Program Number 06-214

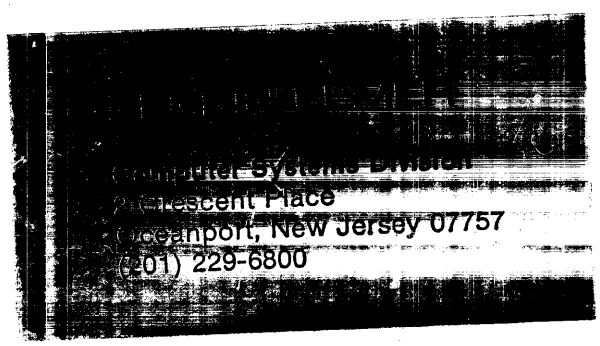
SERIES - 16 19-221

MOS MEMORY TEST

PART 2

Consists of:

Test Program Description	B06-214M95A15
Test Program Listing	06-214F01M96A13
Test Program Listing	06-214F02M96A13
Test Program Paper Tape	06-214F01M17
Test Program Paper Tape	06-214F02M17



SERIES-16 19-221 MOS MEMORY TEST, PART 2

1. GENERAL

Title:

Series-16 19-221 MOS Memory Test, Part 2	06-214R00

Related documents:

Program Listings	06-214F01M96R00A13
	06-214F02M96R00A13
Program Paper Tapes	06-214F01M17R00
	06-214F02M17R00

Test programs to be run prior to loading this test:

8/16E Processor Test, Part 1	06-211
8/16E Processor Test, Part 2	06-212

Other applicable tests:

Common Teletype Basic Confidence Test	06-004
Common CRT Test	06-146
Common Line Printer Test	06-170
Common Carousel 300 Test	06-183
Common Current Loop Interface Test	06-184

2. PURPOSE OF THE TEST

The Series-16 19-221 MOS Memory Test Part 2, Program Number 06-214, verifies the operation of all 8/16E 64kb and larger MOS memories. Part 1 of this program, 06-213, verifies the operation of all 8/16E 32kb MOS memories.

The following test modules are available:

Test 0 (Memory Search Test): This test module lists the limits of memory under test.

Test 1 (Bit Set - Reset Test): This test ensures that all available memory bits can be set and reset at will.

Test 2 (Marching Pattern Test): This test ensures that three patterns can be written throughout memory and complemented.

Test 3 (0 and 1 Walk Test): This test marches a 1 through a field of 0s and a 0 through a field of 1s. It also checks the parity bit.

Test 4 (Double Operation Column Disturb Test): This module ensures that a double column disturb will not cause an error in adjacent columns.

Test 5 (Short Count Relocatable Hammer Disturb Test): This test (short count) relocates a short program throughout memory and executes the program.

Test 6 (Diagonal Galpat Test): This test runs a complete diagonal Galpat on each 32kb of RAM.

Test 7 (Memory Hold Test): This test checks the ability of the MOS memory refresh circuit to operate if a power failure occurs.

Test 8 (Long Count Relocatable Hammer Disturb Test): This overnight (long count) test checks each test location 65,000 times. It also checks background for soft failures.

Test 9 (ECC Disturb Test): This test uses logical data patterns to check the ECC syndrome bits.

Test A (Parity Disturb Test): This test checks the parity bit for set and reset operations under even and odd parity conditions.

3. MINIMUM HARDWARE REQUIRED

Processor:

8/16E with battern backup power supply

Minimum MOS Memory:

64kb or larger

Console Input Device (See Appendix A):

Teletype type device or
CRT on current loop interface or
CRT on PASLA/PALM or
Carousel 15, 30, 35, 300

List Device (See Appendix A):

Teletype type device or
CRT on current loop interface or
CRT on PASLA/PALM or
Line printer or
Carousel 15, 30, 35, 300

Paper Tape Reader:

Teletype type device or
Carousel 35 or
High-speed, paper-tape reader

4. REQUIREMENTS

This program assumes that the applicable test programs have been run without detecting an error.

5. LOADING PROCEDURE

5.1 Test Tape Format

Absolute, non-zoned object tape (M17) with front end bootloader. The test program occupies approximately 7kb memory per section.

5.2 Normal Loading Procedure

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

	LOCATION	CONTENTS
	X'30'	X'0000'
	X'32'	X'0000'
	X'34'	X'0000'
	X'36'	X'0050'
	X'50'	X'D500'
	X'52'	X'00CF'
	X'54'	X'4300'
	X'56'	X'0080'
For TTY or Carousel 35	X'78'	X'0294'
HSPTR	X'78'	X'0399'
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 the CHKSUM byte displayed on the console display register D1. If it is zero, loading is completed. If it is not zero, repeat this loading procedure.

5.3 Loading From Multimedia Diagnostic System

To load this program from the Interdata Multimedia Diagnostic System, refer to Program Description 06-176M95A15 provided in Program Number 06-176.

5.4 Program Execution

Refer to Appendix A and set up the address for the console input device and the list device. Address memory location X'100' for F01 and X'8000' for F02. Start program execution and observe that the following title is output to the list device:

S16 19-221 MOS MEMORY TEST PART 2 06-214F01

or: S16 19-221 MOS MEMORY TEST PART 2 06-214F02

6. OPERATING PROCEDURES

6.1 Normal Testing

To execute the default tests (Tests 0 through 4), enter the following options from the console device. (See Appendix C.) Appendix B summarizes the command/option input format.

*TEST	CR		Selects the default tests (default 0-4).
*SCOPE	0	CR	Selects the error option (default 0).
*DTAPAT	FFFF	CR	Selects the background data pattern (default X'FFFF').
*RUN	CR		Starts the test sequence.

The program executes Test 0 through Test 4 in the default test sequence. Appendix D summarizes expected results. Section 7 summarizes error messages and fault isolation procedures.

6.2 Extended Normal Testing

To execute Test 5, Test 6, Test 9, or Test A, enter the following options from the console device. (See Appendix C.)

*TEST	5 (6,9, or A)	CR	Selects Test 5 (6, 9, or A).
*SCOPE	0	CR	Selects the error option.
*RUN	CR		Starts the test sequence.

The program executes Test 0 and Tests 5 or 6 in sequence.

