDC+8(R11)
2624    07AA                2682           XHR   R10,R10               ZERO
2626    40AB 2F44           2683           STH   R10,SAVEQ(R11)        THESE LOACTIONS
262A    26B2                2684           AIS   R11,2
262C    C5B0 0008           2685           CLHI  R11,X'8'
2630    4280 2618           2686           BL    SELINTZ
2634    0766                2687           XHR   R6,R6                 ZERO COUNTERS
2636    0777                2688           XHR   R7,R7
2638    48F0 0B84           2689           LH    R15,NSELCH            GET NUMBER OF SELCH
263C    91F3                2690           SLLS  R15,3                 MULTIPLE BY 8
263E    4816 0BAC           2691  SELINTX  LH    R1,IODEVN1(R6)        GET THIS DEVICE ADR
2642    9111                2692           SLLS  R1,1                  MULTIPLE BY 2
2644    CA10 00D0           2693           AHI   R1,X'D0'              ADD D0 TO THIS VALUE
2648    C827 2684           2694           LHI   R2,SELF1(R7)          GET THIS INTERRUPT ROUTINE ADR
264C    4021 0000           2695           STH   R2,0(R1)              STORE ADR IN INTERRUPT TABLE
2650    CA70 000A           2696           AHI   R7,X'A'               INCREMENT THIS COUNTER
```

```
2654   2668                2697              AIS    R6,8                INCREMENT THIS COUNTER
2656   056F                2698              CLHR   R6,R15              COMPARE TO 32
2658   4280 263E           2699              BL     SELINTX
265C   0766                2700              XHR    R6,R6               ZERO THE COUNTERS
265E   0777                2701              XHR    R7,R7
2660   4816 0BEC           2702   SELINTY    LH     R1,DISFILN1(R6)     GET THIS CONTROLLER ADR
2664   9111                2703              SLLS   R1,1                MULTIPLE BY 2
2666   CA10 00D0           2704              AHI    R1,X'D0'            ADD D0 TO THIS VALUE
266A   C827 26AC           2705              LHI    R2,SELF5(R7)        GET THIS INTERRUPT ROUTINE ADR
266E   4021 0000           2706              STH    R2,0(R1)            STORE ADR IN INTERRUPT TABLE
2672   CA70 000A           2707              AHI    R7,X'A'             INCREMENT THIS COUNTER
2676   2668                2708              AIS    R6,8                INCREMENT THIS COUNTER
2678   056F                2709              CLHR   R6,R15              COMPARE TO 32
267A   4280 2660           2710              BL     SELINTY
267E   48F0 2F34           2711              LH     R15,SAVEL           RESTORE REGISTER
2682   030F                2712              BR     R15                 RETURN
                           2713   *
                           2714   * ACKNOWLEDGE AND DISMISS CONTROL & DRIVE IMD. INTERRUPTS.
                           2715   *
2684                       2716   SELF1      DS     4
2688   0000                2717              DC     X'0000'
268A   C200 2684           2718              LPSW   SELF1
268E                       2719   SELF2      DS     4
2692   0000                2720              DC     X'0000'
2694   C200 268E           2721              LPSW   SELF2
2698                       2722   SELF3      DS     4
269C   0000                2723              DC     X'0000'
269E   C200 2698           2724              LPSW   SELF3
26A2                       2725   SELF4      DS     4
26A6   0000                2726              DC     X'0000'
26A8   C200 26A2           2727              LPSW   SELF4
26AC                       2728   SELF5      DS     4
26B0   0000                2729              DC     X'0000'
26B2   C200 26AC           2730              LPSW   SELF5
26B6                       2731   SELF6      DS     4
26BA   0000                2732              DC     X'0000'
26BC   C200 26B6           2733              LPSW   SELF6
26C0                       2734   SELF7      DS     4
26C4   0000                2735              DC     X'0000'
26C6   C200 26C0           2736              LPSW   SELF7
26CA                       2737   SELF8      DS     4
26CE   0000                2738              DC     X'0000'
26D0   C200 26CA           2739              LPSW   SELF8
                           2740   *
                           2741   *
                           2742   *
26D4   40F0 2F6C           2743   SELADRT    STH    R15,SAVEV
26D8   0813                2744              LHR    R1,SELCH
26DA   41E0 2B50           2745              BAL    R14,CONVERT
26DE   0004                2746              DC     X'4'
26E0   2D26                2747              DC     Z(SELADRZ)
26E2   48F0 2F6C           2748              LH     R15,SAVEV
26E6   030F                2749              BR     R15
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```
                              2750  *
                              2751  *
                              2752  *
26E8   0766                   2753  MESSOUT  XHR   R6,R6              OUTPUT PARAMETER VALUES
26EA   C816 0B6E              2754           LHI   R1,NOMSG+2(R6)
26EE   C826 0B73              2755           LHI   R2,NOMSG+7(R6)
26F2   4010 2718              2756           STH   R1,PRTX
26F6   4020 271A              2757           STH   R2,PRTZ
26FA   C360 001F              2758           THI   R6,X'1F'
26FE   2337                   2759           BZS   MESSX
2700   41F0 2B9E              2760           BAL   R15,PRINT
2704   2D36                   2761           DC    Z(MEMYMS+2)
2706   2D37                   2762           DC    Z(MEMYMS+3)
2708   4300 2714              2763           B     MESSZ
270C   41F0 2B9E              2764  MESSX    BAL   R15,PRINT
2710   2D18                   2765           DC    Z(ERRMSG)
2712   2D19                   2766           DC    Z(ERRMSG+1)
2714   41F0 2B9E              2767  MESSZ    BAL   R15,PRINT
2718   0B6E                   2768  PRTX     DC    Z(NOMSG+2)
271A   0B73                   2769  PRTZ     DC    Z(NOMSG+7)
271C   41F0 2B9E              2770           BAL   R15,PRINT
2720   2D36                   2771           DC    Z(MEMYMS+2)
2722   2D37                   2772           DC    Z(MEMYMS+3)
2724   4816 0B6C              2773           LH    R1,NOMSG(R6)
2728   41E0 2B50              2774           BAL   R14,CONVERT
272C   000C                   2775           DC    X'C'
272E   2EFE                   2776           DC    Z(MESSAV)
2730   41F0 2B9E              2777           BAL   R15,PRINT
2734   2EFE                   2778           DC    Z(MESSAV)
2736   2F01                   2779           DC    Z(MESSAV+3)
2738   2668                   2780           AIS   R6,8
273A   C560 0148              2781           CLHI  R6,X'148'
273E   4380 0CD2              2782           BNL   TTYIN
2742   4300 26EA              2783           B     MESSOUT+2
                              2784  *
                              2785  *
                              2786  *
2746   4000 2D22              2787  PRTSTAT  STH   R0,ERRNUM
274A   082C                   2788           LHR   R2,STAT
274C   41F0 26D4              2789           BAL   R15,SELADRT
2750   9312                   2790           LBR   R1,R2
2752   41E0 2B50              2791           BAL   R14,CONVERT
2756   0004                   2792           DC    X'4'
2758   2D68                   2793           DC    Z(STATUS)
275A   41F0 2B9E              2794           BAL   R15,PRINT
275E   2D18                   2795           DC    Z(ERRMSG)
2760   2D29                   2796           DC    Z(ENDZ)
2762   41F0 2B9E              2797  STATZ    BAL   R15,PRINT
2766   2D5E                   2798           DC    Z(STATMSG)
2768   2D6B                   2799           DC    Z(STATEND)
276A   2401                   2800  INCERR   LIS   R0,1
276C   6100 2E9A              2801           AHM   R0,TOTALERR
2770   4300 0FDA              2802           B     TSTSEL
```

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                                 2803  *
2774   4000 2D22                 2804  PRTSELA  STH    R0,ERRNUM
2778   D0A0 304A                 2805           STM    R10,SAVEG
277C   41F0 26D4                 2806           BAL    R15,SELADRT
2780   D1A0 304A                 2807           LM     R10,SAVEG
2784   081A                      2808           LHR    R1,R10
2786   41E0 2B50                 2809           BAL    R14,CONVERT
278A   000C                      2810           DC     X'C'
278C   2D52                      2811           DC     Z(SELADR1)
278E   D1A0 304A                 2812           LM     R10,SAVEG
2792   081B                      2813           LHR    R1,R11
2794   41E0 2B50                 2814           BAL    R14,CONVERT
2798   000C                      2815           DC     X'C'
279A   2D58                      2816           DC     Z(SELADR2)
279C   41F0 2B9E                 2817           BAL    R15,PRINT
27A0   2D18                      2818           DC     Z(ERRMSG)
27A2   2D29                      2819           DC     Z(ENDZ)
27A4   41F0 2B9E                 2820           BAL    R15,PRINT
27A8   2D52                      2821           DC     Z(SELADR1)
27AA   2D5D                      2822           DC     Z(END2)
27AC   4300 276A                 2823           B      INCERR
                                 2824  *
                                 2825  *
27B0   4000 2D22                 2826  PRTDATA  STH    R0,ERRNUM
27B4   D0A0 304A                 2827           STM    R10,SAVEG
27B8   41F0 26D4                 2828           BAL    R15,SELADRT
27BC   D1A0 304A                 2829           LM     R10,SAVEG
27C0   D310 305E                 2830           LB     R1,ACTADUP
27C4   41E0 2B50                 2831           BAL    R14,CONVERT
27C8   0000                      2832           DC     X'0'
27CA   2D34                      2833           DC     Z(MEMYMS)
27CC   D1A0 304A                 2834           LM     R10,SAVEG          RESTORE REGISTERS
27D0   C5C0 8000                 2835           CLHI   R12,X'8000'
27D4   4280 27E6                 2836           BL     PRTEXT
27D8   95DD                      2837           EPSR   R13,R13            GET CURRENT PSW STATUS
27DA   C4D0 0010                 2838           NHI    R13,X'0010'        IS BIT 8 EVEN?
27DE   4330 27E6                 2839           BZ     PRTEXT             YES, DO NOT CHANGE PROGRAM ADDRESS
27E2   CAC0 8000                 2840           AHI    R12,X'8000'        NO, ADD 8000 TO PROGRAM ADDRESS
27E6   081C                      2841  PRTEXT   LHR    R1,R12             OUTPUT LS BITS OF ACT ADR
27E8   41E0 2B50                 2842           BAL    R14,CONVERT
27EC   000C                      2843           DC     X'C'
27EE   2D38                      2844           DC     Z(MEMYLS)
27F0   D1A0 304A                 2845           LM     R10,SAVEG          RESTORE REGISTERS
27F4   080E                      2846           LHR    R0,R14
27F6   081D                      2847           LHR    R1,R13
27F8   41E0 2B50                 2848           BAL    R14,CONVERT
27FC   000C                      2849           DC     X'C'
27FE   2D42                      2850           DC     Z(BYTE1)
2800   0810                      2851           LHR    R1,R0
2802   41E0 2B50                 2852           BAL    R14,CONVERT
2806   000C                      2853           DC     X'C'
2808   2D4C                      2854           DC     Z(BYTE3)
280A   41F0 2B9E                 2855           BAL    R15,PRINT
```

```
280E    2D18                          DC    Z(ERRMSG)
2810    2D51                          DC    Z(END1)
2812    4300 276A                     B     INCERR
                          *
                          *
                          *
2816    4000 2D22         PRTADRS     STH   R0,ERRNUM
281A    D0A0 304A                     STM   R10,SAVEG
281E    0812                          LHR   R1,R2
2820    41E0 2B50                     BAL   R14,CONVERT
2824    0008                          DC    X'8'
2826    2DF2                          DC    Z(DEVADRS)
2828    D1A0 304A                     LM    R10,SAVEG
282C    081C                          LHR   R1,R12
282E    41E0 2B50                     BAL   R14,CONVERT
2832    0004                          DC    X'4'
2834    2D68                          DC    Z(STATUS)
2836    41F0 2B9E                     BAL   R15,PRINT
283A    2D18                          DC    Z(ERRMSG)
283C    2D25                          DC    Z(END)
283E    41F0 2B9E                     BAL   R15,PRINT
2842    2DF0                          DC    Z(INTMSG2)
2844    2DF5                          DC    Z(INTEND)
2846    41F0 2B9E                     BAL   R15,PRINT
284A    2D5E                          DC    Z(STATMSG)
284C    2D6B                          DC    Z(STATEND)
284E    C200 2EB8                     LPSW  ENABLE2
                          *
                          *
                          *
2852    4810 2D22         TSTCHK      LH    R1,ERRNUM           IS ERROR FLAG SET ?
2856    4230 0FDA                     BNZ   TSTSEL              NO, CHECK FOR NEXT TEST
285A    4810 0B6C                     LH    R1,NOMSG            IS NOMSG OPT SET ?
285E    2135                          BNZS  RTN1                YES, CHECK FOR NEXT TEST
2860    41F0 2B9E                     BAL   R15,PRINT           NO, PRINT " NO ERROR"
2864    2D98                          DC    Z(NOERR)
2866    2DA3                          DC    Z(ERREND)
2868    4300 0FE0         RTN1        B     TSTSL2              CHECK FOR NEXT TEST
                          *
                          *
                          *
286C    0766              DELAY       XHR   R6,R6               SETUP BXLE REGISTERS
286E    95DD                          EPSR  R13,R13             GET PSW 0-15
2870    40D0 2F70                     STH   R13,SPSW            STORE IT
2874    C4D0 FF0F                     NHI   R13,X'FF0F'         ZERO BITS 8-11
2878    95FD                          EPSR  R14,R13             USE IT
287A    2471                          LIS   R7,1
287C    4880 2EA0                     LH    R8,DVAL
2880    4810 305C                     LH    R1,RDWT             GET READ/WRITE STATUS
2884    9113                          SLLS  R1,3                MULTIPLE BY 8
2886    4890 0CA4                     LH    R9,MULTADR          LOAD ADRS SPECIFIED BY STRBUF OPT
288A    4800 0B7C                     LH    R0,BKGRND           IS BKGRND OPTION = 0 ?
288E    4330 28CC                     BZ    STRMT1              YES, STORE MULTIPLE
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SUBROUTINES

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2892    9001                    2909            SRLS  R0,1               NO, IS BKGRND OPTION = 1 ?
2894    4330 28B0               2910            BZ    FLTPT1             YES, FLOATING POINT
2898    4069 0000               2911  STORE9    STH   R6,0(R9)           NO, STORE A WORD IN MEMORY
289C    4809 0000               2912            LH    R0,0(R9)           LOAD A HALFWORD FROM MEMORY
28A0    0560                    2913            CLHR  R6,R0              IS DATA STORED = DATA READ
28A2    2333                    2914            BES   BXL1               YES, CONTINUE
28A4    C200 2EC8               2915            LPSW  STRERR             NO, PRINT ERROR
28A8    C160 2898               2916  BXL1      BXLE  R6,STORE9          REPEAT UNTIL R6 > R8
28AC    4301 2C4A               2917            B     ERR17(R1)          ERROR
28B0    6800 2EA2               2918  FLTPT1    LE    R0,FLTPVAL         SET UP FLOATING POINT REGS
28B4    2820                    2919            LER   R2,R0
28B6    2840                    2920            LER   R4,R0
28B8    2A02                    2921            AER   R0,R2              ADD
28BA    2B02                    2922            SER   R0,R2              SUBTRACT
28BC    2904                    2923            CER   R0,R4              COMPARE
28BE    2333                    2924            BES   BXL2
28C0    C200 2EC4               2925            LPSW  FLTERR             PRINT ERROR IF FLPT R0 NOT = FLPT R4
28C4    C160 28B0               2926  BXL2      BXLE  R6,FLTPT1          REPEAT UNTIL R6 > R8
28C8    4301 2C4A               2927            B     ERR17(R1)
28CC    D009 0000               2928  STRMT1    STM   R0,0(R9)
28D0    C160 28CC               2929            BXLE  R6,STRMT1
28D4    4301 2C4A               2930            B     ERR17(R1)
                                2931  *
                                2932  *
28D8    D000 2F4C               2933  DELAYM    STM   R0,SAVEP
28DC    24A0                    2934            LIS   R10,X'0'
28DE    4300 28E8               2935            B     DELAYZ
28E2    D000 2F4C               2936  DELAYN    STM   R0,SAVEP
28E6    24A2                    2937            LIS   R10,X'2'
28E8    07BB                    2938  DELAYZ    XHR   R11,R11
28EA    24C1                    2939            LIS   R12,1
28EC    9555                    2940            EPSR  R5,R5
28EE    4050 2F70               2941            STH   R5,SPSW
28F2    C450 FF0F               2942            NHI   R5,X'FF0F'
28F6    9565                    2943            EPSR  R6,R5
28F8    48D0 2D1A               2944            LH    R13,ERRMSG+2
28FC    48E0 0CA4               2945            LH    R14,MULTADR
2900    48F0 0B7C               2946            LH    R15,BKGRND
2904    4330 295C               2947            BZ    STRMT1A
2908    90F1                    2948            SRLS  R15,1
290A    4330 2934               2949            BZ    FLTPT1A
290E    40BE 0000               2950  STORE9A   STH   R11,0(R14)
2912    48FE 0000               2951            LH    R15,0(R14)
2916    05BF                    2952            CLHR  R11,R15
2918    4330 2920               2953            BE    BXL1B
291C    C200 2EC8               2954            LPSW  STRERR
2920    489A 2F7A               2955  BXL1B     LH    R9,SELCOUNT(R10)
2924    4590 2F9A               2956            CLH   R9,COMPARE
2928    4230 2974               2957            BNE   DELAYZX
292C    C1B0 290E               2958            BXLE  R11,STORE9A
2930    4300 298C               2959            B     DELAYZZ
2934    6800 2EA2               2960  FLTPT1A   LE    R0,FLTPVAL
2938    2820                    2961            LER   R2,R0
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293A    2840                   2962          LER    R4,R0
293C    2A02                   2963          AER    R0,R2
293E    2BC2                   2964          SER    R0,R2
2940    2904                   2965          CER    R0,R4
2942    2333                   2966          BES    BXL2B
2944    C200 2EC4              2967          LPSW   FLTERR
2948    489A 2F7A              2968  BXL2B   LH     R9,SELCOUNT(R10)
294C    4590 2F9A              2969          CLH    R9,COMPARE
2950    4230 2974              2970          BNE    DELAYZX
2954    C1B0 2934              2971          BXLE   R11,FLTPT1A
2958    4300 298C              2972          B      DELAYZZ
295C    D00E 0000              2973  STRMT1A STM    R0,0(R14)
2960    489A 2F7A              2974          LH     R9,SELCOUNT(R10)
2964    4590 2F9A              2975          CLH    R9,COMPARE
2968    4230 2974              2976          BNE    DELAYZX
296C    C1B0 295C              2977          BXLE   R11,STRMT1A
2970    4300 298C              2978          B      DELAYZZ
2974    4860 2F70              2979  DELAYZX LH     R6,SPSW
2978    9556                   2980          EPSR   R5,R6
297A    4870 0CAC              2981          LH     R7,TESTSEL
297E    4330 2992              2982          BZ     DELAYZY
2982    08AA                   2983          LHR    R10,R10
2984    4330 2992              2984          BZ     DELAYZY
2988    4300 18CE              2985          B      TEST7EY
298C    4860 2F70              2986  DELAYZZ LH     R6,SPSW
2990    9556                   2987          EPSR   R5,R6
2992    D100 2F4C              2988  DELAYZY LM     R0,SAVEP
2996    030F                   2989          BR     R15
                               2990  *
2998    4800 2E68              2991  DEVCHK  LH     R0,IO
299C    2410                   2992          LIS    R1,0
299E    4010 2E6A              2993          STH    R1,CRTFLG              RESET CRT FLAG
29A2    4010 2E6C              2994          STH    R1,MICROFLG            RESET MICRO IO FLAG
29A6    C500 0001              2995          CLHI   R0,1
29AA    4330 29D0              2996          BE     CRT
29AE    C500 0005              2997          CLHI   R0,5                   CONSOLE ON MICRO IO
29B2    4330 29EA              2998          BE     MICROIO
29B6    4800 2E74              2999          LH     R0,TTYWRT
29BA    4000 2E6E              3000          STH    R0,WRTCMD
29BE    D300 2E7B              3001          LB     R0,TTYADR
29C2    D200 2E70              3002          STB    R0,ADDRESS
29C6    0700                   3003          XHR    R0,R0
29C8    4000 2E6A              3004          STH    R0,CRTFLG
29CC    4300 0A08              3005          B      EXEC
29D0    4800 2E76              3006  CRT     LH     R0,CRTWRT
29D4    4000 2E6E              3007          STH    R0,WRTCMD
29D8    D300 2E7C              3008          LB     R0,CRTADR
29DC    D200 2E70              3009          STB    R0,ADDRESS
29E0    2401                   3010          LIS    R0,1
29E2    4000 2E6A              3011          STH    R0,CRTFLG
29E6    4300 0A08              3012          B      EXEC
29EA    4800 2E78              3013  MICROIO LH     R0,MICROWRT            PICKUP COMMANDS
29EE    4000 2E6E              3014          STH    R0,WRTCMD
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29F2   D300 2E7A        3015            LB    R0,MICROADR         GET ADDRESS
29F6   D200 2E70        3016            STB   R0,ADDRESS          SAVE IT
29FA   24C1             3017            LIS   R0,1                FLAG FOR MICRO IO
29FC   4000 2E6C        3018            STH   R0,MICROFLG
2A00   4300 0A08        3019            B     EXEC
                        3020  *
                        3021  *
                        3022  *
2A04   D000 2FE6        3023  SVCERR    STM   R0,SSAVE
2A08   C800 0096        3024            LHI   R0,X'96'
2A0C   4000 2A62        3025            STH   R0,PSW+2
2A10   C800 3230        3026            LHI   R0,X'3230'
2A14   4300 2A50        3027            B     COMRTN
                        3028  *
2A18   D000 2FE6        3029  FIXPT     STM   R0,SSAVE
2A1C   C800 0048        3030            LHI   R0,X'48'
2A20   4000 2A62        3031            STH   R0,PSW+2
2A24   C800 3231        3032            LHI   R0,X'3231'
2A28   4300 2A50        3033            B     COMRTN
                        3034  *
2A2C   D000 2FE6        3035  FLPT      STM   R0,SSAVE
2A30   C800 0028        3036            LHI   R0,X'28'
2A34   4000 2A62        3037            STH   R0,PSW+2
2A38   C800 3233        3038            LHI   R0,X'3233'
2A3C   4300 2A50        3039            B     COMRTN
                        3040  *
2A40   D000 2FE6        3041  SYSQ      STM   R0,SSAVE
2A44   C800 008C        3042            LHI   R0,X'8C'
2A48   4000 2A62        3043            STH   R0,PSW+2
2A4C   C800 3232        3044            LHI   R0,X'3232'
                        3045  *
2A50   4000 2D22        3046  COMRTN    STH   R0,ERRNUM
2A54   41F0 2B9E        3047            BAL   R15,PRINT
2A58   2D18             3048            DC    Z(ERRMSG)
2A5A   2D25             3049            DC    Z(END)
2A5C   D100 2FE6        3050            LM    R0,SSAVE
2A60   C200 0096        3051  PSW       LPSW  X'96'
                        3052  *
                        3053  *
                        3054  *
2A64   D000 2FE6        3055  EXTINT    STM   R0,SSAVE
2A68   9F12             3056            AIR   R1,R2
2A6A   41E0 2B50        3057            BAL   R14,CONVERT
2A6E   0008             3058            DC    X'8'
2A70   2DF2             3059            DC    Z(DEVADRS)
2A72   C810 2D20        3060            LHI   R1,TESTNUM
2A76   4010 2DEC        3061            STH   R1,INTMSG
2A7A   41F0 2B9E        3062            BAL   R15,PRINT
2A7E   2DEA             3063            DC    Z(INTMSG1)
2A80   2DF5             3064            DC    Z(INTEND)
2A82   D100 2FE6        3065            LM    R0,SSAVE
2A86   C200 0040        3066            LPSW  X'40'
                        3067  *
```

```
                                3068  *
2A8A    0000                    3069  EXTINT1   DC    0
2A8C    0000                    3070            DC    0
2A8E    20F0                    3071            DC    X'20F0'
2A90    C810 2D20               3072            LHI   R1,TESTNUM
2A94    4010 2DF8               3073            STH   R1,AUTOMSG1
2A98    41F0 2B9E               3074            BAL   R15,PRINT
2A9C    2DF6                    3075            DC    Z(AUTOMSG)
2A9E    2DFB                    3076            DC    Z(AUTOEND)
2AA0    C200 2A8A               3077            LPSW  EXTINT1
                                3078  *
                                3079  *
2AA4    4810 0030               3080  ILGINT    LH    R1,X'30'             LOAD DATA TO BE CONVERTED
2AA8    41E0 2B50               3081            BAL   R14,CONVERT          CONVERT TO ASCII CHARACTERS
2AAC    000C                    3082            DC    X'C'
2AAE    2DBC                    3083            DC    Z(ADRS00)
2AB0    4810 0032               3084            LH    R1,X'32'             LOAD DATA TO BE CONVERTED
2AB4    41E0 2B50               3085            BAL   R14,CONVERT          CONVERT TO ASCII CHARACTERS
2AB8    000C                    3086            DC    X'C'
2ABA    2DC2                    3087            DC    Z(ADRS0)
2ABC    41F0 2B9E               3088            BAL   R15,PRINT            PRINT ILLEGAL INSTRUCTION MESSAGE
2AC0    2DA4                    3089            DC    Z(ILGMSG)
2AC2    2DC7                    3090            DC    Z(ILGEND)
2AC4    9DBA                    3091            SSR   R11,R10              IS TTY OFF ?
2AC6    2315                    3092            BNMS  CONT14               NO, LOAD NEW PSW
2AC8    C870 5555               3093            LHI   R7,X'5555'           YES, WRITE TO DISPLAY PANEL
2ACC    41E0 2B3E               3094            BAL   R14,WRITE
2AD0    C200 2EBC               3095  CONT14    LPSW  HALT                 LOAS NEW PSW AND HALT
                                3096  *
                                3097  *
                                3098  *
                                3099  *
                                3100  *
                                3101  *
2AD4    9511                    3102  MALFTN    EPSR  R1,R1
2AD6    24C1                    3103            LIS   R12,1
2AD8    04C1                    3104            NHR   R12,R1
2ADA    23F5                    3105            BFFS  X'F',5
2ADC    4890 0024               3106            LH    R9,X'24'
2AE0    4300 2B14               3107            B     CONT16
2AE4    0811                    3108  CONT13    LHR   R1,R1
2AE6    2133                    3109            BNZS  CONT15
2AE8    4090 0024               3110            STH   R9,X'24'
2AEC    41E0 2B50               3111  CONT15    BAL   R14,CONVERT
2AF0    0000                    3112            DC    X'0'
2AF2    2DE0                    3113            DC    Z(CCADRS)
2AF4    4810 0024               3114            LH    R1,X'24'
2AF8    41E0 2B50               3115            BAL   R14,CONVERT
2AFC    000C                    3116            DC    X'C'
2AFE    2DE4                    3117            DC    Z(MMADRS)
2B00    41F0 2B9E               3118            BAL   R15,PRINT
2B04    2DC8                    3119            DC    Z(MACHMAL)
2B06    2DE9                    3120            DC    Z(MMEND)
```

```
2B08    9DBA                  SSR    R11,R10
2B0A    2315                  BNMS   CONT16
2B0C    C870 AAAA             LHI    R7,X'AAAA'
2B10    41E0 2B3E             BAL    R14,WRITE
2B14    C200 2EBC   CONT16    LPSW   HALT
                    *
                    *
                    *
2B18    D310 2E72   TSTNUM    LB     R1,SUBTST
2B1C    41E0 2B50             BAL    R14,CONVERT
2B20    0004                  DC     X'4'
2B22    2D20                  DC     Z(TESTNUM)
2B24    4810 2D20             LH     R1,TESTNUM
2B28    4010 2D74             STH    R1,VALUE
2B2C    08EF                  LHR    R14,R15
2B2E    48F0 0B6C             LH     R15,NOMSG
2B32    023E                  BNER   R14
2B34    41F0 2B9E             BAL    R15,PRINT
2B38    2D6C                  DC     Z(TESTMSG)
2B3A    2D77                  DC     Z(TESTEND)
2B3C    030E                  BR     R14
                    *
2B3E    24D1        WRITE     LIS    R13,1                PUT DISPLAY IN INCREMENTAL MODE
2B40    DED0 2E7E             OC     R13,INCRMT           LOAD CONTENTS OF R7 INTO R12 AND
2B44    08C7                  LHR    R12,R7               WRITE VALUE ON DISPLAY PANEL
2B46    94CC                  EXBR   R12,R12
2B48    98DC                  WHR    R13,R12
2B4A    DED0 2E7D             OC     R13,NORM
2B4E    030E                  BR     R14
                    *
                    *
                    *
                    * CONVERT ROUTINE   R1 = DATA TO BE CONVERTED TO ASCII
                    *                   R10 = ADRS WHERE DATA IS TO BE STORED
                    *                   R12 = SHIFT VALUE
                    *
2B50    48CE 0000   CONVERT   LH     R12,0(R14)
2B54    48AE 0002             LH     R10,2(R14)
2B58    08B1        CONVERT1  LHR    R11,R1               LOAD DATA TO BE CONVERTED
2B5A    CCBC 0000             SRHL   R11,0(R12)           SHIFT HEX DIGIT TO BE CONVERTED
2B5E    C4B0 000F             NHI    R11,X'F'             ISOLATE HEX DIGIT
2B62    C6B0 0030             OHI    R11,X'30'            CONVERT TO ASCII NUMBER
2B66    C5B0 003A             CLHI   R11,X'3A'            IS IT A VALID NUMBER ?
2B6A    2182                  BLS    CONT                 YES, CONTINUE
2B6C    26B7                  AIS    R11,7                NO,CONVERT TO ASCII LETTER
2B6E    D2BA 0000   CONT      STB    R11,0(R10)           STORE ASCII BYTE IN MESSAGE
2B72    08CC                  LHR    R12,R12              HAS ENTIRE NUMBER BEEN CONVERTED ?