To execute Test 7, enter the following options from the console device. (See Appendix C.) Appendix B summarizes the command/option input format.

*TEST	7	CR	Selects Test 7.
*SCOPE	0	CR	Selects the error option.
*RUN	CR		Starts the test sequence.

The program now executes Test 0 and Test 7 in sequence. Appendix D summarizes expected results. Section 7 summarizes error messages and fault isolation procedures.

6.3 Optional Testing

6.3.1 General

The appropriate options should be changed (refer to the option table in Appendix C) for the configuration under test. Overnight testing is allowed by turning the console off-line while the test is running. When the console is returned to the on-line condition, the program prints its statistics (total passes and total errors) when it reaches the end of a test module and after a delay has been provided to let CRT warm up. If the console is not returned to the on-line condition before X'7FFF' passes are executed or X'7FFF' errors are detected, the processor halts and resumes execution only upon depressing RUN.

6.3.2 Test 8

To run the Long Relocatable Hammer Disturb Test, use the following option entry sequence:

```
*TEST          8          CR
*SCOPE         0          CR
*DTAPAT      FFFF         CR
*RUN           CR
```

Test 0 prints out the addresses under test. Test 8 increments the display for each location tested. Errors are printed on the list device and the specified SCOPE option dictates further processor action.

7. ERROR PROCEDURES

Error Recovery - If the program detects an error in any test, it executes the SCOPE option entered before the start of program execution.

Error Message and Fault Isolation - Appendix E summarizes error messages. It is designed to guide the user through a systematic fault isolation procedure. Looping can be accomplished by entering the appropriate option. See Appendix C.

8. PROGRAMMING NOTES

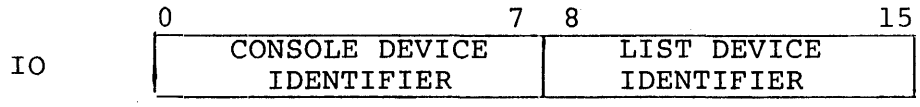
To abort a test in progress or exit the testing sequence when CONTIN equals 1, depress and hold the BREAK key on the console device for five seconds. The test terminates when the console device is interrogated.

If present, the display panel (D3 and D4) indicates the PSW Bits 8-11 (Physical Memory Segment) under test. D1 and D2 indicate the location under test.

Tests 9 and A cannot be run in conjunction with each other. An "ILLEGAL TEST SEQUENCE" message will result.

APPENDIX A
USER DEVICE DEFINITION

The halfword labeled 'IO' (see the Program Listing) has the default value for Teletype, CRT, or Carousel 15/30/35 (all on Current Loop Interface) as the input/output console device. If the setup is different, 'IO' must be changed as follows:



CONSOLE DEVICE IDENTIFIER	MEANING
X'01'	GDT/CRT on PASLA/PALM interface, strapped for FDX operation and highest baud rate.
X'02'	TTY/GDT/CRT/Carousel 15/30/35 on current loop interface.
X'03'	Reserved; interpreted as X'02'.
X'04'	Carousel 300 on PASLA/PALM interface, strapped for FDX operation and highest baud rate.
X'05'	Micro I/O bus (or adapter).
X'00', X'06' - X'FF'	Reserved; interpreted at X'02'.

LIST DEVICE IDENTIFIER	MEANING
X'01'	GDT/CRT on PASLA/PALM interface, strapped for FDX operation and highest baud rate.
X'02'	TTY/GDT/CRT/Carousel 15/30/35 on current loop interface.
X'03'	Line printer (Data Printer or Centronics) on line printer interface.
X'04'	Carousel 300 on PASLA/PALM interface, strapped for FDX operation and highest baud rate.
X'05'	Micro I/O bus (or adapter).
X'00', X'06' - X'FF'	Reserved; interpreted as X'02'.

1. If the Graphic Display Terminal (GDT) is used on PASLA/PALM interface, it should be strapped for device addresses X'10' and X'11' for receive and transmit sides, respectively. If the addresses are different, then the halfword labeled 'PASLADR' (see the Program Listing) must be changed accordingly.

2. If the Teletype typewriter or current loop interface is used, it should be strapped for device address X'02'. If the address is different, the halfword labeled 'CLIFADR' (see the Program Listing) must be changed accordingly.

3. If the line printer interface is used, it should be strapped for device address X'62'. If the address is different, the halfword labeled 'LPADR' (see the Program Listing) must be changed accordingly.

4. If the Carousel 300 is used, it should be strapped for device addresses X'10' and X'11', for receive and transmit sides, respectively. If the addresses are different, the halfword labeled 'C300ADR' (see the Program Listing) must be changed accordingly.

APPENDIX B
COMMAND/OPTION INPUT METHOD

An asterisk (*) output to the console device indicates that the program is waiting user input. All option names must be typed in from the console followed by a space and the desired argument or arguments separated by commas. A carriage return (CR) must be typed to end every command/option input. An invalid command/option name or option value causes a question mark (?) followed by a carriage return (CR), line feed (LF), and an asterisk (*) to be output. If an error is made during command/option entry, it can be handled in two ways: the hash mark (#) can be typed to delete the entire line, causing a carriage return (CR), line feed (LF), and an asterisk (*) to be output; or either the left arrow (←) or backspace (Control-H) can be typed to delete the previous character; or a string of characters can be deleted by typing a left arrow (←) or backspace (Control-H) for each character to be deleted.

APPENDIX C
OPTION TABLE

OPTION	DEFAULT	TESTS	DESCRIPTION
LOPHYS	0	ALL	Low physical sector (address PSW) 0-6
HIPHYS	6	ALL	High physical sector (address PSW) 0-6
DATA	FFFF	5	Data pattern used as background in relocatable hammer disturb tests (four hexadecimal characters)
SCOPE	0	ALL	Error handling procedure 0 = Print error data and skip to next test 1 = Print chip number(s) and skip to next test 2 = Print error data and continue test 3 = Print error data and halt 4 = Ignore error and continue test 5 = Print chip number(s) and error data and continue test
TEST	0,1,2,3,4	ALL	Test number (0 - A) Note: Tests 9 and A cannot be run together
NOMSG	0	ALL	Message handling option 0 = Print all messages 1 = Print only error messages
CONTIN	0	ALL	Testing sequence option 0 = No effect on testing sequence 1 = Run all selected tests continuously (e.g., 0 → 4, 0 → 4, 0 → 4, etc.)
LOOP	0	ALL	Number of loops through each test (0-7FFF)
POUND	A	5	Number of times each location is checked in Test 5
CON	0		Return to console (use with X'8800' code support only)

NOTE

The limits of memory under test are fixed and cannot be changed except with LOPHYS and HIPHYS. LOPHYS and HIPHYS correspond to MSD of OS address.

APPENDIX D
EXPECTED RESULT TABLE

S16 19-221 MOS MEMORY TEST PART 2 06-214F01 (or F02)

```
*TEST
*RUN

TEST 00
MEMORY UNDER TEST
08000-6FFFF (or 00000-07FFF)
NO ERROR
TEST 01
NO ERROR
TEST 02
NO ERROR
TEST 03
NO ERROR
TEST 04
NO ERROR
END OF TEST
*
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

*TEST 5,6,7,8,9 (or 5,6,7,8,A)
*RUN

TEST 00
MEMORY UNDER TEST
08000-6FFFF (or 00000-07FFF)
NO ERROR
TEST 05
NO ERROR
TEST 06
MEMORY UNDER GALPAT TEST
08000-6FFFF (or 00000-07FFF)
NO ERROR
TEST 07
POWER DOWN PROCESSOR FOR 30 SECONDS
NO ERROR
TEST 08
NO ERROR
TEST 09 (or TEST 0A)
NO ERROR
END OF TEST
*
```

APPENDIX E
ERROR MESSAGES

EXPECTED ERROR PRINTOUT

If SCOPE = 0, 2, or 3

```
ERROR TTNN
LOC PXXXX DATA EXP YYYY DATA READ ZZZZ PSW = QQQQ
```

If SCOPE = 4, no error printout until end of test and then only the number of passes and the number of errors are printed.

If SCOPE = 1 or 5

```
ERROR TTNN
SUSPECTED BAD CHIP DEEE
LOC PXXXX DATA ESP YYYY DATA READ ZZZZ PSW = QQQQ
```

Where:

```
    TT = Test number
    NN = Error number

     D = Drive letter (A or B)
   EEE = Chip number within drive area
     P = Physical segment of failure (0 - 6)
  XXXX = Location of memory failure(as seen by processor)
  YYYY = Data written to location XXXX
  ZZZZ = Data read from location XXXX
  QQQQ = PSW at the time of error

  i.e.  LOC 38002 = physical segment 3 and location
        0002 in that segment.
```

If equipped, the display panel register D3 shows the most significant digit of the address under test (as per OS16/MT). Registers D2 and D1 show the address under test (when displayed).

APPENDIX E (Continued)
ERROR MESSAGES

ERROR NUMBER	ERROR CONDITION	POSSIBLE EXPLANATION	SUGGESTED ACTION
TT01	Bit did not set in halfword when X'FFFF' was stored at LOC.	1. Hard reset bit in memory chip 2. "Soft" reset bit in memory chip 3. Timing problem	1. Manually write X'FFFF' to LOC and read LOC. 2. Check timing. 3. Replace memory chip.
TT02	Bit did not reset in halfword when 0 was stored at LOC.	1. Hard set bit in memory chip 2. Hard to reset bit in memory chip 3. Timing problem	1. Manually write X'FFFF' to LOC and read LOC. 2. Check timing. 3. Replace memory chip.
TT03	Bit pattern was not written/read correctly.	1. Hard bit failure (set or reset) 2. Hard to set or reset bit in memory chip (soft failure) 3. Timing problem 4. Double addressing	1. Manually write X'FFFF' to LOC and read LOC. 2. Check timing. 3. Replace memory chip.
TT04	Bit pattern did not complement.	1. Hard bit failure (set or reset) 2. Hard to set or reset bit in memory chip 3. Timing problem	1. Manually write X'FFFF' to LOC and read LOC. 2. Check timing. 3. Replace memory chip.
TT05	Complement bit pattern was disturbed while writing to another location.	1. Double addressing 2. Timing problem 3. Hard to set or reset bit in memory chip (soft failure)	1. Check refresh circuitry. 2. Check memory chip address lines. 3. Replace memory chip.

ERROR NUMBER	ERROR CONDITION	POSSIBLE EXPLANATION	SUGGESTED ACTION
TT06	Original data pattern did not restore properly.	1. Double addressing 2. Timing problem 3. Hard to set or reset bit in memory chip (soft failure)	1. Check refresh circuitry 2. Check memory chip address lines. 3. Replace memory chip.
TT07	Test bit did not reset in halfword when a 0 was walked through a field of all 1s.	1. Hard to reset bit in memory chip 2. Timing problem	1. Manually write X'FFFF' to LOC and read LOC. 2. Check timing. 3. Replace memory chip.
TT08	Test bit did not set in halfword when a 1 was walked through a field of all 0s.	1. Hard to set bit in memory chip 2. Timing problem	1. Manually write X'FFFF' to LOC and read LOC. 2. Check timing. 3. Replace memory chip.
TT09	Original background pattern did not set after single disturb.	1. Refresh problem 2. Double addressing 3. Bad memory chip	1. Check refresh circuitry. 2. Check memory chip address lines. 3. Replace memory chip.
TT0A	Complement background pattern did not set while doing a double disturb.	1. Refresh problem 2. Double addressing 3. Bad memory chip	1. Check refresh circuitry. 2. Check memory chip address lines. 3. Replace memory chip.
TT0B	Complement background pattern did not set after a single disturb.	1. Refresh problem 2. Double addressing 3. Bad memory chip	1. Check refresh circuitry. 2. Check memory chip address lines. 3. Replace memory chip.