2B74    433E 0004             BZ     4(R14)               YES, RETURN
2B78    27C4                  SIS    R12,4                NO, DECREMENT SHIFT INDEX
2B7A    26A1                  AIS    R10,1                INCREMENT STORAGE INDEX
2B7C    4300 2B58             B      CONVERT1             REPEAT FOR NEXT HEX DIGIT
                    *
                    *
```

```
                            3174  *
2B80    9DB0                3175  GETCHR   SSR    R11,R0             * READ CHAR ROUTINE
2B82    021F                3176           BMR    R15                EXIT IF TTY DU
2B84    2082                3177           BCS    GETCHR             IF BUSY SENSE AGAIN
2B86    4800 2E6C           3178           LH     R0,MICROFLG        CONSOLE ON MICRO IO
2B8A    4330 2B96           3179           BZ     GETCHR1            BRANCH IF NOT
2B8E    9BB0                3180           RDR    R11,R0             GET THE CHARACTER
2B90    9AB0                3181           WDR    R11,R0             ECHO FOR MICRO BUS
2B92    4300 2B98           3182           B      GETCHR2
2B96    9BB0                3183  GETCHR1  RDR    R11,R0             READ A CHARACTER                   E
2B98    C400 007F           3184  GETCHR2  NHI    R0,X'7F'           MASK OF PARITY BIT
2B9C    030F                3185           BR     R15                RETURN
                            3186  *
                            3187  *
                            3188  *
2B9E    D3B0 2E70           3189  PRINT    LB     R11,ADDRESS
2BA2    48A0 2E6A           3190           LH     R10,CRTFLG
2BA6    2332                3191           BZS    CMD3
2BA8    26B1                3192           AIS    R11,1
2BAA    DEB0 2E6E           3193  CMD3     OC     R11,WRTCMD
2BAE    9DBA                3194  SENSE    SSR    R11,R10
2BB0    2315                3195           BNMS   CONT12
2BB2    D2B0 2E71           3196           STB    R11,TTYFLG
2BB6    430F 0004           3197           B      4(R15)
2BBA    2086                3198  CONT12   BCS    SENSE
2BBC    48CF 0000           3199           LH     R12,0(R15)
2BC0    48DF 0002           3200           LH     R13,2(R15)
2BC4    96BC                3201           WBR    R11,R12
2BC6    9DBA                3202           SSR    R11,R10
2BC8    2081                3203           BTBS   8,1
2BCA    48A0 2E6A           3204           LH     R10,CRTFLG
2BCE    433F 0004           3205           BZ     4(R15)
2BD2    07AA                3206           XHR    R10,R10
2BD4    9ABA                3207           WDR    R11,R10
2BD6    9DBA                3208           SSR    R11,R10
2BD8    2081                3209           BTBS   8,1
2BDA    27B1                3210           SIS    R11,1
2BDC    430F 0004           3211           B      4(R15)
                            3212  *
                            3213  *
                            3214  *
                            3215  *
                            3216  *
                            3217  *
                            3218  *
2BE0    C800 2024           3219  ERR1     LHI    R0,X'2024'
2BE4    4300 2774           3220           B      PRTSELA
2BE8    C800 3035           3221  ERR5     LHI    R0,X'3035'
2BEC    4300 2746           3222           B      PRTSTAT
2BF0    C800 3036           3223  ERR6     LHI    R0,X'3036'
2BF4    4300 2746           3224           B      PRTSTAT
2BF8    C800 3037           3225  ERR7     LHI    R0,X'3037'
2BFC    08CA                3226           LHR    STAT,WORK
```

SUBROUTINES

```
2BFE   4300 2746            3227           B      PRTSTAT
2C02   C800 3038            3228  ERR8     LHI    R0,X'3038'
2C06   4300 2774            3229           B      PRTSELA
2C0A   C800 3039            3230  ERR9     LHI    R0,X'3039'
2C0E   4300 2746            3231           B      PRTSTAT
2C12   C800 3130            3232  ERR10    LHI    R0,X'3130'
2C16   4300 2746            3233           B      PRTSTAT
2C1A   C800 3131            3234  ERR11    LHI    R0,X'3131'
2C1E   4300 2746            3235           B      PRTSTAT
2C22   C800 3132            3236  ERR12    LHI    R0,X'3132'
2C26   4300 2746            3237           B      PRTSTAT
2C2A   C800 3133            3238  ERR13    LHI    R0,X'3133'
2C2E   4300 2746            3239           B      PRTSTAT
2C32   C800 3134            3240  ERR14    LHI    R0,X'3134'
2C36   4300 2746            3241           B      PRTSTAT
2C3A   C800 3135            3242  ERR15    LHI    R0,X'3135'
2C3E   4300 27B0            3243           B      PRTDATA
2C42   C800 3136            3244  ERR16    LHI    R0,X'3136'
2C46   4300 27B0            3245           B      PRTDATA
2C4A   C800 3137            3246  ERR17    LHI    R0,X'3137'
2C4E   C200 2EA8            3247           LPSW   DERROR
2C52   C800 3138            3248  ERR18    LHI    R0,X'3138'
2C56   4300 230E            3249           B      PRTERR
2C5A   C800 3139            3250  ERR19    LHI    R0,X'3139'
2C5E   4300 2816            3251           B      PRTADRS
2C62   C800 3235            3252  ERR25    LHI    R0,X'3235'
2C66   4300 2746            3253           B      PRTSTAT
2C6A   C800 3236            3254  ERR26    LHI    R0,X'3236'
2C6E   4300 2746            3255           B      PRTSTAT
2C72   C800 3237            3256  ERR27    LHI    R0,X'3237'
2C76   4300 230E            3257           B      PRTERR
2C7A   C800 3330            3258  ERR30    LHI    R0,X'3330'
2C7E   4300 230E            3259           B      PRTERR
2C82   C800 3331            3260  ERR31    LHI    R0,X'3331'
2C86   4300 2746            3261           B      PRTSTAT
2C8A   C800 3332            3262  ERR32    LHI    R0,X'3332'
2C8E   4300 27B0            3263           B      PRTDATA
2C92   C800 3333            3264  ERR33    LHI    R0,X'3333'
2C96   4300 2774            3265           B      PRTSELA
2C9A   C800 3335            3266  ERR35    LHI    R0,X'3335'
2C9E   C200 2EA8            3267           LPSW   DERROR
2CA2   C800 3336            3268  ERR36    LHI    R0,X'3336'
2CA6   C200 2EA8            3269           LPSW   DERROR
2CAA   C800 3337            3270  ERR37    LHI    R0,X'3337'
2CAE   4300 27B0            3271           B      PRTDATA
2CB2   C800 3338            3272  ERR38    LHI    R0,X'3338'
2CB6   4300 27B0            3273           B      PRTDATA
2CBA   C800 3339            3274  ERR39    LHI    R0,X'3339'
2CBE   C200 2EA8            3275           LPSW   DERROR
2CC2   C800 3430            3276  ERR40    LHI    R0,X'3430'
2CC6   C200 2EA8            3277           LPSW   DERROR
2CCA   C800 3431            3278  ERR41    LHI    R0,X'3431'
2CCE   C200 2EA8            3279           LPSW   DERROR
```

SUBROUTINES

```
2CD2   C800 3432            3280  ERR42     LHI    R0,X'3432'
2CD6   C200 2EA8            3281            LPSW   DERROR
2CDA   C800 3433            3282  ERR43     LHI    R0,X'3433'
2CDE   4300 2746            3283            B      PRTSTAT
2CE2   C800 3434            3284  ERR44     LHI    R0,X'3434'
2CE6   4300 27B0            3285            B      PRTDATA
2CEA   C800 3435            3286  ERR45     LHI    R0,X'3435'
2CEE   4300 2746            3287            B      PRTSTAT
2CF2   C800 3436            3288  ERR46     LHI    R0,X'3436'
2CF6   4300 2746            3289            B      PRTSTAT
                            3290  *
                            3291  *
                            3292  *
2CFA   0D0A                 3293  TITLE     DC     X'0D0A',C'S16 SELCH TEST 06-222 R01',X'0D0A'
2CFC   5331 3620 5345 4C43
2D04   4820 5445 5354 2030
2D0C   362D 3232 3220 5230
2D14   3120
2D16   0D0A
       0000 2D17            3294  ENDOF     EQU    *-1
                            3295  *
                            3296  *
                            3297  * ERROR MESSAGE = ERROR TTEE
                            3298  *                 EX XXXXXX
                            3299  *                 RD YYYYYY
                            3300  *
                            3301  * TT = TEST NUMBER  EE = ERROR NUMBER
                            3302  * XXXXXX = EXP ECTED DATA  YYYYYY = DATA READ
                            3303  *
2D18   0D0A                 3304  ERRMSG    DC     X'0D0A'
2D1A   4552 524F 5220       3305            DC     C'ERROR '
2D20   0000                 3306  TESTNUM   DC     X'0'
2D22   0000                 3307  ERRNUM    DC     X'0'
2D24   0D0A                 3308            DC     X'0D0A'
       0000 2D25            3309  END       EQU    *-1
2D26   0000                 3310  SELADRZ   DC     X'0000'
2D28   0D0A                 3311            DC     X'0D0A'
       0000 2D29            3312  ENDZ      EQU    *-1
2D2A   4D45 4D4F 5259 2020  3313            DC     C'MEMORY    '
2D32   2020
2D34   0000                 3314  MEMYMS    DC     0
2D36   2020                 3315            DC     X'2020'
2D38   0000                 3316  MEMYLS    DC     0
2D3A   0000                 3317            DC     0
2D3C   0D0A                 3318            DC     X'0D0A'
2D3E   4558 2020            3319            DC     C'EX  '
2D42   0000                 3320  BYTE1     DC     X'0'
2D44   0000                 3321  BYTE2     DC     X'0'
2D46   0D0A                 3322            DC     X'0D0A'
2D48   5244 2020            3323            DC     C'RD  '
2D4C   0000                 3324  BYTE3     DC     X'0'
2D4E   0000                 3325  BYTE4     DC     X'0'
2D50   0D0A                 3326            DC     X'0D0A'
```

```
SUBROUTINES

      0000 2D51            3327  END1      EQU   *-1
                           3328  *
                           3329  *
2D52  0000                 3330  SELADR1   DC    X'0'
2D54  0000                 3331            DC    X'0'
2D56  0D0A                 3332            DC    X'0D0A'
2D58  0000                 3333  SELADR2   DC    X'0'
2D5A  0000                 3334            DC    X'0'
2D5C  0D0A                 3335            DC    X'0D0A'
      0000 2D5D            3336  END2      EQU   *-1
2D5E  0D0A                 3337  STATMSG   DC    X'0D0A'
2D60  5354 4154 5553 2020  3338            DC    C'STATUS  '
2D68  0000                 3339  STATUS    DC    X'0'
2D6A  0D0A                 3340            DC    X'0D0A'
      0000 2D6B            3341  STATEND   EQU   *-1
                           3342  *
                           3343  *
                           3344  *
2D6C  0D0A                 3345  TESTMSG   DC    X'0D0A',C'TEST  '
2D6E  5445 5354 2020
2D74  0000                 3346  VALUE     DC    X'0000'
2D76  0D0A                 3347            DC    X'0D0A'
      0000 2D77            3348  TESTEND   EQU   *-1
                           3349  *
                           3350  *
                           3351  *
2D78  0D0A 3F20            3352  QMARK     DC    Y'0D0A3F20'
2D7C  0D0A                 3353            DC    X'0D0A'
      0000 2D7D            3354  QEND      EQU   *-1
                           3355  *
                           3356  *
                           3357  *
2D7E  0D0A 2A20            3358  ASTERISK  DC    Y'0D0A2A20'
      0000 2D81            3359  ENDAST    EQU   *-1
                           3360  *
                           3361  *
                           3362  *
2D82  0D0A                 3363  TOTMSG    DC    X'0D0A'
2D84  0000                 3364  TOTALMSG  DC    0
2D86  0000                 3365            DC    0
2D88  544F 5441 4C20 2020  3366            DC    C'TOTAL  '
      0000 2D8F            3367  TOTALEND  EQU   *-1
2D90  4552 524F 5220       3368            DC    C'ERROR',X'0D0A'
2D96  0D0A
      0000 2D97            3369  ERROREND  EQU   *-1
                           3370  *
                           3371  *
                           3372  *
2D98  0D0A                 3373  NOERR     DC    X'0D0A',C'NO ERROR',X'0D0A'
2D9A  4E4F 2045 5252 4F52
2DA2  0D0A
      0000 2DA3            3374  ERREND    EQU   *-1
                           3375  *
```

```
                              3376  *
                              3377  *
2DA4   0D0A                   3378  ILGMSG   DC    X'0D0A',C'ILLEGAL INSTRUCTION'
2DA6   494C 4C45 4741 4C20
2DAE   494E 5354 5255 4354
2DB6   494F 4E20
2DBA   0D0A                   3379           DC    X'0D0A'
2DBC   0000                   3380  ADRS00   DC    0
2DBE   0000                   3381           DC    0
2DC0   2020                   3382           DC    X'2020'
2DC2   0000                   3383  ADRS0    DC    0
2DC4   0000                   3384           DC    0
2DC6   0D0A                   3385           DC    X'0D0A'
       0000 2DC7              3386  ILGEND   EQU   *-1
                              3387  *
                              3388  *
                              3389  *
2DC8   0D0A                   3390  MACHMAL  DC    X'0D0A',C'MACHINE MALFUNCTION'
2DCA   4D41 4348 494E 4520
2DD2   4D41 4C46 554E 4354
2DDA   494F 4E20
2DDE   0D0A                   3391           DC    X'0D0A'
2DE0   00                     3392  CCADRS   DB    0
2DE2   2020                   3393           DC    X'2020'
2DE4   0000                   3394  MMADRS   DC    0
2DE6   00                     3395           DB    0
2DE8   0D0A                   3396           DC    X'0D0A'
       0000 2DE9              3397  MMEND    EQU   *-1
                              3398  *
                              3399  *
                              3400  *
2DEA   0D0A                   3401  INTMSG1  DC    X'0D0A'
2DEC   0000                   3402  INTMSG   DC    X'0'
2DEE   3234                   3403           DC    X'3234'
2DF0   0D0A                   3404  INTMSG2  DC    X'0D0A'
2DF2   0000                   3405  DEVADRS  DC    0
2DF4   0D0A                   3406           DC    X'0D0A'
       0000 2DF5              3407  INTEND   EQU   *-1
                              3408  *
                              3409  *
                              3410  *
2DF6   0D0A                   3411  AUTOMSG  DC    X'0D0A'
2DF8   0000                   3412  AUTOMSG1 DC    0
2DFA   3230                   3413           DC    X'3230'
       0000 2DFB              3414  AUTOEND  EQU   *-1
                              3415  *
                              3416  *
                              3417  *
2DFC   0D0A                   3418  MEMER1   DC    X'0D0A',C'ACCESS PROGRAM MEMORY'
2DFE   4143 4345 5353 2050
2E06   524F 4752 414D 204D
2E0E   454D 4F52 5920
       0000 2E13              3419  MEMER1E  EQU   *-1
```

```
2E14   0D0A                    3420  MEMER2    DC     X'0D0A',C'MEMORY ALLOCATION ERROR'
2E16   4D45 4D4F 5259 2041
2E1E   4C4C 4F43 4154 494F
2E26   4E20 4552 524F 5220
       0000 2E2D               3421  MEMER2E   EQU    *-1
2E2E   0D0A                    3422  TOCMESG   DC     X'0D0A',C'TOP OF MEMORY  '
2E30   544F 5020 4F46 204D
2E38   454D 4F52 5920 2020
2E40   0000                    3423  TOCMS     DC     0
2E42   2020                    3424            DC     X'2020'
2E44   0000                    3425  TOCLS     DC     0
2E46   0000                    3426            DC     0
       0000 2E47               3427  TOCMESGE  EQU    *-1
2E48                           3428            ALIGN  4
2E48   C2C1                    3429  DRWC      DC     X'C2C1'
2E4A   3010                    3430  SRWC      DC     X'3010'
2E4C   0000                    3431  ZERO      DC     X'0'
2E4E   0000                    3432  DISFIL1   DC     X'0'
```

MEMORY ALLOCATION

```
                               3434  *
                               3435  *
                               3436  *
        0000 2E50              3437  STARTADR EQU    *
2E50    00                     3438  ADRS1    DB     0
2E51    00                     3439  ADRS2    DB     0
2E52                           3440           DS     6
        0000 2E58              3441  ENDADRS  EQU    *
2E58    00                     3442  ADRS3    DB     0
2E59    00                     3443  ADRS4    DB     0
2E5A                           3444           DS     6
        0000 2E60              3445  BYTE     EQU    *
2E60    00                     3446  BYTE11   DB     0
2E61    00                     3447  BYTE21   DB     0
2E62                           3448           DS     6
                               3449  *
                               3450  *
                               3451  *
2E68                           3452           ALIGN 4
2E68    0005                   3453  IO       DC     5
2E6A    0000                   3454  CRTFLG   DC     0
2E6C    0000                   3455  MICROFLG DC     0
2E6E    00                     3456  WRTCMD   DB     0
2E6F    00                     3457  RDCMD    DB     0
2E70    00                     3458  ADDRESS  DB     0
2E71    00                     3459  TTYFLG   DB     0
2E72    00                     3460  SUBTST   DB     0
2E73    F8                     3461  CRTCMD   DB     X'F8'
2E74    98                     3462  TTYWRT   DB     X'98'
2E75    A4                     3463  TTYRD    DB     X'A4'
2E76    A3                     3464  CRTWRT   DB     X'A3'
2E77    B1                     3465  CRTRD    DB     X'B1'
2E78    02                     3466  MICROWRT DB     X'02'
2E79    82                     3467  MICRORD  DB     X'82'
2E7A    C0                     3468  MICROADR DB     X'C0'
2E7B    02                     3469  TTYADR   DB     2
2E7C    10                     3470  CRTADR   DB     X'10'
2E7D    80                     3471  NORM     DB     X'80'
2E7E    40                     3472  INCRMT   DB     X'40'
2E7F    F8                     3473  REWIND   DB     X'F8'                 REWIND TAPE
2E80    E3                     3474  SKPFILF  DB     X'E3'                 SKIP FILE FORWARD
2E81    D3                     3475  SKPFILR  DB     X'D3'                 SKIP FILE REVERSE
2E82    E1                     3476  READ1    DB     X'E1'                 READ A RECORD
2E83    E2                     3477  WRITE1   DB     X'E2'                 WRITE A RECORD
2E84    F0                     3478  WRTEOF   DB     X'F0'                 WRITE FILE MARK (EOF)
2E85    E0                     3479  CLEAR1   DB     X'E0'
2E86    02                     3480  CLEAR    DB     X'2'
2E87    04                     3481  INC      DB     X'4'
2E88    08                     3482  STOP     DB     X'08'
        0000 2E88              3483  STOP1    EQU    STOP
        0000 2E88              3484  STOP2    EQU    STOP
2E89    10                     3485  GO       DB     X'10'
2E8A    30                     3486           DB     X'30'
```

MEMORY ALLOCATION

```
2E8B    AB                    3487  DATA1     DB     X'AB'
2E8C    CD                    3488  DATA2     DB     X'CD'
2E8D    EF                    3489  DATA3     DB     X'EF'
2E8E                          3490            DB     *
        0000 2E48             3491  SEEKC     EQU    DRWC
        0000 2E49             3492  RESTOC    EQU    DRWC+1
        0000 2E88             3493  RESETC    EQU    STOP
2E8E    0201                  3494  MSDRW     DC     X'0201'
2E90    10                    3495  CYLCMD    DB     X'10'
2E91    20                    3496  HEDCMD    DB     X'20'
2E92    C2                    3497  SEEKMC    DB     X'C2'
                              3498  *
                              3499  *
                              3500  *
2E98                          3501            ALIGN 8
2E98    0000                  3502  TOTAL     DC     0
2E9A    0000                  3503  TOTALERR  DC     0
2E9C    0000                  3504  OPTSAV    DC     0
2E9E    0000                  3505  TOC       DC     X'0'
2EA0    FFF0                  3506  DVAL      DC     X'FFF0'
2EA2    4110                  3507  FLTPVAL   DC     X'4110'              FLTP VAL
2EA4                          3508  OUTBUF    DS     2
2EA6                          3509  INBUF     DS     2
                              3510  *
                              3511  *
2EA8    2000                  3512  DERROR    DC     X'2000',PRTERRZ
2EAA    2322
2EAC    0000                  3513  SET1      DC     X'0000',DEVCHK
2EAE    2998
2EB0    2000                  3514  ENABLE    DC     X'2000',PRT
2EB2    0B40
2EB4    2000                  3515  ENABLE1   DC     X'2000',INTRTN
2EB6    19C4
2EB8    2000                  3516  ENABLE2   DC     X'2000',INCERR
2EBA    276A
2EBC    A000                  3517  HALT      DC     X'A000',ORG
2EBE    0B60
2EC0    6000                  3518  WAIT      DC     X'6000',DELAY
2EC2    286C
2EC4    2000                  3519  FLTERR    DC     X'2000',ERR36
2EC6    2CA2
2EC8    2000                  3520  STRERR    DC     X'2000',ERR35
2ECA    2C9A
2ECC    6800                  3521  TEST7PS   DC     X'6800',TEST7Z
2ECE    182C
2ED0    6800                  3522  TEST7PSA  DC     X'6800',DELAY
2ED2    286C
2ED4    0000                  3523  TEST7PSB  DC     X'0000',TEST7GA
2ED6    190E
2ED8    0D0A                  3524  SDCBEG    DC     X'0D0A',C'SELCH INTERRUPT  '
2EDA    5345 4C43 4820 494E
2EE2    5445 5252 5550 5420
2EEA    2020
```

MEMORY ALLOCATION

```
2EEC                        3525  SELCHDC  DSH   8
       0000 2EFB            3526  SDCEND   EQU   *-1
2EFC                        3527           ALIGN 4
2EFC                        3528  HEAD     DS    2
2EFE                        3529  MESSAV   DS    4
2F02                        3530  NNSELCH  DS    2
2F04                        3531  INBUFS   DS    8
2F0C                        3532  OUTBUFS  DS    8
2F14                        3533  SAVEZO   DSH   16
2F34                        3534  SAVEL    DS    2
2F36                        3535  SAVEM    DSH   7
2F44                        3536  SAVEQ    DSH   4
2F4C                        3537  SAVEP    DSH   16
2F6C                        3538  SAVEV    DS    2
2F6E                        3539  WTEST    DS    2
2F70                        3540  SPSW     DS    2
2F72                        3541  SELCHS   DS    4
2F76                        3542  SELCNTA  DS    2
2F78                        3543  SELCNTB  DS    2
2F7A                        3544  SELCOUNT DS    2
2F7C                        3545  SLCOUNT  DS    2
2F7E                        3546  SELCTA   DS    2
2F80                        3547  SELCTB   DS    2
2F82                        3548  SELCTC   DS    2
2F84                        3549  SELCTD   DS    2
2F86                        3550  SELCTAZ  DS    2
2F88                        3551  SELCTBZ  DS    2
2F8A                        3552  SELCTCZ  DS    2
2F8C                        3553  SELCTDZ  DS    2
2F8E                        3554  STORE    DS    2
2F90                        3555  SELDEV1  DS    2
2F92                        3556  SELDEV2  DS    2
2F94                        3557  SELDEV3  DS    2
2F96                        3558  SELDEV4  DS    2
2F98                        3559  COUNTER  DS    2
2F9A                        3560  COMPARE  DS    2
2F9C                        3561  IODEV    DS    2
2F9E                        3562  SELCH4   DS    2
2FA0                        3563  CYCNUM   DS    2
2FA2                        3564  SECTOR   DS    2
2FA4                        3565  DISFIL   DS    2
2FA6                        3566  DEVICE   DS    2
                            3567  *
                            3568  *
                            3569  *
2FA8                        3570           ALIGN 4
2FA8                        3571  TABLE1   DS    12
2FB4                        3572  TTYBUF   DS    6
2FBA                        3573  PSWSAVE  DS    4
2FBE                        3574  ACTTOCMS DS    2
2FC0                        3575  ACTTOCLS DS    2
2FC2                        3576  RSAVE    DS    32
2FE2                        3577  RDWTDV   DS    4
```

MEMORY ALLOCATION

```
    2FE6                       3578  SSAVE    DSH   16
    3006                       3579  SAVE     DSH   6
    3012                       3580  SAVE1    DSH   2
    3016                       3581  SAVE2    DSH   7
    3024                       3582  SAVE3    DSH   3
    302A                       3583  SAVE4    DS    2
    302C                       3584  SAVE5    DSH   5
    3036                       3585  SAVE8    DS    6
    303C                       3586  SAVEA    DS    2
    303E                       3587  SAVED    DS    2
    3040                       3588  SAVEF    DSH   5
    304A                       3589  SAVEG    DSH   5
    3054                       3590  SAVEH    DS    2
    3056                       3591  SAVET1   DS    2
    3058                       3592  SAVET2   DS    2
    305A                       3593  TESTZ    DS    2
    305C                       3594  RDWT     DS    2
    305E                       3595  ACTADUP  DS    2
    3060                       3596  INCBUF   DS    2
            0000 3061          3597  PROGEND  EQU   *-1
                               3598  *
    3062    2400               3599  $CHKSUM  LIS   R0,0                PUNCH M17 TAPE WITH CHECKSUM
    3064    9510               3600           EPSR  R1,R0               CLEAR PSW
                               3601  *
    3066    C810 0A00          3602           LHI   R1,X'0A00'          START ADDRESS
    306A    2421               3603           LIS   R2,1                INCREMENT
    306C    C830 2EEB          3604           LHI   R3,SELCHDC-1        FINAL ADDRESS
    3070    2440               3605           LIS   R4,0                CHECKSUM BYTE
    3072    D351 0000          3606  $GEN     LB    R5,0(R1)
    3076    0745               3607           XHR   R4,R5
    3078    C110 3072          3608           BXLE  R1,$GEN
    307C    D240 00B9          3609           STB   R4,MN+3             CHECKSUM BYTE TO BOOT LOADER
                               3610  *
    3080    C810 0080          3611  $TAPE    LHI   R1,X'0080'
    3084    9E21               3612           OCR   R2,R1               DISPLAY  NORMAL MODE
    3086    9444               3613           EXBR  R4,R4
    3088    9824               3614           WHR   R2,R4               CHECKSUM BYTE TO D1
    308A    9411               3615           EXBR  R1,R1
    308C    9501               3616           EPSR  R0,R1               HALT PROCESSOR
                               3617  *
                               3618  *
    308E    D360 007A          3619  $PUNCH   LB    R6,X'7A'            GET BOUTDV (PUNCH) ADDRESS
    3092    DE60 007B          3620           OC    R6,X'7B'            START TAPE PUNCH
    3096    9D60               3621           SSR   R6,R0
    3098    2081               3622           BTBS  8,1
    309A    41F0 30DC          3623           BAL   R15,$TAPL           PUNCH LEADER
    309E    9411               3624           EXBR  R1,R1               (R1) = X'8000'
    30A0    C830 00CF          3625           LHI   R3,X'CF'
    30A4    DA61 0000          3626  $PNCH1   WD    R6,0(R1)            PUNCH BOOT LOADER
    30A8    9D60               3627           SSR   R6,R0
    30AA    2081               3628           BTBS  8,1
    30AC    C110 30A4          3629           BXLE  R1,$PNCH1
    30B0    41F0 30E2          3630           BAL   R15,$TAPL1          PUNCH ONE=FOLD GAP.
```

```
                             3631  *
30B4   D340 00B9             3632           LB    R4,MN+3           GET CHECKSUM BYTE
30B8   C810 0A00             3633           LHI   R1,X'A00'         START ADDRESS
30BC   C830 2EEB             3634           LHI   R3,SELCHDC-1      END ADDRESS
30C0   D351 0000             3635  $PNCH2   LB    R5,0(R1)          PUNCH PROGRAM
30C4   0745                  3636           XHR   R4,R5
30C6   9A65                  3637           WDR   R6,R5
30C8   9401                  3638           EXBR  R0,R1
30CA   9820                  3639           WHR   R2,R0             DATA ADDRESS TO DISPLAY
30CC   9D60                  3640           SSR   R6,R0
30CE   2081                  3641           BTBS  8,1
30D0   C110 30C0             3642           BXLE  R1,$PNCH2
30D4   41F0 30DC             3643           BAL   R15,$TAPL         PUNCH TRAILER.
30D8   4300 3080             3644           B     $TAPE             DISPLAY CHECKSUM, HALT PROCESSOR
                             3645  *
30DC   C800 0100             3646  $TAPL    LHI   R0,256            TP PUNCH BLANK LEADER
30E0   2303                  3647           BS    $TAPLP
30E2   C800 0055             3648  $TAPL1   LHI   R0,85             TO PUNCH 1-FOLD GAP
30E6   2701                  3649  $TAPLP   SIS   R0,1
30E8   032F                  3650           BNPR  R15               RETURN
30EA   2430                  3651           LIS   R3,0
30EC   9A63                  3652           WDR   R6,R3             PUNCH BLANK FRAME
30EE   9D68                  3653           SSR   R6,R8
30F0   2081                  3654           BTBS  8,1
30F2   2206                  3655           BS    $TAPLP            CONTINUE.