APPENDIX E (Continued)
ERROR MESSAGES

ERROR NUMBER	ERROR CONDITION	POSSIBLE EXPLANATION	SUGGESTED ACTION
TT0C	Original background pattern did not reset while doing a double disturb.	1. Refresh problem 2. Double addressing 3. Bad memory chip	1. Check refresh circuitry. 2. Check memory chip address lines. 3. Replace memory chip.
TT0D	Bit(s) failed to set or reset while doing a location pound.	1. Hard bit failure (set or reset) 2. Hard to set or reset bit in memory chip 3. Timing problem	1. Manually write X'FFFF' to LOC and read LOC. 2. Check timing. 3. Replace memory chip.
TT0E	Background cell was disturbed when a test location was written.	1. Double addressing 2. Timing problem 3. Hard to set or reset bit in memory chip (soft failure)	1. Check refresh circuitry. 2. Check memory chip. address lines. 3. Replace memory chip.
TT10	Test cell failed to complement on a diagonal Galpat.	1. Timing problem 2. "Soft" memory chip failure	1. Check timing circuitry. 2. Replace memory chip.
TT11	Running cell changed when test cell was written to on diagonal Galpat.	1. Refresh problem 2. Timing problem 3. "Soft" memory chip failure	1. Check refresh circuitry. 2. Check timing circuitry. 3. Replace memory chip.
TT12	Parity bit error.	1. Parity check failure 2. Refresh problem 3. Timing problem 4. "Soft" memory chip failure	1. Check parity circuitry. 2. Check refresh circuitry. 3. Check timing circuitry. 4. Replace memory chip.

ERROR NUMBER	ERROR CONDITION	POSSIBLE EXPLANATION	SUGGESTED ACTION
TT2N	Upon powering down processor, memory changed at LOC indicated and was detected on read pass "N".	1. P12 or P5S problem 2. Refresh problem 3. Memory chip fails to refresh in standby (burst mode)	1. Check P12 and P5S (W/WO AC power). 2. Check refresh circuitry. 3. Replace memory chip.
TTF1	16-bit, fixed-point arithmetic fault interrupt.	1. Fixed-point division by zero 2. Fixed-point quotient overflow	1. Depress INIT. 2. Restart program from beginning.
TTF2	Illegal instruction interrupt.	1. Program did not load properly 2. Program destroyed	1. Reload program. 2. Start from beginning.
TTF3	Machine malfunction interrupt. Condition code in PSW printout indicates nature of machine malfunction interrupt.	1. Power fail/restore 2. Initialize 3. Memory malfunction	1. Machine will be halted. 2. Depress RUN.
TTF4	Unexpected device spurious interrupt	1. Device interrupt queued 2. RACK0/TACK0 problem	1. Depress INIT. 2. Restart program from beginning. 3. Check backpanel.
TTF5	16-bit, floating-point fault interrupt.	1. Floating-point division by zero 2. Floating-point exponent overflow or underflow	1. Depress INIT. 2. Restart program from beginning.

PROG= MOSQ21 ASSEMBLED BY CAL 03-066R05-01 (32-BIT)

```
                CROSS                                                   MOS30010
                TARGT 16                                                MOS30020
                WIDTH 120                                               MOS30030
MOSQ21          PROG  S16 19-221 MOS MEMORY TEST PART 2 06-214F01M96R00A13 MOS30040
                SQCHK                                                   MOS30050
*  ************************************************************         MOS30060
*       SERIES-16 19-221 MOS MEMORY TEST PART 2 - SECTION 1 (F01)       MOS30070
*       COPYRIGHT        PERKIN-ELMER CORP.        OCTOBER, 1978        MOS30080
*                                                                       MOS30090
*       THIS PROGRAM TESTS THE UPPER PORTION OF A 64KB OR LARGER        MOS30100
*       MOS MEMORY IN  AN INTERDATA SERIES 16 EXTENDED MEMORY           MOS30110
*       PROCESSOR WITH AN OPTIONAL BATTERY BACK-UP POWER SUPPLY.        MOS30120
*                                                                       MOS30130
*       TEST 0                    MEMORY SEARCH TEST                    MOS30140
*                                                                       MOS30150
*       TEST 1                    BIT SET-RESET TEST                    MOS30160
*                                                                       MOS30170
*       TEST 2                    MARCHING PATTERN TEST                 MOS30180
*                                                                       MOS30190
*       TEST 3                    0 AND 1 WALK TEST                     MOS30200
*                                                                       MOS30210
*       TEST 4                    DOUBLE OPERATION COLUMN DISTURB TEST  MOS30220
*                                                                       MOS30230
*       TEST 5 (OPTIONAL)         SHORT COUNT RELOCATABLE               MOS30240
*                                 HAMMER DISTURB TEST                   MOS30250
*                                                                       MOS30260
*       TEST 6 (OPTIONAL)         DIAGONAL GALPAT TEST                  MOS30270
*                                                                       MOS30280
*       TEST 7  (OPTIONAL)        MEMORY HOLD TEST                      MOS30290
*       (REQUIRES MANUAL INTERVENTION & BATTERY BACK-UP POWER SUPPLY)   MOS30300
*                                                                       MOS30310
*       TEST 8 (OPTIONAL)         LONG COUNT RELOCATABLE                MOS30320
*                                 HAMMER DISTURB TEST                   MOS30330
*                                                                       MOS30340
*       TEST 9 (OPTIONAL)         ECC DISTURB TEST (IN 2 PARTS)         MOS30350
*                                                                       MOS30360
*       TEST A (OPTIONAL)         PARITY DISTURB TEST (IN 2 PARTS)      MOS30370
*                                                                       MOS30380
*       THE DEFAULT TESTS ARE 0, 1, 2, 3, & 4.                          MOS30390
*                                                                       MOS30400
*       TEST 0 IS EXECUTED WHENEVER "RUN" IS ENTERED.                   MOS30410
*          TEST 0 FORCES "LOLIM" AND "HILIM" TO THE BOUDRIES PRINTED    MOS30420
*       ON THE LIST DEVICE.                                             MOS30430
*                                                                       MOS30440
*       TEST 7 REQUIRES MANUAL INTERVENTION AND CANNOT BE LOOPED ON     MOS30450
*       WHILE THE PROCESSOR IS UNATTENDED.                              MOS30460
*                                                                       MOS30470
*       TEST 8 IS AN OPTIONAL, LONG TERM (I.E.,OVERNIGHT) TEST.         MOS30480
*                                                                       MOS30490
*       TEST 9 IS AN OPTIONAL TEST TO BE USED WITH ECC TURNED ON.       MOS30500
*                                                                       MOS30510
*       TEST A IS AN OPTIONAL TEST TO BE USED W/PARITY MEMORIES ONLY.   MOS30520
*  ************************************************************         MOS30530
```

```
0000 0000          56  R0      EQU   0                                  MOS30560
0000 0001          57  R1      EQU   1                                  MOS30570
0000 0002          58  R2      EQU   2                                  MOS30580
0000 0003          59  R3      EQU   3                                  MOS30590
0000 0004          60  R4      EQU   4                                  MOS30600
0000 0005          61  R5      EQU   5                                  MOS30610
0000 0006          62  R6      EQU   6                                  MOS30620
0000 0007          63  R7      EQU   7                                  MOS30630
0000 0008          64  R8      EQU   8                                  MOS30640
0000 0009          65  R9      EQU   9                                  MOS30650
0000 000A          66  R10     EQU   10                                 MOS30660
0000 000B          67  R11     EQU   11                                 MOS30670
0000 000C          68  R12     EQU   12                                 MOS30680
0000 000D          69  R13     EQU   13                                 MOS30690
0000 000E          70  R14     EQU   14                                 MOS30700
0000 000E          71  RET     EQU   14                                 MOS30710
0000 000F          72  R15     EQU   15                                 MOS30720
0000 000F          73  LINK    EQU   15                                 MOS30730

                   75  *       LISTING NOTES:                           MOS30750
                   76  *                                                MOS30760
                   77  *       1)   TRIPLE ASTERISKS IN COLUMNS 69-71 INDICATE A   MOS30770
                   78  *          DELETION OR MINOR MODIFICATION TO THE EXECUTIVES. MOS30780
                   79  *                                                MOS30790
                   80  *       2)   QUAD ASTERISKS IN COLUMNS 68-71 INDICATE MAJOR MOS30800
                   81  *          CHANGES TO THE EXEC WHICH MUST BE NOTED. THESE    MOS30810
                   82  *          CHANGES MAY YIELD INCOMPATIBILITIES BETWEEN THIS  MOS30820
                   83  *          (MODIFIED) AND OTHER (UNMODIFIED) EXTENDED TEST   MOS30830
                   84  *          PROGRAM EXECUTIVES.                               MOS30840
```

BOOTSTRAP LOADER

```
                                86  *                                                                    MOS30860
                                87  *  BOOTLOADER WITH CHKSUM                                           MOS30870
                                88  *                                                                    MOS30880
0000?                           89          ORG    X'80'                                                 MOS30890
0080   2421                     90          LIS    R2,1                                                  MOS30900
0082   2303                     91          BS     BOOT                                                  MOS30910
0084   1EB8                     92          DC     Z(PSWSAVE)        CURRENT PSW SAVE POINTER(32-BIT M/C) MOS30920
0086   1F40                     93          DC     Z(RSAVE)          REGISTER SAVE POINTER(32-BIT M/C)   MOS30930
0088   C810 0100                94  BOOT    LHI    R1,ORIGIN1        R1 = ADR( FIRST BYTE OF TEST PROG ) MOS30940
008C   C830 1EAE                95          LHI    R3,LNZB+1         R3 = ADR( LAST NON-ZERO BYTE )      MOS30950
0090   4030 0022                96          STH    R3,X'22'          REGISTER SAVE POINTER (16-BIT M/C)  MOS30960
0094   2731                     97          SIS    R3,1                                                  MOS30970
0096   C860 0000                98  MN      LHI    R6,0              R6 = CHKSUM BYTE = X'MN'            MOS30980
009A   D340 0078                99          LB     R4,X'78'          INPUT DEV ADR                       MOS30990
009E   DE40 0079               100          OC     R4,X'79'                                              MOS31000
00A2   9D45                     101 LEADER  SSR    R4,R5                                                 MOS31010
00A4   2091                     102         BTBS   9,1               DU,BSY                              MOS31020
00A6   9B45                     103         RDR    R4,R5                                                 MOS31030
00A8   0855                     104         LDAR   R5,R5                                                 MOS31040
00AA   2234                     105         BZS    LEADER            IGNORE LEADER                       MOS31050
00AC   D251 0000                106 LOAD    STB    R5,0(R1)          STORE 1ST NON-ZERO & SUBSEQUENT BYTE MOS31060
00B0   D351 0000                107         LB     R5,0(R1)          RELOAD DATA BYTE TO                 MOS31070
00B4   0765                     108         XAR    R6,R5             GENERATE CHKSUM                     MOS31080
00B6   9481                     109         EXBR   R8,R1                                                 MOS31090
00B8   9828                     110         WHR    R2,R8             DISPLAY MEMORY ADDRESS              MOS31100
00BA   9D45                     111         SSR    R4,R5                                                 MOS31110
00BC   2091                     112         BTBS   9,1               DU,BSY                              MOS31120
00BE   9B45                     113         RDR    R4,R5                                                 MOS31130
00C0   C110 00AC                114         BXLE   R1,LOAD          LOAD TILL LAST BYTE                 MOS31140
00C4   9486                     115         EXBR   R8,R6                                                 MOS31150
00C6   9828                     116         WHR    R2,R8             FINAL CHKSUM                        MOS31160
00C8   2478                     117 LDWT    LIS    R7,8                                                  MOS31170
00CA   917C                     118         SLLS   R7,12             R7 = X'8000'                        MOS31180
00CC   9557                     119         EPSR   R5,R7             HALT PROCESSOR.                     MOS31190
00CE   2203                     120         BS     LDWT                                                  MOS31200
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00D0                        122          ORG   X'100'              *                                   ***  MOS31220
0100  4300 011E             123  ORIGIN1 B     START2              START HERE FOR 16-BIT PROCESSOR          MOS31230
                            124  *                                                                        MOS31240
                            125  *---------------------------------                                      MOS31250
                            126  *   TEST CONSTANTS                          *                            MOS31260
                            127  *                                                                        MOS31270
0104  0000                  128  FIRST   DCX   0                   *                                   ***  MOS31280
0106  3000                  129  PSW     DCX   3000                                                       MOS31290
0108  3000                  130  PSW2    DCX   3000                                                       MOS31300
010A  0000                  131  IOSAVE  DCX   0                                                          MOS31310
010C  0000                  132  TEMP    DCX   0                                                          MOS31320
010E  80                    133  NORM    DB    X'80'                                                      MOS31330
010F  40                    134  INCR    DB    X'40'                                                      MOS31340
                            135  *                                                                        MOS31350
                            136  *                                                                        MOS31360
0110  0505                  137  IO      DC    X'0505'             I/O DEVICE(S) IDENTIFIER               MOS31370
0112  1011                  138  PASLADR DC    X'1011'             PASLA/PALM READ/WRITE ADDRESSES        MOS31380
0114  0202                  139  CLIFADR DC    X'0202'             CURRENT LOOP INTERFACE R/W ADDRESSES   MOS31390
0116  6262                  140  LPADR   DC    X'6262'             LINE PRINTER ADDRESS                   MOS31400
0118  1011                  141  C300ADR DC    X'1011'             CAROUSEL 300/PASLA ADDRESSES           MOS31410
011A  C0C0                  142  MICROBUS DC   X'C0C0'             MICROBUS ADDRESS                       MOS31420
011C  0000                  143          DCX   0                   PROVISION FOR SPECIAL DEVICE           MOS31430