                             3656  *
30F4                         3657           END
```

```
   MEMORY ALLOCATION

ASSEMBLED BY CAL 03-066R05-01   (32-BIT)

START OPTIONS:  T=16,CROSS,ERLST,

     NO CAL ERRORS
     NO CAL WARNINGS
      2 PASSES

  $CHKSUM   0000 3062       3599*
  $GEN      0000 3072       3606*  3608
  $PNCH1    0000 30A4       3626*  3629
  $PNCH2    0000 30C0       3635*  3642
  $PUNCH    0000 308E       3613*
  $TAPE     0000 3080       3611*  3644
  $TAPL     0000 30DC       3623   3643   3646*
  $TAPL1    0000 30E2       3630   3648*
  $TAPLP    0000 30E6       3647   3649*  3655
  ABSTOP    0000 30F4
  ACTADUP   0000 305E        159    203    527    558    559   1650   2052   2204   2221   2242   2248   2253   2254
                            2258   2264   2391   2392   2477   2830   3595*
  ACTTOCLS  0000 2FC0        210    215    485    492   2201   2218   3575*
  ACTTOCMS  0000 2FBE        209    476   2205   2222   2245   2261   3574*
  ADC       0000 0002
  ADDRESS   0000 2E70        221    547    603   1295   1317   2230   3002   3009   3016   3189   3458*
  ADRS0     0000 2DC2       3087   3383*
  ADRS00    0000 2DBC       3083   3380*
  ADRS1     0000 2E50       1641   2468   3438*
  ADRS2     0000 2E51       1642   2469   3439*
  ADRS3     0000 2E58       1646   2474   3442*
  ADRS4     0000 2E59       1647   2475   3443*
  ADRTRANA  0000 1E58       1773   2036*  2099   2133   2152
  ADRTRANB  0000 1E64       2040*  2086
  ADRTRANI  0000 1E70        838    853    859    877   1074   1176   1558   2044*  2078   2423
  ADRTRANO  0000 1E7A        160    803    818    824    873   1071   1086   1173   1188   1555   1570   1759   2047*
                            2091   2122   2138
  ADRTRANQ  0000 1EA8       2054   2061*
  ADRTRANX  0000 1E80       2039   2043   2046   2049*
  ASTERISK  0000 2D7E        300   3358*
  AUTOEND   0000 2DFB       3076   3414*
  AUTOMSG   0000 2DF6       3075   3411*
  AUTOMSG1  0000 2DF8       3073   3412*
  BADST     0000 0A00        125*
  BKGRND    0000 0B7C        240*  1713   2907   2946
  BRANCH    0000 16B0       1292   1321*  2234
  BRANCH1   0000 16BC       1324*  1330
  BRANCH2   0000 16D2       1323   1332*
  BREAK     0000 1182        556    667*   675
  BRKCHK    0000 20A2       2213   2229*  2252   2257   2267
  BUFADR    0000 169E       1294   1314*
  BUFADR1   0000 0C8C        274*   346    465    483    498    506    513    560   2386
  BUFADR2   0000 0C94        275*   351    472    490    502    508    511    562   2388
  BUFCHK    0000 1F04        829   1054   1153   1482   2103*
  BUFCHK1   0000 0D70        341    346*
```

```
   MEMORY ALLOCATION

BUFCHK2   0000 0D84      347    351*
BUFCK5    0000 1F8C     2141   2144*
BUFCKA    0000 1F4E     2125*  2132   2136
BUFCKB    0000 1F58     2125   2128*
BUFCKC    0000 1F82     2141*  2151   2155
BUFCKD    0000 1F26     2110   2113*
BUFCKE    0000 1F36     2112   2116   2118*
BUFCKF    0000 1F32     2114   2117*
BUMP      0000 0FE8      537*   541
BXL0      0000 1B32     1720   1728   1731*
BXL1      0000 28A8     2914   2916*
BXL1B     0000 2920     2953   2955*
BXL2      0000 28C4     2924   2926*
BXL2B     0000 2948     2966   2968*
BXLE1     0000 1F9E     2148   2150*
BXLEA     0000 1B96     1769   1771*
BXLEB     0000 1B82     1765*  1772   1775
BXLEC     0000 1B8A     1765   1767*
BYTE      0000 2E60     1689   3445*
BYTE1     0000 2D42     2850   3320*
BYTE11    0000 2E60     1686   3446*
BYTE2     0000 2D44     3321*
BYTE21    0000 2E61     1687   3447*
BYTE3     0000 2D4C     2854   3324*
BYTE4     0000 2D4E     3325*
BYTE7     0000 0C6C      270*   393    460    784    787    801    836    868   1039   1042   1066   1135   1138
                        1168   1300   1306   1408   1411   1423   1424   1550   1643   1762   2108   2165   2179
                        2189   2353   2418   2470
BYTECHK   0000 0E1E      388    393*
CCADRS    0000 2DE0     3113   3392*
CHECKA    0000 0DAC      357    361*
CLEAR     0000 2E86     1776   2408   3480*
CLEAR1    0000 2E85     1806   1819   2406   3479*
CLR       0000 136A      882    888*
CMD       0000 1698     1241   1287   1293   1312*
CMD1      0000 1BA4     1747   1766   1776*
CMD1X     0000 1BC4     1782   1785*
CMD1Z     0000 1BD0     1784   1788*
CMD2      0000 10D6      605    610*
CMD3      0000 2BAA     3191   3193*
COMPARE   0000 2F9A     1437   1530   2303   2956   2969   2975   3560*
COMRTN    0000 2A50     3027   3033   3039   3046*
CONCHK    0000 1108      615    622    625*
CONT      0000 2B6E     3164   3166*
CONT1     0000 1692     1288   1310*
CONT12    0000 2BBA     3195   3198*
CONT13    0000 2AF4     3108*
CONT14    0000 2AD0     3092   3095*
CONT15    0000 2AEC     3109   3111*
CONT16    0000 2B14     3107   3122   3125*
CONT2     0000 1642     1283   1285*
CONTIN    0000 0B74      239*   625   1298
CONTR     0000 1318      857    863*
```

```
   MEMORY ALLOCATION

CONTW      0000 12A4        822   828*
CONVERT    0000 2B50        212   216   651   658  2629  2745  2774  2791  2809  2814  2831  2842  2846
                           2852  2865  2870  3057  3081  3085  3111  3115  3130  3157*
CONVERT1   0000 2B58       3159*  3171
COUNTER    0000 2F98        577  1422  1488  1591  1614  1638  1660  1748  1785  1837  1850  1929  1992
                           2104  2276  2287  2322  2332  2336  2380  2384  2453  2488  3559*
CRT        0000 29D0       2996  3006*
CRTADR     0000 2E7C       3008  3470*
CRTCMD     0000 2E73        222  3461*
CRTFLG     0000 2E6A        219   548   604   632  1332  2993  3004  3011  3130  3204  3454*
CRTRD      0000 2E77       3465*
CRTWRT     0000 2E76       3006  3464*
CYCNUM     0000 2FA0        569  1879  1955  2508  3563*
CYCNUMB1   0000 0C0C        258*  284   568  2507
CYCNUMB2   0000 0C14        259*
CYCNUMB3   0000 0C1C        260*
CYCNUMB4   0000 0C24        261*
CYLCMD     0000 2E90       1967  3495*
DATA1      0000 2E8B        968  3487*
DATA2      0000 2E8C        969  3488*
DATA3      0000 2E8D       3489*
DECOD1     0000 1C2C       1822*
DECODE     0000 1C20       1805  1811  1819*
DELAY      0000 286C       2897* 3518  3522
DELAYM     0000 28D8       1509  2933*
DELAYN     0000 28E2       1534  2936*
DELAYZ     0000 28E8       2935  2938*
DELAYZX    0000 2974       2957  2970  2976  2979*
DELAYZY    0000 2992       2982  2984  2988*
DELAYZZ    0000 298C       2959  2972  2978  2986*
DERROR     0000 2EA8       3247  3267  3269  3275  3277  3279  3281  3512*
DEVADRS    0000 2DF2       2867  3059  3405*
DEVCHK     0000 2998       2991* 3513
DEVICE     0000 2FA6        573   581   778   798   833   880   921  1281  2402  2492  3566*
DEVICEN1   0000 0BCC        250*  286   572  1667  2120  2491
DEVICEN2   0000 0BD4        251*
DEVICEN3   0000 0BDC        252*
DEVICEN4   0000 0BE4        253*
DEVICENZ   0000 0DAE        362*  371
DISC       0000 10A6        584   591*
DISCDR     0000 1CBA        591  1875* 2505
DISCHK     0000 1AA4       1669  1683*
DISCK1     0000 13F2        923   930*
DISFIL     0000 2FA4        575  1878  1952  2512  3565*
DISFIL1    0000 2E4F       3432*
DISFILN1   0000 0BEC        254*  574  1600  2511  2702
DISFILN2   0000 0BF4        255*
DISFILN3   0000 0BFC        256*
DISFILN4   0000 0C04        257*
DISTOT     0000 10EA        612   616*
DISX       0000 1D5E       1926  1929*
DISZ       0000 1D6A       1928  1932*
DRIVER     0000 0005         88*  587   589   591   593   795   830  1048  1056  1146  1155  1311  1417
```

```
MEMORY ALLOCATION

                         1485   2499   2503   2505   2517
DRIVER1   0000 23F2      2494   2504   2505*
DRIVER2   0000 2410      2496   2517*
DRIVER3   0000 23DA      2498   2503*
DRIVERM   0000 239E      1416   1484   2277   2385   2487*
DRWC      0000 2E48      1927   1930   3429*  3491   3492
DSD5      0000 1CF8      1894*  1896
DVAL      0000 2EA0      1619   1703   2903   3506*
ENABLE    0000 2EB0      3514*
ENABLE1   0000 2EB4      1596   3515*
ENABLE2   0000 2EB8      2882   3516*
END       0000 2D25      2447   2875   3049   3309*
END1      0000 2D51      2857   3327*
END2      0000 2D5D      2822   3336*
ENDADRS   0000 2E58      1645   1688   2473   3441*
ENDAST    0000 2D81       301   3359*
ENDBY1    0000 2308      2420   2430*
ENDBY2    0000 22EC      2422*  2431
ENDBYTE   0000 22DA       901   1092   1194   2417*
ENDOF     0000 2D17       225   3294*
ENDZ      0000 2D29      2439   2796   2819   3312*
ERR01     0000 143C       978    980    984*
ERR1      0000 2BE0       990   3219*
ERR10     0000 2C12      1675   1803   1815   1862   3232*
ERR11     0000 2C1A      1902   3234*
ERR12     0000 2C22      1909   3236*
ERR13     0000 2C2A      1940   3238*
ERR14     0000 2C32      1907   1971   3240*
ERR15     0000 2C3A      1082   1091   3242*
ERR16     0000 2C42      1184   1193   3244*
ERR17     0000 2C4A      2917   2927   2930   3246*
ERR18     0000 2C52      3248*
ERR19     0000 2C5A      1602   3250*
ERR25     0000 2C62      1712   3252*
ERR26     0000 2C6A      1866   3254*
ERR27     0000 2C72       718    967   1621   2530   2554   2576   2599   3256*
ERR30     0000 2C7A      1777   1807   1813   1820   1828   1843   1893   1960   2411   3258*
ERR31     0000 2C82       920    931   3260*
ERR32     0000 2C8A       886    896    900    914   3262*
ERR33     0000 2C92       730   3264*
ERR35     0000 2C9A      1721   3266*  3520
ERR36     0000 2CA2      1729   3268*  3519
ERR37     0000 2CAA      2130   2146   3270*
ERR38     0000 2CB2      2427   3272*
ERR39     0000 2CBA      2618   3274*
ERR40     0000 2CC2      1507   3276*
ERR41     0000 2CCA      1480   3278*
ERR42     0000 2CD2      1532   3280*
ERR43     0000 2CDA      2012   3282*
ERR44     0000 2CE2      1566   1574   3284*
ERR45     0000 2CEA      1975   3286*
ERR46     0000 2CF2      2010   3288*
ERR5      0000 2BE8      1627   3221*
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ERR6        0000 2BF0       1666    1684    3223*
ERR7        0000 2BF8       3225*
ERR8        0000 2C02       1691    3228*
ERR9        0000 2C0A       1732    3230*
ERREND      0000 2DA3       2892    3374*
ERRMSG      0000 2D18       2438    2446    2765    2766    2795    2818    2856    2874    2944    3048    3304*
ERRNUM      0000 2D22        459     534    2435    2444    2787    2804    2926    2862    2886    3046    3307*
ERROREND    0000 2D97        663    3369*
EXEC        0000 0A08        127*   3005    3012    3019
EXTINT      0000 2A64        142    1162    3055*
EXTINT1     0000 2A8A        147    3069*   3077
FINDTOC     0000 0A7C        159*    197     201
FINDTOC1    0000 0B10        184     193     195     203*
FINDTOC2    0000 0AD4        166     170     182     185*
FIXPT       0000 2A18        145    3029*
FLPT        0000 2A2C        133    3035*
FLTERR      0000 2EC4       2925    2967    3519*
FLTPT       0000 1B1A       1716    1722*
FLTPT1      0000 28B0       2910    2918*   2926
FLTPT1A     0000 2934       2949    2960*   2971
FLTPVAL     0000 2EA2       1722    2918    2960    3507*
FRSRRX      0000 1E2A       2003*
FRSSR       0000 1E20       1965    1973    2000*
FRSSRO      0000 1E24       2001*   2002
FRSSRZ      0000 1E2E       2005*   2006    2013
GETCHR      0000 2B80        310     430     446    3175*   3177
GETCHR1     0000 2B96       3179    3183*
GETCHR2     0000 2B98       3182    3184*
GO          0000 2E89       1649    2476    3485*
HALT        0000 2EBC       3095    3125    3517*
HALT1       0000 00C8        117     119*
HALT2       0000 00CC        118     120*
HEAD        0000 2EFC       1883    1980    2017    2514    3528*
HEAD1       0000 0C4C        266*   2513
HEAD2       0000 0C54        267*
HEAD3       0000 0C5C        268*
HEAD4       0000 0C64        269*
HEDCMD      0000 2E91       2018    3496*
HEX         0000 0EBE        437     443*
HEXASC      0000 0E98        336     342     348     353     358     364     374     382     389     395     409     414     430*
                             433
HEXLP       0000 0EA4        434*    451
ILGEND      0000 2DC7       3090    3386*
ILGINT      0000 2AA4        136    3080*
ILGMSG      0000 2DA4       3089    3378*
IMAGE       0000 0C74        271*    781    1035    1131    1307    1404    2118
IMPTOP      0000 0000R
INBUF       0000 2EA6        563     790     837     842     852     858     865    1045    1059    1063    1141    1158    1165
                            1285    1302    1398    2164    2214    2216    2228    2256    2265    2367    2389    2422    3509*
INBUFS      0000 2F04       1403    1547    2163    2465    3531*
INC         0000 2E87       1783    1786    1976    3481*
INCBUF      0000 3060       2171    2174    2176    2188    2198    2200    2207    2208    2215    2224    2255    3596*
INCERR      0000 276A       2440    2448    2800*   2823    2858    3516
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   MEMORY ALLOCATION

INCRMT    0000 2E7E      3144    3472*
INDEXBF1  0000 1EE6      2093*   2098    2101
INDEXBF2  0000 1EF0      2093    2096*
INDEXBF3  0000 1EBE      2080*   2085    2088
INDEXBF4  0000 1EC8      2080    2083*
INDEXBFI  0000 1EB4       791    1046    1142    1303    1414    2077*
INDEXBFO  0000 1EDC       785    1040    1136    1309    1409    2090*
INTEND    0000 2DF5      2878    3064    3407*
INTMSG    0000 2DEC      3061    3402*
INTMSG1   0000 2DEA      3063    3401*
INTMSG2   0000 2DF0      2877    3404*
INTRTN    0000 19C4      1607*   3515
IO        0000 2E68      2991    3453*
IODEV     0000 2F9C       565     580    3561*
IODEVN1   0000 0BAC       246*    564    1432    1469    1597    1672    2500    2506    2518    2691
IODEVN2   0000 0BB4       247*   1433
IODEVN3   0000 0BBC       248*   1434
IODEVN4   0000 0BC4       249*   1435
IODEVS    0000 0004        84*    819     827     854     862     918    1495    1776    1778    1802    1806    1809    1812
                         1814    1819    1827    1830    1835    1842    1848    1861    2406    2408    2410    2500    2506
                         2518
L1        0000 1260       807*
L2        0000 12D4       842*
LADC      0000 0001
LF        0000 0CDA       299*    406     411     427     471     482
LF1       0000 0E5C       402     411*
LOAD1     0000 1336       870     872*
LOAD2     0000 14C6      1068    1070*
LOAD3     0000 15AA      1170    1172*
LOAD7A    0000 192E      1552*   1564
LOAD7C    0000 1936      1552    1554*
LOAD7D    0000 1974      1553    1575*
LOADA     0000 132E       870*    892
LOADB     0000 14BE      1068*   1080
LOADC     0000 15A2      1170*   1182
LOADER    0000 0080        93*
LOKAGN    0000 0E4E       404     407*
LOOKUP    0000 0D1E       322*    329
LOOP      0000 16A0      1315*   1316
LOOPE1    0000 22C4      2403    2408*
LOOPE2    0000 22CC      2405    2410*
LOOPEZ    0000 22D0      2407    2409    2411*
LOOPZZ    0000 16EE      1337    1341*
MACHMAL   0000 2DC8      3119    3390*
MALFTN    0000 2AD4       139    3102*
MATCH     0000 0D36       330*
MEMER1    0000 2DFC       469    3418*
MEMER1E   0000 2E13       470    3419*
MEMER2    0000 2E14       480    3420*
MEMER2E   0000 2E2D       481    3421*
MEMMOD    0000 0C9C       276*    387     463     526     557    2390
MEMYLS    0000 2D38      2844    3316*
MEMYMS    0000 2D34      2761    2762    2771    2772    2833    3314*
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   MEMORY ALLOCATION

MESS       0000 0CB4         279*    403
MESSAV     0000 2EFE        2776    2778    2779    3529*
MESSCHK    0000 0E3E         394     403*
MESSOUT    0000 26E8         405    2753*   2783
MESSX      0000 270C        2759    2764*
MESSZ      0000 2714        2763    2767*
MICROADR   0000 2E7A        3015    3468*
MICROFLG   0000 2E6C         630     667    1322    2994    3018    3178    3455*
MICROIO    0000 29EA        2998    3013*
MICRORD    0000 2E79        3467*
MICROWRT   0000 2E78        3013    3466*
MMADRS     0000 2DE4        3117    3394*
MMCHK1     0000 0F20         464     474     476*
MMCHK2     0000 0F12         467     472*
MMCHK3     0000 0F06         468*    475
MMCHK4     0000 0F7E         494     497     506*
MMCHK5     0000 0F36         478     483*
MMCHK6     0000 0F2A         479*    486     489     493     496     501     505     509     514     515     520     525
MMCHK7     0000 0F4A         487     490*
MMCHK8     0000 0F66         477     498*
MMCHKA     0000 0FA6         510     517*
MMCHKB     0000 0FBA         515     522*
MMCHKZ     0000 0FCA         518     521     523     526*
MMEND      0000 2DE9        3120    3397*
MMODCHK    0000 0E08         381     387*
MN         0000 00B6         113*   3609    3632
MOVECHK1   0000 0D44         334*
MOVECHK2   0000 0D5A         335     340*
MOVEIN     0000 0C84         273*    340     519     522    2194    2212    2251    2340
MOVEOUT    0000 0C7C         272*    334     517     524    2192    2240    2342
MS1        0000 1DAE        1958    1961*
MSDIS      0000 1D80         587    1949*   2503
MSDISX     0000 1E0C        1989    1992*
MSDISZ     0000 1E18        1991    1995*
MSDRW      0000 2E8E        1990    1993    3494*