                            144  *                                                                        MOS31440
                            145  * IO =   0101  FOR CRT ON PASLA                                         MOS31450
                            146  *        0202  FOR TELETYPE, CAROUSEL 15/30                             MOS31460
                            147  *        XX03  FOR LINE PRINTER                                        MOS31470
                            148  *        0404  FOR CAROUSEL 300                                        MOS31480
                            149  *        0505  FOR MICROBUS                                            MOS31490
                            150  *                                                                        MOS31500
                            151  *                                                                        MOS31510
                            152  *---------------------------------                                      MOS31520
                            153  *                                                                        MOS31530
011E  4810 0108             154  START2  LH    R1,PSW2             *                                   ***  MOS31540
0122  C820 0132             155  ST      LDAI  R2,START            *                                   ***  MOS31550
0126  4010 0034             156          STH   R1,X'34'                                                   MOS31560
012A  4020 0036             157          STH   R2,X'36'            II INT NEW PSW LOC                     MOS31570
012E  0000                  158          DCX   0                   TAKE AN ILLEGAL INSTRUCTION INT        MOS31580
0130  2200                  159          BS    *                   HALT IF II INTERRUPT NOT TAKEN         MOS31590
                            160  *                                                                        MOS31600
0132  D310 0110             161  START   LB    R1,IO               GET I/O IDENTIFIERS                    MOS31610
0136  D320 0111             162          LB    R2,IO+1                                                    MOS31620
013A  2436                  163          LIS   R3,6                IDENTIFIER CAN BE 1,2,3,4,5            MOS31630
013C  0513                  164          CLAR  R1,R3                                                      MOS31640
013E  2182                  165          BLS   IO.OK1              BRANCH IF KB IDENTIFIER OK             MOS31650
0140  2412                  166          LIS   R1,2                OTHERWISE FORCE IT TO BE TTY           MOS31660
0142  0523                  167  IO.OK1  CLAR  R2,R3                                                      MOS31670
0144  2182                  168          BLS   IO.OK2              SAME TEST FOR LIST DEVICE              MOS31680
0146  2422                  169          LIS   R2,2                                                       MOS31690
0148  D210 0110             170  IO.OK2  STB   R1,IO               REESTABLISH VALUES                     MOS31700
014C  D220 0111             171          STB   R2,IO+1                                                    MOS31710
0150  D362 0B04             172          LB    R6,CONRQ2S(R2)                                             MOS31720
0154  4060 0AE8             173          STH   R6,PASFLG2          SET PASLA FLAG (LIST DEVICE)           MOS31730
0158  0866                  174          LDAR  R6,R6                                                      MOS31740
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```
015A   2336          175          BZS   IO.OK3          SKIP IF NOT PASLA                        MOS31750
015C   0A22          176          AAR   R2,R2           (SLHLS  R2,1)                  ****      MOS31760
015E   D302 0111     177          LB    R0,IO+1(R2)                                             MOS31770
0162   DEC2 0AF8     178          OC    R0,CON2ND(R2)   ISSUE 2ND COMMAND (LIST DEVICE)  ***      MOS31780
                     179  *                                                                       MOS31790
0166   41F0 098E     180  IO.OK3  BAL   LINK,SETKB      ESTABLISH KEYBOARD DEVICE                MOS31800
016A   9310          181          LBR   R1,R0           (R1) = 1,2,4,5                           MOS31810
016C   0A11          182          AAR   R1,R1           (R1) = 2,4,6,A (SLHLS  R1,1)   ****      MOS31820
016E   4831 0110     183          LH    R3,IO(R1)                                               MOS31830
0172   4030 0AEA     184          STH   R3,CONADR       SET UP CONSOLE DEVICE ADDRESS            MOS31840
0176   4821 0AEC     185          LH    R2,CONRD(R1)                                            MOS31850
017A   4020 0AEC     186          STH   R2,CONRD        SET UP R/W COMMANDS                      MOS31860
017E   4821 0AF8     187          LH    R2,CON2ND(R1)                                           MOS31870
0182   4020 0AF8     188          STH   R2,CON2ND       2ND CMD; ENABLE READ CMD                 MOS31880
0186   9011          189          SRHLS R1,1                                                    MOS31890
0188   D341 0B04     190          LB    R4,CONRQ2S(R1)                                          MOS31900
018C   D240 0B04     191          STB   R4,CONRQ2S      CONSOLE REQUEST TO SEND                  MOS31910
0190   4040 0AE6     192          STH   R4,PASFLG       SET PASLA FLAG (CONSOLE)                 MOS31920
0194   9333          193          LBR   R3,R3           MASK CONSOLE DEVICE TO 8 BITS    ***     MOS31930
0196   0844          194          LDAR  R4,R4                                                   MOS31940
0198   2333          195          BZS   IO.OK4          SKIP 2ND OC IF NOT PASLA                 MOS31950
019A   9422          196          EXBR  R2,R2                                                   MOS31960
019C   9E32          197          CCR   R3,R2           ISSUE 2ND COMMAND (CONSOLE)              MOS31970
019E   DE30 0AEC     198  IO.OK4  OC    R3,CONRD        PUT CONSOLE IN READ MODE                 MOS31980
01A2   9B3F          199          RDR   R3,R15          READ A DUMMY CHARACTER (SET BUSY)        MOS31990
                     200  *                                                                       MOS32000
01A4   41F0 09D0     201          BAL   LINK,LCORE      SET UP LOW CORE                          MOS32010
01A8   2400          202          LIS   R0,0                                                    MOS32020
01AA   4000 0B12     203          STH   R0,WASDU        RESET 'DEVICE UNAVAILABLE' FLAGS         MOS32030
01AE   4000 0B14     204          STH   R0,WASDU1                                               MOS32040
01B2   41F0 07DE     205          BAL   LINK,CRLF                                               MOS32050
01B6   C850 0D6E     206          LDAI  R5,TITLE                                                MOS32060
01BA   41F0 0756     207          BAL   R15,PRINT       PRINT TEST PROGRAM TITLE                 MOS32070
                     208  *--------------------------------                                      MOS32080
                     209  *  KEYBOARD INPUT ROUTINE                                             MOS32090
                     210  *                                                                       MOS32100
01BE   C8F0 0A5A     211  OPTIN   LDAI  LINK,MM        *                              ***       MOS32110
01C2   40F0 003E     212          STH   LINK,X'3E'      RESTORE ETPE MM POINTER        ***       MOS32120
01C6   41F0 07DE     213          BAL   LINK,CRLF       CR,LF TO LIST DEVICE                     MOS32130
01CA   4820 0108     214  OPTIN1  LH    R2,PSW2                                                 MOS32140
01CE   9512          215          EPSR  R1,R2           NO INT. REG SET 15                       MOS32150
01D0   41F0 098E     216          BAL   LINK,SETKB      ESTABLISH CONSOLE                        MOS32160
01D4   D340 0B98     217          LB    R4,AMSG         OUTPUT AN * TO INDICATE                  MOS32170
01D8   41F0 07EC     218          BAL   LINK,OUTCHR     COMMAND MODE ESTABLISHED                 MOS32180
01DC   2541          219          LCS   R4,1            X'FF'                                    MOS32190
01DE   41F0 07EC     220          BAL   LINK,OUTCHR                                             MOS32200
01E2   C8C0 08A8     221          LDAI  R12,QUESTN      SET UP R12 FOR ERR ROUTINE               MOS32210
01E6   C8C0 2020     222          LDAI  R0,X'2020'      BLANK OUT COMMAND BUFFER                 MOS32220
01EA   40C0 1EAE     223          STH   R0,OPTBUF       WHICH WILL CONTAIN OPTION                MOS32230
01EE   4000 1EB0     224          STH   R0,OPTBUF+2     NAME                                     MOS32240
01F2   4000 1EB2     225          STH   R0,OPTBUF+4                                             MOS32250
01F6   2410          226          LIS   R1,0            CLEAR OPTBUF INDEX                       MOS32260
01F8   4010 0B0C     227          STH   R1,ISITERR      RESET FORCED PRINTING FLAG     ****      MOS32270
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01FC  41F0 087A      228 RDCHR    BAL   R15,GETCHR          GET A CHAR IN R4                    MOS32280
0200  C540 0060      229          CLAI  R4,X'60'            UPPER CASE ALPHA ?                  MOS32290
0204  2183          230          BLS   RDCHAR0             BRANCH IF NO.                       MOS32300
0206  CB40 0020      231          SAI   R4,X'20'           CONVERT TO LOWER CASE               MOS32310
020A  C540 0023      232 RDCHAR0  CLAI  R4,X'23'           IS IT A HASH MARK ?                 MOS32320
020E  4330 01BE      233          BE    OPTIN                                                   MOS32330
0212  C540 005F      234          CLAI  R4,X'5F'           LEFT ARROW, UNDERLINE OR DELETE ?   MOS32340
0216  2334          235          BES   RDCHAR1            YES, BRANCH                         MOS32350
0218  C540 0008      236          CLAI  R4,X'08'           BACK SPACE ?                        MOS32360
021C  2139          237          BNES  RDCHR1             NO, BRANCH                          MOS32370
021E  2711          238 RDCHAR1  SIS   R1,1                YES, DECREMENT INDEX                MOS32380
0220  021C          239          BMR   R12                BUFFER UNDERFLOW; PRINT '?'         MOS32390
0222  C8C0 0020      240          LDAI  R0,X'20'                                               MOS32400
0226  D201 1EAE      241          STB   R0,OPTBUF(R1)                                          MOS32410
022A  4300 01FC      242          B     RDCHR                                                  MOS32420
022E  C540 000D      243 RDCHR1   CLAI  R4,X'0D'           IS IT CR ?                          MOS32430
0232  233C          244          BES   LOOKUP             YES, TRY MATCH                      MOS32440
0234  C540 0020      245          CLAI  R4,X'20'           IS IT A BLANK?                      MOS32450
0238  2339          246          BES   LOOKUP             YES, TRY MATCH                      MOS32460
023A  C510 0006      247          CLAI  R1,6               7 CHARACTERS INPUT ?                MOS32470
023E  038C          248          BNLR  R12                IF YES, ERROR                       MOS32480
0240  D241 1EAE      249          STB   R4,OPTBUF(R1)      STORE CURRENT BYTE                  MOS32490
0244  2611          250          AIS   R1,1               BUMP BUFFER INDEX                   MOS32500
0246  4300 01FC      251          B     RDCHR              READ NEXT CHARACTER                 MOS32510
                     252 *--------------------------------                                     MOS32520
                     253 *  OPTION MATCH ROUTINE                                              MOS32530
                     254 *                                                                    MOS32540
024A  C810 03B4      255 LOOKUP   LDAI  R1,OPT             LOAD ADDRESS OF OPTION TABLE        MOS32550
024E  2430          256 LOOK1    LIS   R3,0               CLEAR BUFFER INDEX                  MOS32560
0250  0861          257          LDAR  R6,R1              SET OPTION WORD INDEX               MOS32570
0252  4856 0000      258 LOOK2    LH    R5,0(R6)                                              MOS32580
0256  021C          259          BMR   R12                IF MINUS, THEN NO MATCH = ERROR     MOS32590
0258  4553 1EAE      260          CLH   R5,OPTBUF(R3)      COMPARE TO OPTBUF HW                MOS32600
025C  2333          261          BES   LOOK3                                                  MOS32610
025E  261C          262          AIS   R1,12                                                  MOS32620
0260  2209          263          BS    LOOK1                                                  MOS32630
0262  2632          264 LOOK3    AIS   R3,2                TRY NEXT HW                         MOS32640
0264  2662          265          AIS   R6,2                                                   MOS32650
0266  C530 0006      266          CLAI  R3,6               3 MATCHING HW FOUND ?               MOS32660