MSGTST     0000 10DA         609     611*
MULSEL     0000 2252         736     904     981    1095    1197    1343    2375*
MULTADR    0000 0CA4         277*    356    1704    2906    2945
MULTCHK    0000 0D98         352     356*
MULX       0000 229E        2378    2383    2395*
MVCHK      0000 1FF0         902    1093    1195    2178*
MVCHK1     0000 202E        2193    2197*
MVCHK2     0000 206C        2196    2214*
MVCHK3     0000 2052        2202    2203    2207*
MVCHK4     0000 2092        2219    2220    2224*
MVCHK6     0000 20CA        2210    2227    2240*
MVCHK7     0000 210E        2241    2258*
MVCHK8     0000 200C        2181    2187*
MVCHK9     0000 2010        2184    2186    2188*
MVCHKA     0000 1FB2        1341    1577    2159*
MVCHKAA    0000 1FDE        2172*   2175
MVCHKB     0000 1FD6        2168    2170*
MVCHKXX    0000 2018        2177    2190*
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   MEMORY ALLOCATION

MVCHKYY   0000 1FE8      2173   2176*
MVEXIT    0000 20C2      2206   2223   2238*  2247   2263
NEXT      0000 0E92       325    428*
NMTCK1    0000 1CA2      1859*
NMTNCK    0000 1C9E      1808   1821   1829   1831   1844   1858*
NNSELCH   0000 2F02      1399   1497   1525   1542   2170   2337   2351   3530*
NOERR     0000 2D98      2891   3373*
NOMSG     0000 0B6C       238*   611   1579   2754   2755   2768   2769   2773   2888   3136
NORM      0000 2F7D      3148   3471*
NSELCH    0000 0B84       241*   372    383   1451   2334   2379   2632   2651   2689
NSELCHNZ  0000 0DD2       370    372*
ODDCHK1   0000 1378       889    893*
ODDCK2    0000 14E6      1077   1081*
ODDCK3    0000 15CA      1179   1183*
ODDCK7    0000 1956      1561   1565*
OKIN      0000 0D18       312    314    319*
OKIN2     0000 0D1A       320*   429
OKR       0000 130A       835    845    846    850    858*
OKRR      0000 1312       841    860*
OKW       0000 1296       800    810    811    815    823*
OKWW      0000 129E       806    825*
OPTCHK    0000 10C2       539    603*
OPTSAV    0000 2E9C       535    542   3504*
ORG       0000 0B60       236*   322    330    334    340    346    351    356    362    372    380    387    393
                          401    403    407    410    413    423    424   3517
OUTADR    0000 1B6E      1751   1755   1757   1758*
OUTBUF    0000 2EA4       561    777    802    807    817    823    864   1036   1051   1062   1083   1132   1149
                         1164   1185   1239   1308   1397   1758   2111   2162   2197   2199   2211   2250   2350
                         2360   2362   2363   2387   3508*
OUTBUFS   0000 2F0C      1402   1546   1754   1756   2115   2117   2161   2461   3532*
OUTSEL00  0000 2566      2624*  2635
OUTSELAD  0000 2560      1581   2622*
OUTSELZZ  0000 257C      2628   2631*
PRINT     0000 2B9E       223    226    290    297    468    479    654    661   2437   2445   2636   2760   2764
                         2767   2770   2777   2794   2797   2817   2820   2855   2873   2876   2879   2890   3047
                         3062   3074   3088   3118   3138   3189*
PROGEND   0000 3061        95   3597*
PRT       0000 0B40       219*  3514
PRTADRS   0000 2816      2862*  3251
PRTDATA   0000 27B0      2826*  3243   3245   3263   3271   3273   3285
PRTERR    0000 230E      2435*  3249   3257   3259
PRTERRZ   0000 2322      2444*  3512
PRTEXT    0000 27E6      2836   2839   2841*
PRTSELA   0000 2774      2804*  3220   3229   3265
PRTSTAT   0000 2746      2787*  3222   3224   3227   3231   3233   3235   3237   3239   3241   3253   3255   3261
                         3283   3287   3289
PRTTITLE  0000 0B50       220    223*
PRTTOC    0000 0B58       226*
PRTX      0000 2718      2756   2763*
PRTZ      0000 271A      2757   2769*
PSW       0000 2A60      3025   3031   3037   3043   3051*
PSWHALT2  0000 00C4       114    118*
PSWSAVE   0000 2FBA       129   3573*
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MEMORY ALLOCATION

PURETOP     0000 0000R
QEND        0000 2D7D       293   3354*
QMARK       0000 2D78       292   3352*
QUESTN      0000 0CCC       291*   298
QUESTNZ     0000 0CC8       290*   780   2366   2370
R0          0000 0000        67*   131    131    132    135    138    141    144    147    151    208    304    305
                            306    307    311    313    315    332    412    412    413    425    432    434    436
                            438    440    442    443    445    447    449    725    727    968    970    972    977
                            984   1321   1589   1603   1713   1715   1718   1719   1722   1723   1724   1725   1726
                           1727   1730   1774   1774   2003   2004   2087   2087   2100   2101   2120   2135   2135
                           2154   2154   2435   2444   2526   2540   2542   2550   2564   2572   2586   2595   2609
                           2787   2800   2801   2804   2826   2846   2851   2862   2907   2909   2912   2913   2918
                           2919   2920   2921   2922   2923   2929   2933   2936   2960   2961   2962   2963   2964
                           2965   2973   2988   2991   2995   2997   2999   3000   3001   3002   3003   3003   3004
                           3006   3007   3008   3009   3010   3011   3013   3014   3015   3016   3017   3018   3023
                           3024   3025   3026   3029   3030   3031   3032   3035   3036   3037   3038   3041   3042
                           3043   3044   3046   3050   3055   3065   3175   3178   3180   3181   3183   3184   3219
                           3221   3223   3225   3228   3230   3232   3234   3236   3238   3240   3242   3244   3246
                           3248   3250   3252   3254   3256   3258   3260   3262   3264   3266   3268   3270   3272
                           3274   3276   3278   3280   3282   3284   3286   3288   3599   3600   3616   3621   3627
                           3638   3639   3640   3646   3648   3649
R1          0000 0001        68*    93    104    105    107    112    127    128    129    130    133    134    136
                            137    139    140    142    143    145    146    148    151    152    157    159    198
                            200    211    215    303    309    309    315    316    317    318    319    321    330
                            334    340    346    351    356    362    372    380    387    393    401    403    407
                            410    413    423    424    428    463    476    517    519    522    524    531    531
                            533    533    534    536    537    538    543    544    578    581    583    585    611
                            616    617    625    650    657    808    809    814    843    844    849    864    872
                            890   1062   1070   1078   1164   1172   1180   1318   1318   1341   1397   1402   1405
                           1423   1425   1449   1451   1452   1454   1456   1467   1468   1469   1470   1471   1472
                           1473   1490   1491   1492   1493   1546   1554   1562   1567   1579   2160   2161   2162
                           2163   2164   2192   2194   2197   2198   2199   2200   2201   2209   2212   2214   2215
                           2216   2217   2218   2226   2240   2242   2243   2244   2246   2248   2249   2250   2251
                           2253   2254   2255   2256   2258   2259   2260   2262   2264   2265   2266   2328   2331
                           2332   2335   2335   2336   2340   2342   2350   2353   2354   2355   2358   2360   2363
                           2364   2365   2368   2369   2527   2528   2529   2537   2551   2552   2553   2561   2573
                           2574   2575   2583   2596   2597   2598   2606   2624   2645   2649   2650   2651   2652
                           2654   2656   2658   2659   2660   2662   2663   2664   2665   2667   2668   2669   2670
                           2672   2673   2674   2675   2677   2691   2692   2693   2695   2702   2703   2704   2706
                           2744   2754   2756   2773   2790   2808   2813   2830   2841   2847   2851   2864   2869
                           2886   2888   2904   2905   2917   2927   2930   2992   2993   2994   3056   3060   3061
                           3072   3073   3080   3084   3102   3102   3104   3108   3108   3114   3129   3133   3134
                           3159   3600   3602   3606   3608   3611   3612   3615   3615   3616   3624   3624   3626
                           3629   3633   3635   3638   3642
R10         0000 000A        77*    85    155    174    183    185    192    546    728    729    731    984    985
                            986   1404   1412   1428   1465   1470   1473   1541   1541   1544   1546   1547   1575
                           1763   1763   1767   1768   1770   1770   2083   2036   2471   2472   2473   2625   2626
                           2627   2679   2680   2681   2682   2682   2683   2805   2807   2808   2812   2827   2829
                           2834   2845   2863   2868   2934   2937   2955   2968   2974   2983   2983   3091   3121
                           3158   3166   3170   3190   3194   3202   3204   3206   3206   3207   3208
R11         0000 000B        78*    86    158    196    199    199    204    210    219    221    222    308    547
                            550    551    553    554    603    606    607    608    610    613    614    620    621
                            623    627    634    635    637    641    645    669    673    724    726    727    729
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                                 732    777    807    809    812    817    823    837    842    844    847    852    858
                                 872    876    987    988    989   1070   1073   1083   1085   1172   1175   1185   1187
                                1295   1296   1302   1308   1317   1319   1324   1328   1334   1335   1338   1405   1413
                                1429   1463   1554   1557   1567   1569   1659   1692   1752   1754   1756   1758   2038
                                2042   2049   2113   2229   2230   2231   2232   2235   2297   2302   2303   2310   2313
                                2314   2323   2418   2419   2421   2422   2430   2453   2454   2455   2462   2466   2466
                                2469   2471   2473   2474   2475   2480   2481   2632   2634   2678   2678   2680   2681
                                2683   2684   2685   2813   2938   2938   2950   2952   2958   2971   2977   3091   3121
                                3159   3160   3161   3162   3163   3165   3166   3175   3180   3181   3183   3189   3192
                                3193   3194   3196   3201   3202   3207   3208   3210
R12         0000 000C             79*    87    161    163    165    185    188    190    548    554    555    604    614
                                 621    627    628    645    647    648    648    667    669    670    671    673    674
                                 819    825    827    854    860    862    874    875    878    879    917    926    928
                                 932   1072   1075   1087   1174   1177   1189   1319   1320   1324   1325   1326   1328
                                1329   1338   1430   1461   1556   1559   1571   1649   1652   1653   1767   1771   1894
                                1895   1897   1899   1901   1905   1908   1937   1939   1961   1968   1970   1974   1974
                                1977   2001   2005   2007   2009   2019   2049   2056   2058   2083   2084   2096   2097
                                2128   2131   2144   2150   2232   2233   2300   2304   2424   2455   2458   2458   2461
                                2465   2476   2479   2481   2835   2840   2841   2869   2939   3103   3104   3145   3146
                                3146   3147   3157   3160   3167   3167   3169   3199   3201
R13         0000 000D             80*   206    206    207    208    336    342    348    353    358    364    374    382
                                 389    395    409    414    448    450    812    813    814    816    825    826    847
                                 848    849    851    860    861    874    883    885    888    897    899   1072   1076
                                1088   1089   1090   1174   1178   1190   1191   1192   1396   1395   1399   1401   1402
                                1403   1420   1421   1422   1431   1459   1556   1560   1572   1573   1591   1592   1593
                                1597   1600   1638   1639   1640   1641   1642   1645   1646   1647   1648   1649   1650
                                1651   1652   1799   1832   1840   1845   1949   1986   1995   2000   2011   2036   2040
                                2044   2047   2050   2050   2051   2060   2061   2062   2118   2129   2137   2137   2145
                                2147   2149   2149   2159   2165   2166   2167   2169   2171   2174   2176   2178   2179
                                2180   2182   2183   2185   2187   2188   2189   2190   2238   2301   2304   2318   2319
                                2320   2344   2347   2350   2363   2375   2380   2381   2382   2384   2393   2395   2400
                                2412   2425   2426   2456   2459   2476   2477   2478   2479   2487   2491   2492   2493
                                2495   2497   2501   2507   2508   2509   2510   2511   2512   2513   2514   2515   2519
                                2837   2837   2838   2847   2898   2898   2899   2900   2901   2944   3143   3144   3147
                                3148   3200
R14         0000 000E             81*   175    176    179    180    203    205    209    211    212    216    290    291
                                 297    299    619    651    658    733    878    884    885    888    898    899   1075
                                1076   1090   1177   1178   1192   1559   1560   1593   1594   1597   1598   1600   1601
                                1613   1614   1615   1616   1624   1643   1644   1650   1661   1662   1667   1672   1674
                                1676   1685   1686   1687   1688   1689   1697   1701   1708   1709   1744   1745   1746
                                1748   1749   1756   1779   1780   1788   1800   1801   1822   1822   1824   1826   1875
                                1876   1877   1883   1884   1885   1886   1903   1903   1915   1919   1923   1924   1927
                                1930   1932   1942   1950   1951   1957   1957   1987   1990   1993   2052   2053   2055
                                2103   2104   2105   2117   2119   2120   2123   2126   2128   2129   2134   2139   2142
                                2144   2145   2153   2170   2172   2190   2191   2217   2225   2236   2272   2274   2276
                                2283   2284   2286   2287   2288   2289   2290   2292   2298   2298   2300   2307   2308
                                2320   2345   2348   2360   2362   2364   2365   2367   2368   2369   2377   2379   2382
                                2386   2387   2388   2389   2390   2391   2392   2424   2426   2470   2472   2489   2489
                                2490   2491   2500   2506   2507   2509   2511   2513   2518   2627   2628   2629   2745
                                2774   2791   2809   2814   2831   2842   2846   2848   2852   2865   2870   2901   2945
                                2950   2951   2973   3057   3081   3085   3094   3111   3115   3124   3130   3135   3137
                                3141   3149   3157   3158   3168
R15         0000 000F             82*   160    167    167    168    169    171    171    172    176    180    187    187
```

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   MEMORY ALLOCATION

SAVE        0000 3006          3579*
SAVE1       0000 3012          3580*
SAVE2       0000 3016          1613    1624    1631    1634    1654    1659    1692    1697    1709    2159    2178    2238    2271
                               2278    2375    2393    2395    2417    2428    2452    2482    3581*
SAVE3       0000 3024          2036    2040    2044    2047    2062    3582*
SAVE4       0000 302A          2077    2081    2090    2094    3583*
SAVE5       0000 302C          2283    2290    2292    2297    2310    2323    3584*
SAVE8       0000 3036          1744    1779    1788    1799    1832    1840    1845    1875    1923    1932    1949    1986    1995
                               2103    2123    2126    2134    2139    2142    2153    3585*
SAVEA       0000 303C           917     926     928     932    3586*
SAVED       0000 303E          3587*
SAVEF       0000 3040          2229    2235    3588*
SAVEG       0000 304A          2487    2501    2515    2519    2805    2807    2812    2827    2829    2834    2845    2853    2866
                               3589*
SAVEH       0000 3054          3590*
SAVEL       0000 2F34          2644    2711    3534*
SAVEM       0000 2F36          2622    2639    3535*
SAVEP       0000 2F4C          2933    2936    2988    3537*
SAVEQ       0000 2F44          2537    2561    2583    2606    2624    2683    3536*
SAVET1      0000 3056           875     908    3591*
SAVET2      0000 3058           879     911    3592*
SAVEV       0000 2F6C          2743    2748    3538*
SAVEZO      0000 2F14          1589    1603    2400    2412    2526    2540    2542    2550    2564    2572    2586    2595    2609
                               3533*
SDCBEG      0000 2ED8          2637    3524*
SDCEND      0000 2EFB          2638    3526*
SECTOR      0000 2FA2           571    1881    1953    2510    3564*
SECTORN1    0000 0C2C           262*    285     570    2509
SECTORN2    0000 0C34           263*
SECTORN3    0000 0C3C           264*
SECTORN4    0000 0C44           265*
SEEK        0000 1D38          1910    1916*
SEEKC       0000 2E48          1918    3491*
SEEKMC      0000 2E92          1972    3497*
SELADR1     0000 2D52          2811    2821    3330*
SELADR2     0000 2D58          2816    3333*
SELADRT     0000 26D4          2436    2743*   2789    2806    2828
SELADRZ     0000 2D26          2747    3310*
SELCH       0000 0003            83*    717     719     720     721     722     723     724     725     966     970     971     972
                                973     974     975     976    1310    1315    1496    1616    1620    1622    1641    1642    1646
                               1647    1653    1662    1663    1664    1686    1687    1705    2289    2318    2401    2468    2469
                               2474    2475    2490    2744
SELCH1      0000 19C8           794    1047    1055    1145    1154    1415    1483    1613*
SELCH2I     0000 19F8          1058    1157    1286    1631*
SELCH2M     0000 2332          1419    1487    2452*
SELCH2O     0000 1A02          1050    1148    1240    1313    1633    1634*
SELCH2X     0000 235C          2460    2465*
SELCH2Y     0000 2366          2464    2468*
SELCH3      0000 1A50          1053    1061    1152    1161    1481    1524    1659*
SELCH3Q     0000 1A96          1678*   1817
SELCH3X     0000 1A88          1674*   1677
SELCH3Z     0000 1A62          1664*
SELCH4      0000 2F9E           567     579    3562*
```

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  MEMORY ALLOCATION

SELCHS     0000 1ACA        1052    1060    1697*
SELCHAA    0000 241E        2524*   2541    2676
SELCHAA0   0000 2452        2538*   2545
SELCHAA1   0000 2462        2539    2542*   2563    2585    2608
SELCHAA2   0000 246A        2534    2544*
SELCHBB    0000 2472        2548*   2565    2671
SELCHBB0   0000 24A6        2562*   2567
SELCHBB2   0000 24B6        2558    2566*
SELCHCC    0000 24BE        2570*   2587    2666
SELCHCC0   0000 24F2        2584*   2589
SELCHCC2   0000 2502        2580    2588*
SELCHDC    0000 2EEC        2627    2631    2680    2681    3525*   3604    3634
SELCHDD    0000 250A        2593*   2610    2661
SELCHDD0   0000 253E        2607*   2612
SELCHDD2   0000 254E        2603    2611*
SELCHFF    0000 2556        2616*   2648
SELCHN1    0000 0B8C         242*    566    1428    1470    1593    1616    1662    2289    2301    2490    2527    2673
SELCHN2    0000 0B94         243*   1429    2551    2668
SELCHN3    0000 0B9C         244*   1430    2573    2663
SELCHN4    0000 0BA4         245*   1431    2596    2658
SELCHS     0000 2F72        1459    1461    1463    1465    1473    1496    2481    3541*
SELCHXX    0000 2346        2457    2459*
SELCNTA    0000 2F76        1438    1491    1498    3542*
SELCNTB    0000 2F78        1439    1523    1526    3543*
SELCOUNT   0000 2F7A        1440    1501    2535    2536    2559    2560    2581    2582    2604    2605    2955    2968    2974
                            3544*
SELCTA     0000 2F7E        1443    1493    1512    2313    3546*
SELCTAZ    0000 2F86        1444    2532    2533    3550*
SELCTB     0000 2F80        1513    3547*
SELCTBZ    0000 2F88        2556    2557    3551*
SELCTC     0000 2F82        1514    3548*
SELCTCZ    0000 2F8A        2578    2579    3552*
SELCTD     0000 2F84        1515    3549*
SELCTDZ    0000 2F8C        2601    2602    3553*
SELDEV1    0000 2F90        1445    2300    2320    2528    3555*
SELDEV2    0000 2F92        2552    3556*
SELDEV3    0000 2F94        2574    3557*
SELDEV4    0000 2F96        2597    3558*
SELF1      0000 2684        2694    2716*   2718
SELF2      0000 268E        2719*   2721
SELF3      0000 2698        2722*   2724
SELF4      0000 26A2        2725*   2727
SELF5      0000 26AC        2705    2728*   2730
SELF6      0000 26B6        2731*   2733
SELF7      0000 26C0        2734*   2736
SELF8      0000 26CA        2737*   2739
SELINT     0000 1990        1143    1589*
SELINT1    0000 2604        2653    2673*
SELINT2    0000 25F2        2655    2668*
SELINT3    0000 25E0        2657    2663*
SELINTA    0000 2598        1394    2544*
SELINTX    0000 263E        2691*   2699
SELINTY    0000 2660        2702*   2710
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MEMORY ALLOCATION

```
SELINTZ   0000 2618      2679*   2686
SELTS1    0000 0EDA       331     455*
SELTST    0000 0FD2       530*    624     629
SELTZ     0000 214E      1477    1516    2263*
SELTZ1    0000 216C      2285    2292*
SELXX     0000 19A8      1595    1597*
SENSE     0000 2BAE      3194*   3198
SENSE1    0000 19E6      1622*   1626
SENSE10   0000 1132       631     637*    643
SENSE11   0000 1148       633     645*    646
SENSE2    0000 1BE4      1802*
SENSE3    0000 16E6      1333    1338*   1339
SENSE3A   0000 16EA      1331    1340*
SENSE7    0000 1AE4      1705*   1731
SENSE8    0000 1CA6      1861*   1865
SET1      0000 2EAC       126    3513*
SHIFT     0000 0FF2       532     540*
SHIFT7    0000 1CEE      1889    1891*
SKPFILF   0000 2E80      1830    3474*
SKPFILR   0000 2E81      1827    3475*
SLCOUNT   0000 2F7C      1441    1518    1529    2544    2566    2588    2611    3545*
SLOOP     0000 1652      1243    1292*
SNXX      0000 1018       549     553*
SNZZ      0000 101C       552     554*
SPSW      0000 2F70       172     179    1699    1707    2899    2941    2979    2986    3540*
SRWC      0000 2E4A      3430*
SSAVE     0000 2FE6      3023    3029    3035    3041    3050    3055    3065    3578*
SSEL      0000 2174      1479    1503    1520    2297*
SSL1      0000 217C      2300*   2309
SSL2      0000 2192      2306*   2317
SSL3      0000 21A4      2305    2312*
SSL4      0000 21B8      2315    2318*
STARTO    0000 0A04       125     126*
STARTADR  0000 2E50      1640    2462    2466    2471    3437*
STAT      0000 000C        87*    918     919     924     930    1315    1590    1622    1664    1665    1670    1683    1705
                         1711    1802    1804    1809    1810    1814    1816    1861    1863    2788    3226
STATEND   0000 2D6B      2799    2881    3341*
STATMSG   0000 2D5E      2798    2880    3337*
STATUS    0000 2D68      2793    2872    3339*
STATUS1   0000 0094        99*    103
STATZ     0000 2762      2797*
STOP      0000 2E88       966     974    1663    2529    2553    2575    2598    3482*   3483    3484    3493
STOP1     0000 2E88       717     723    1310    1620    2401    3483*
STOP2     0000 2E88      3484*
STORE     0000 2F8E      1502    1519    2302    3554*
STORE8    0000 1B08      1717*
STORE9    0000 2898      2911*   2916
STORE9A   0000 290E      2950*   2958
STR       0000 009E       104*    112
STR1      0000 0E36       338     344     350     355     360     367     379     384     385     391     401*
STRERR    0000 2EC8      2915    2954    3520*
STRMLT    0000 1B2E      1714    1730*
STRMT1    0000 28CC      2908    2928*   2929
```

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   MEMORY ALLOCATION

STRMT1A    0000 295C        2947    2973*   2977
SUBTST     0000 2E72         536     543    1678    3129    3460*
SVCERR     0000 2A04        3023*
SXX        0000 19BC        1599    1603*
SYSQ       0000 2A40        3041*
TABLE1     0000 2FA8        3571*
TAPDR      0000 10A0         586     589*
TAPEDR     0000 1BD8         589    1799*   2517
TDX        0000 1B66        1753    1756*
TERMCHK    0000 0DC4         363     368*
TERMCK     0000 13C4         828     863     917*
TERMEX     0000 13EC         925     928*
TEST       0000 0B64         237*    407     530
TEST0      0000 11A0         595     711*
TEST1      0000 11F0         596     775*
TEST1A     0000 1234         794*    927
TEST1B     0000 11F8         777*    903     906
TEST2      0000 1400         597     964*
TEST2A     0000 1408         966*    983
TEST3      0000 144C         598    1033*
TEST3A     0000 1454        1035*   1094    1097
TEST4      0000 1520         599    1129*
TEST4A     0000 1528        1131*   1196    1199
TEST5      0000 1604         600    1234*
TEST5A     0000 1612        1238*   1346
TEST6      0000 1628         601    1277*
TEST6A     0000 1636        1281*   1347
TEST7      0000 170A         602    1393*   1750    1781    1833    1846    1925    1988    2109
TEST7A     0000 1716        1396*   2339
TEST7A1    0000 1806        1453    1464*
TEST7A2    0000 17FE        1455    1462*
TEST7A3    0000 17F6        1457    1460*
TEST7AA    0000 177C        1400    1428*
TEST7AX    0000 1812        1450    1467*
TEST7B     0000 1720        1399*   1427
TEST7BZ    0000 17B4        1443*   1448
TEST7D0    0000 187E        1501*   1510
TEST7DD    0000 1892        1504    1506*
TEST7DZ    0000 183C        1478    1481*   1505
TEST7EA    0000 18F0        1521    1531*   1536
TEST7ED    0000 18BE        1518*   1528    1537
TEST7EQ    0000 18E8        1517    1529*
TEST7EX    0000 198C        1580    1582*
TEST7EY    0000 18CE        1522*   2985
TEST7EZ    0000 18A4        1499    1511*
TEST7GA    0000 190E        1541*   3523
TEST7GB    0000 1916        1544*   1576
TEST7GC    0000 190A        1527    1538*
TEST7PS    0000 2ECC        2543    3521*
TEST7PSA   0000 2ED0        1466    1474    3522*
TEST7PSB   0000 2ED4        1538    3523*
TEST7Z     0000 182C        1477*   3521
TESTDR     0000 1B3A         593    1744*   2499
```

MEMORY ALLOCATION

```
TESTEND   0000 2D77      3140    3348*
TESTER    0000 10AC       582     593*
TESTMSG   0000 2D6C      3139    3345*
TESTNUM   0000 2D20      3060    3072    3132    3133    3306*
TESTSEL   0000 0CAC       278*    380    1449    1535    1752    2113    2272    2284    2326    2377    2456    2981
TESTST    0000 0E60       408     412*
TESTZ     0000 305A       793     821     856     893    3593*
TIMER     0000 19F0      1623    1626*
TIMER1    0000 1AF4      1706    1711*
TITLE     0000 2CFA       224    3293*
TOC       0000 2F9E      3505*
TOCLS     0000 2E44       218    3425*
TOCMESG   0000 2E2E       227    3422*
TOCMESGE  0000 2E47       228    3427*
TOCMS     0000 2E40       214    3423*
TOTAL     0000 2E98       457     617     618     650    3502*
TOTALEND  0000 2D8F       656    3367*
TOTALERR  0000 2F9A       458     657    2801    3503*
TOTALMSG  0000 2D84       653     660     662    3364*
TOTMSG    0000 2D82       655    3363*
TS1END    0000 13A8       894     908*
TSELCK    0000 0DEE       373     380*
TST       0000 10B2       578     595*   1680
TST00     0000 0E66       414*    426
TST01     0000 0E72       418*    422
TST2      0000 0E7E       419     423*
TSTCHK    0000 2852       737     905     982    1096    1198    1582    2886*
TSTCHK1   0000 1390       871     887     901*
TSTCHK2   0000 1508      1069    1092*
TSTCHK3   0000 15EC      1171    1194*
TSTCHK7   0000 197A      1545    1577*   2338
TSTCHKZ   0000 1394       902*    910     913
TSTNUM    0000 2B18       711     775     964    1033    1129    1234    1277    1393    3129*
TSTPAT    0000 1F76      2121    2137*
TSTSEL    0000 0FDA       533*   2802    2887
TSTSL2    0000 0FE0       535*   1344    2893
TTYADR    0000 2E7B      3001    3469*
TTYBUF    0000 2FB4       305     306     307     315     324    3572*
TTYCHK    0000 114C       626     636     644     647*
TTYFLG    0000 2E71       456     623     647    3196    3459*
TTYIN     0000 0CD2       236     297*    649     664     668     676    1342    2782
TTYRD     0000 2E75      3463*
TTYWRT    0000 2E74      2999    3462*
VALUE     0000 2D74      3134    3346*
WAIT      0000 2EC0      1150    1159    3518*
WAITREW   0000 1C10      1814*   1818
WDFT      0000 1E4A      1979    1985    2017*
WEOF      0000 1C70      1823    1842*
WFILE     0000 1D00      1897*   1900    1911
WFILE2    0000 1D20      1904    1906    1908*
WORK      0000 000A        85*    781     789     921     922    1035    1044    1131    1140    1238    1238    1281    1282
                         1284    1293    1301    1307    1636    1637    1637    1640    1644    1645    1678    1679    1680
                         1680    1681    1682    1688    1690    1808    1821    1829    1831    1844    1864    3226
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   MEMORY ALLOCATION

WORK1      0000 000B          86*    790    802   1036   1045   1132   1141   1239   1285   1294   1689   1690   2111
                            2115   2117
WRITE      0000 2B3E         619    733   2237   3094   3124   3143*
WRITE1     0000 2E83        1848   1851   3477*
WRT        0000 1C7C        1845*
WRTCMD     0000 2E6E         607    610   1296   3000   3007   3014   3193   3456*
WRTDAT     0000 11AE         715*   735
WRTEOF     0000 2E84        1842   3478*
WRTX       0000 1C8E        1847   1850*
WSAA       0000 21E0        2329   2334*
WSBB       0000 21EA        2333   2337*
WSCC       0000 2206        2341   2344*
WSDD       0000 220C        2343   2347*
WSEE       0000 2210        2346   2349*
WSEEK1     0000 1D76        1939*  1941
WSEEKC     0000 1D72        1915   1919   1937*  1938
WSELCH     0000 2132         712    776    965   1034   1130   1235   1278   2271*
WSELCHZ    0000 21D0        1395   1578   2328*
WSFF       0000 2216        2351*  2361
WSGG       0000 2234        2352   2362*
WSHH       0000 222C        2357   2359*
WTEST      0000 2F6E        1237   1280   1345   3539*
XAA        0000 25AA        2649*  2650
XADRTRAN   0000 1EB0        2055   2066*
XCC        0000 0A64         151*   152
XR         0000 167E        1242   1304*
XX         0000 0C0C         284*
YY         0000 0C2C         285*
ZERO       0000 2E4C         205   1778   2057   3431*
ZRO        0000 11A8         713*   738
ZZ         0000 0BCC         286*   362
```

```
                         732    777    807    809    812    817    823    837    842    844    847    852    858
                         872    876    987    988    989   1070   1073   1083   1085   1172   1175   1185   1187
                        1295   1296   1302   1308   1317   1319   1324   1328   1334   1335   1338   1405   1413
                        1429   1463   1554   1557   1567   1569   1659   1692   1752   1754   1756   1758   2038
                        2042   2049   2113   2229   2230   2231   2232   2235   2297   2302   2303   2310   2313
                        2314   2323   2418   2419   2421   2422   2430   2453   2454   2455   2462   2466   2466
                        2469   2471   2473   2474   2475   2480   2481   2632   2634   2678   2678   2680   2681
                        2683   2684   2685   2813   2938   2938   2950   2952   2958   2971   2977   3091   3121
                        3159   3160   3161   3162   3163   3165   3166   3175   3180   3181   3183   3189   3192
                        3193   3194   3196   3201   3202   3207   3208   3210
R12         0000 000C     79*    87    161    163    165    185    188    190    548    554    555    604    614
                         621    627    628    645    647    648    648    667    669    670    671    673    674
                         819    825    827    854    860    862    874    875    878    879    917    926    928
                         932   1072   1075   1087   1174   1177   1189   1319   1320   1324   1325   1326   1328
                        1329   1338   1430   1461   1556   1559   1571   1649   1652   1653   1767   1771   1894
                        1895   1897   1899   1901   1905   1908   1937   1939   1961   1968   1970   1974   1974
                        1977   2001   2005   2007   2009   2019   2049   2056   2058   2083   2084   2096   2097
                        2128   2131   2144   2150   2232   2233   2300   2304   2424   2455   2458   2458   2461
                        2465   2476   2479   2481   2835   2840   2841   2869   2939   3103   3104   3145   3146
                        3146   3147   3157   3160   3167   3167   3169   3199   3201
R13         0000 000D     80*   206    206    207    208    336    342    348    353    358    364    374    382
                         389    395    409    414    448    450    812    813    814    816    825    826    847
                         848    849    851    860    861    874    883    885    888    897    899   1072   1076
                        1088   1089   1090   1174   1178   1190   1191   1192   1396   1396   1399   1401   1402
                        1403   1420   1421   1422   1431   1459   1556   1560   1572   1573   1591   1592   1593
                        1597   1600   1638   1639   1640   1641   1642   1645   1646   1647   1648   1649   1650
                        1651   1652   1799   1832   1840   1845   1949   1986   1995   2000   2011   2036   2040
                        2044   2047   2050   2050   2051   2060   2061   2062   2118   2129   2137   2137   2145
                        2147   2149   2149   2159   2165   2166   2167   2169   2171   2174   2176   2178   2179
                        2180   2182   2183   2185   2187   2188   2189   2190   2238   2301   2304   2318   2319
                        2320   2344   2347   2350   2363   2375   2380   2381   2382   2384   2393   2395   2400
                        2412   2425   2426   2456   2459   2476   2477   2478   2479   2487   2491   2492   2493
                        2495   2497   2501   2507   2508   2509   2510   2511   2512   2513   2514   2515   2519
                        2837   2837   2838   2847   2898   2898   2899   2900   2901   2944   3143   3144   3147
                        3148   3200
R14         0000 000E     81*   175    176    179    180    203    205    209    211    212    216    290    291
                         297    299    619    651    658    733    878    884    885    888    898    899   1075
                        1076   1090   1177   1178   1192   1559   1560   1593   1594   1597   1598   1600   1601
                        1613   1614   1615   1616   1624   1643   1644   1650   1661   1662   1667   1672   1674
                        1676   1685   1686   1687   1688   1689   1697   1701   1708   1709   1744   1745   1746
                        1748   1749   1756   1779   1780   1788   1800   1801   1822   1822   1824   1826   1875
                        1876   1877   1883   1884   1885   1886   1903   1903   1915   1919   1923   1924   1927
                        1930   1932   1942   1950   1951   1957   1957   1987   1990   1993   2052   2053   2055
                        2103   2104   2105   2117   2119   2120   2123   2126   2128   2129   2134   2139   2142
                        2144   2145   2153   2170   2172   2190   2191   2217   2225   2236   2272   2274   2276
                        2283   2284   2286   2287   2288   2289   2290   2292   2298   2298   2300   2307   2308
                        2320   2345   2348   2360   2362   2364   2365   2367   2368   2369   2377   2379   2382
                        2386   2387   2388   2389   2390   2391   2392   2424   2425   2470   2472   2489   2489
                        2490   2491   2500   2506   2507   2509   2511   2513   2518   2627   2628   2629   2745
                        2774   2791   2809   2814   2831   2842   2846   2848   2852   2865   2870   2901   2945
                        2950   2951   2973   3057   3081   3085   3094   3111   3115   3124   3130   3135   3137
                        3141   3149   3157   3158   3168
R15         0000 000F     82*   160    167    167    168    169    171    171    172    176    180    187    187
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                                   223   226   291   299   310   405   430   446   458   479   630   632   635
                                   637   638   639   641   642   654   661   711   712   736   775   776   778
                                   779   785   791   792   793   794   795   798   799   803   804   804   805
                                   818   820   821   824   828   829   830   833   834   838   839   839   840
                                   853   855   856   859   863   873   877   880   881   893   901   902   904
                                   908   909   911   912   929   933   964   965   981  1033  1034  1040  1045
                                  1047  1048  1050  1052  1053  1054  1055  1056  1058  1060  1061  1071  1074
                                  1086  1087  1089  1092  1093  1095  1129  1130  1136  1142  1145  1146  1148
                                  1152  1153  1154  1155  1157  1161  1173  1176  1188  1189  1191  1194  1195
                                  1197  1234  1235  1236  1237  1240  1241  1242  1277  1278  1279  1280  1286
                                  1287  1288  1292  1303  1309  1311  1313  1322  1332  1335  1336  1340  1343
                                  1345  1393  1394  1395  1409  1414  1415  1416  1417  1419  1477  1479  1481
                                  1482  1483  1484  1485  1487  1488  1489  1493  1494  1495  1496  1501  1502
                                  1503  1509  1516  1518  1519  1520  1524  1529  1530  1534  1535  1555  1558
                                  1570  1571  1573  1577  1578  1581  1607  1625  1636  1655  1667  1668  1672
                                  1673  1674  1693  1698  1698  1699  1700  1701  1707  1708  1710  1745  1750
                                  1759  1773  1781  1785  1787  1789  1800  1833  1837  1839  1841  1846  1850
                                  1852  1876  1925  1929  1931  1933  1950  1965  1973  1979  1980  1981  1982
                                  1984  1985  1988  1992  1994  1996  2008  2021  2055  2057  2059  2060  2061
                                  2063  2077  2078  2081  2082  2086  2090  2091  2094  2095  2099  2109  2122
                                  2127  2133  2138  2143  2152  2195  2236  2239  2271  2273  2275  2277  2278
                                  2279  2291  2293  2299  2299  2301  2306  2311  2312  2313  2316  2321  2322
                                  2324  2338  2371  2376  2385  2394  2396  2402  2404  2413  2417  2423  2428
                                  2429  2436  2437  2445  2461  2462  2465  2466  2483  2502  2516  2520  2636
                                  2640  2644  2689  2690  2698  2709  2711  2712  2743  2748  2749  2760  2764
                                  2767  2770  2777  2789  2794  2797  2806  2817  2820  2828  2855  2873  2876
                                  2879  2890  2946  2948  2951  2952  2989  3047  3062  3074  3088  3118  3135
                                  3136  3138  3176  3185  3197  3199  3200  3205  3211  3623  3630  3643  3650
R2          0000 0002               69*    94   106   116   149   361   361   362   368   369   465   466   472
                                   473   483   484   485   488   490   491   492   495   498   499   500   502
                                   503   504   506   507   508   511   512   513   865   876   891   969   971
                                   973   979   986  1063  1073  1079  1165  1175  1181  1398  1403  1413  1424
                                  1426  1436  1437  1438  1439  1440  1441  1443  1444  1445  1497  1498  1547
                                  1557  1563  1590  1594  1598  1601  1723  1725  1726  2204  2205  2207  2208
                                  2209  2221  2222  2224  2225  2226  2245  2246  2251  2252  2330  2334  2337
                                  2355  2356  2531  2532  2533  2535  2544  2555  2556  2557  2559  2566  2577
                                  2578  2579  2581  2588  2600  2601  2602  2604  2611  2646  2661  2662  2666
                                  2667  2671  2672  2676  2677  2694  2695  2705  2706  2755  2757  2788  2790
                                  2864  2919  2921  2922  2961  2963  2964  3056  3603  3612  3614  3639
R3          0000 0003               70*    83    95   150   156   173   181   186   194   320   320   324   327
                                   328   417   420   420   423   424   460   461   484   488   499   500   507
                                   579  1442  1443  1444  1445  1446  1447  2536  2537  2538  2560  2561  2562
                                  2582  2583  2584  2605  2606  2607  2647  3604  3625  3634  3651  3652
R4          0000 0004               71*    84    96    97    99   101   109   111   161   162   164   186   189
                                   191   321   322   326   461   462   491   495   503   504   512   580  1724
                                  1727  1783  1892  1894  1922  1927  1937  1959  1961  1968  1977  1983  1984
                                  1990  2001  2005  2019  2648  2649  2920  2923  2962  2965  3605  3607  3609
                                  3613  3613  3614  3632  3636
R5          0000 0005               72*    88    99   109   164   191   322   324  2940  2940  2941  2942  2943
                                  2980  2987  3606  3607  3635  3636  3637
R6          0000 0006               73*   101   102   102   104   111   178   183   189   194   337   343   349
                                   354   359   365   375   377   383   390   396   397   399   399   401   410
                                   415   418   421   431   431   444   445   713   713   715   720   722   728
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MEMORY ALLOCATION

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                         735    1432    1464    1469    1472    1542    1543    1544    1617    1617    1626    1717    1719
                        1731    1878    1897    1908    1912    1913    1914    1916    1917    1918    1920    1921    1939
                        1952    1963    1966    1967    1972    1976    2004    2007    2017    2018    2037    2041    2045
                        2048    2052    2687    2687    2691    2697    2698    2700    2700    2702    2708    2709    2753
                        2753    2754    2755    2758    2773    2780    2781    2897    2897    2911    2913    2916    2926
                        2929    2943    2979    2980    2986    2987    3619    3620    3621    3626    3627    3637    3640
                        3652    3653
R7          0000 0007     74*    105     106     107     108     115     115     116     618     732     734     782     782
                         786     786     866     866     870     895     975     977     987    1037    1037    1041    1041
                        1064    1064    1068    1081    1084    1085    1133    1133    1137    1137    1166    1166    1170
                        1183    1186    1187    1297    1297    1298    1304    1304    1406    1406    1410    1410    1433
                        1462    1548    1548    1552    1565    1568    1569    1618    1702    1760    1760    1765    1859
                        1859    1865    1881    1882    1886    1887    1887    1888    1890    1891    1922    1953    1954
                        1983    2038    2042    2080    2093    2106    2106    2125    2141    2211    2228    2688    2688
                        2694    2696    2701    2701    2705    2707    2902    2981    3093    3123    3145
R8          0000 0008     75*     98      98     108     113     177     181     188     192     302     303     455     455
                         456     457     458     459     526     527     530     535     540     542     545     546     557
                         558     559     560     561     562     563     564     565     566     567     568     569     570
                         571     572     573     574     575     576     577     578     588     590     592     594     714
                         783     867     890     891     976     979     989    1038    1065    1078    1079    1134    1143
                        1144    1162    1163    1167    1180    1181    1299    1305    1407    1434    1460    1522    1523
                        1525    1526    1549    1562    1563    1619    1703    1761    1771    1860    1880    1912    1916
                        1920    2084    2097    2107    2131    2150    2903    3653
R9          0000 0009     76*    163     190     298     323     333     339     345     366     376     378     386     392
                         398     400     416     435     439     441     715    -716     719     721     784     787     788
                         797     797     801     813     826     832     832     836     848     861     868     869     895
                        1039    1042    1043    1066    1067    1081    1135    1138    1139    1168    1169    1183    1300
                        1306    1408    1411    1435    1458    1500    1500    1506    1508    1511    1511    1512    1513
                        1514    1515    1531    1533    1550    1551    1565    1631    1632    1634    1635    1650    1654
                        1704    1717    1718    1730    1762    1764    1786    1787    1838    1839    1851    1852    1858
                        1879    1880    1913    1917    1921    1930    1931    1955    1956    1966    1982    1993    1994
                        2079    2092    2108    2124    2140    2349    2349    2351    2359    2452    2463    2467    2477
                        2482    2622    2623    2624    2625    2633    2634    2639    2906    2911    2912    2928    2955
                        2956    2968    2969    2974    2975    3106    3110
RDADRS      0000 1AAC   1671    1685*
RDCHP       0000 0CFC    310*    318
RDCMD       0000 2E6F    308     551     553     613     620     634    1334    2231    3457*
RDCMD1      0000 1C4C   1825    1832*
RDCMDX      0000 1C5C   1834    1837*
RDCMDZ      0000 1C68   1836    1840*   1849    1853
RDWT        0000 305C   1648    1746    1780    1801    1877    1924    1951    1987    2459    2904    3594*
RDWTDV      0000 2FE2   1458    1460    1462    1464    1472    1495    1787    1839    1852    1931    1994    3577*
READ1       0000 2E82   1835    1838    3476*
REREAD      0000 1D44   1920*
RESET       0000 1CF0   1892*
RESET1      0000 1588   1162*
RESETC      0000 2E88   1892    1959    1963    2410    3493*
RESTOC      0000 2E49   1914    3492*
REWIND      0000 2E7F   1673    1812    3473*
RSAVE       0000 2FC2    127    3576*
RTN1        0000 2868   2889    2893*
RTN2        0000 22A4   1336    1340    2376    2400*
RUN         0000 0CBC    280*    330
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SAVE       0000 3006       3579*
SAVE1      0000 3012       3580*
SAVE2      0000 3016       1613   1624   1631   1634   1654   1659   1692   1697   1709   2159   2178   2238   2271
                           2278   2375   2393   2395   2417   2428   2452   2482   3581*
SAVE3      0000 3024       2036   2040   2044   2047   2062   3582*
SAVE4      0000 302A       2077   2081   2090   2094   3583*
SAVE5      0000 302C       2283   2290   2292   2297   2310   2323   3584*
SAVE8      0000 3036       1744   1779   1788   1799   1832   1840   1845   1875   1923   1932   1949   1986   1995
                           2103   2123   2126   2134   2139   2142   2153   3585*
SAVEA      0000 303C        917    926    928    932   3586*
SAVED      0000 303E       3587*
SAVEF      0000 3040       2229   2235   3588*
SAVEG      0000 304A       2487   2501   2515   2519   2805   2807   2812   2827   2829   2834   2845   2863   2866
                           3589*
SAVEH      0000 3054       3590*
SAVEL      0000 2F34       2644   2711   3534*
SAVEM      0000 2F36       2622   2639   3535*
SAVEP      0000 2F4C       2933   2936   2988   3537*
SAVEQ      0000 2F44       2537   2561   2583   2606   2624   2683   3536*
SAVET1     0000 3056        875    908   3591*
SAVET2     0000 3058        879    911   3592*
SAVEV      0000 2F6C       2743   2748   3538*
SAVEZ0     0000 2F14       1589   1603   2400   2412   2526   2540   2542   2550   2564   2572   2586   2595   2609
                           3533*
SDCBEG     0000 2ED8       2637   3524*
SDCEND     0000 2EFB       2638   3526*
SECTOR     0000 2FA2        571   1881   1953   2510   3564*
SECTORN1   0000 0C2C        262*   285    570   2509
SECTORN2   0000 0C34        263*
SECTORN3   0000 0C3C        264*
SECTORN4   0000 0C44        265*
SEEK       0000 1D38       1910   1916*
SEEKC      0000 2E48       1918   3491*
SEEKMC     0000 2E92       1972   3497*
SELADR1    0000 2D52       2811   2821   3330*
SELADR2    0000 2D58       2816   3333*
SELADRT    0000 26D4       2436   2743*  2789   2806   2828
SELADRZ    0000 2D26       2747   3310*
SELCH      0000 0003         83*   717    719    720    721    722    723    724    725    966    970    971    972
                            973    974    975    976   1310   1315   1496   1616   1620   1622   1641   1642   1646
                           1647   1653   1662   1663   1664   1686   1687   1705   2289   2318   2401   2468   2469
                           2474   2475   2490   2744
SELCH1     0000 19C8        794   1047   1055   1145   1154   1415   1483   1613*
SELCH2I    0000 19F8       1058   1157   1286   1631*
SELCH2M    0000 2332       1419   1487   2452*
SELCH2O    0000 1A02       1050   1148   1240   1313   1633   1634*
SELCH2X    0000 235C       2460   2465*
SELCH2Y    0000 2366       2464   2468*
SELCH3     0000 1A50       1053   1061   1152   1161   1481   1524   1659*
SELCH3Q    0000 1A96       1678*  1817
SELCH3X    0000 1A88       1674*  1677
SELCH3Z    0000 1A62       1664*
SELCH4     0000 2F9E        567    579   3562*
```