026A  208C          267          BLS   LOOK2                                                  MOS32670
                     268 *                                                                    MOS32680
026C  C510 0C50      269          CLAI  R1,RUN             RUN COMMAND ?                       MOS32690
0270  4330 03EA      270          BE    RUNIT                                                  MOS32700
0274  C510 0C44      271          CLAI  R1,OPTION          OPTION CMD ?                        MOS32710
0278  4230 038A      272          BNE   LOOK4              NO, LOOK FURTHER                    MOS32720
                     273 *--------------------------------                                     MOS32730
                     274 *  TO PROCESS INPUT COMMAND 'OPTION'                                 MOS32740
                     275 *                                                                    MOS32750
027C  C540 000D      276          CLAI  R4,X'0D'           YES, CR ?                           MOS32760
0280  233C          277          BES   OPTEXX             YES, BRANCH                         MOS32770
0282  41E0 0682      278          BAL   R14,OPTVAL         NO, GET OPTION DEV PRINTOUT NO.     MOS32780
0286  C560 0006      279          CLAI  R6,6               IS DEVICE NO. VALID ?               MOS32790
028A  2387          280          BNLS  OPTEXX             NO, BRANCH                          MOS32800
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028C   C840 000A          281           LDAI  R4,X'0A'          YES, LOAD A LF CHARACTER              MOS32810
0290   41F0 07EC          282           BAL   LINK,OUTCHR       WRITE IT TO THE CONSOLE               MOS32820
0294   D260 010B          283           STB   R6,IOSAVE+1       CHANGE THE LIST DEVICE NO.            MOS32830
0298   4820 0C4C          284 OPTEXX    LH    R2,OPTION+8       CHECK FOR SPECIAL ROUTINE             MOS32840
029C   0232               285           BNZR  R2                LINK TO ROUTINE                       MOS32850
                          286 *                                                                       MOS32860
029E   C830 0BB4          287 OPTRTN    LDAI  R3,TEST           RETURN HERE                           MOS32870
02A2   C8E0 0328          288           LDAI  R14,OPTCMD8                                             MOS32880
02A6   41F0 07DE          289           BAL   LINK,CRLF                                               MOS32890
02AA   2420               290 OPTCMD    LIS   R2,0              RESET COUNTER                         MOS32900
02AC   D342 0BB4          291 OPTCMD1   LB    R4,OPT(R2)        TO PRINT TEST                         MOS32910
02B0   41F0 07EC          292           BAL   LINK,OUTCHR                                             MOS32920
02B4   2621               293           AIS   R2,1                                                    MOS32930
02B6   C520 0006          294           CLAI  R2,6                                                    MOS32940
02BA   2087               295           BLS   OPTCMD1                                                 MOS32950
02BC   C840 0020          296           LDAI  R4,C' '                                                 MOS32960
02C0   41F0 07EC          297           BAL   LINK,OUTCHR       OUTPUT 1 SPACE                        MOS32970
02C4   2450               298           LIS   R5,0              TO PRINT SELECTED TEST NUMBERS        MOS32980
02C6   4050 0104          299           STH   R5,FIRST                                                MOS32990
02CA   4823 0006          300           LH    R2,6(R3)          FIRST TEST WORD                       MOS33000
02CE   2440               301 OPTCMD2   LIS   R4,0              START WITH TEST 0                     MOS33010
02D0   4040 010C          302           STH   R4,TEMP                                                 MOS33020
02D4   0A22               303 OPTCMD3   AAR   R2,R2              (SLHLS  R2,1)             ****        MOS33030
02D6   4380 0308          304           BNC   OPTCMD7                                                 MOS33040
02DA   4040 010C          305 OPTCMD4   STH   R4,TEMP           OPTION VALUE FOUND.                   MOS33050
02DE   4800 0104          306           LH    R0,FIRST          IS IT FIRST ?                         MOS33060
02E2   2335               307           BZS   OPTCMD5                                                 MOS33070
02E4   C840 002C          308           LDAI  R4,C','           NO, OUTPUT COMMA                      MOS33080
02E8   41F0 07EC          309           BAL   LINK,OUTCHR                                             MOS33090
02EC   40F0 0104          310 OPTCMD5   STH   LINK,FIRST                                               MOS33100
02F0   0855               311           LDAR  R5,R5             TEST VALUE FROM SECOND HW             MOS33110
02F2   2335               312           BZS   OPTCMD6           NO                                    MOS33120
02F4   C840 0031          313           LDAI  R4,C'1'           YES,OUTPUT '1'                        MOS33130
02F8   41F0 07EC          314           BAL   LINK,OUTCHR                                             MOS33140
02FC   4840 010C          315 OPTCMD6   LH    R4,TEMP           RESTORE R4                            MOS33150
0300   D344 0B34          316           LB    R4,HEXTAB(R4)     CONVERT                               MOS33160
0304   41F0 07EC          317           BAL   LINK,OUTCHR       OUTPUT 0-F                            MOS33170
0308   4840 010C          318 OPTCMD7   LH    R4,TEMP           RESTORE                               MOS33180
030C   2641               319           AIS   R4,1              INCREMENT TEST NUMBER                 MOS33190
030E   4040 010C          320           STH   R4,TEMP                                                 MOS33200
0312   C540 0010          321           CLAI  R4,16                                                   MOS33210
0316   4280 02D4          322           BL    OPTCMD3                                                 MOS33220
031A   0855               323 OPTCMD71  LDAR  R5,R5             DONE ?                                MOS33230
031C   023E               324           BNZR  R14                                                     MOS33240
031E   4823 0008          325           LH    R2,8(R3)          SECOND TEST WORD                      MOS33250
0322   2451               326           LIS   R5,1              R5 = 1 FOR SECOND TEST HW             MOS33260
0324   4300 02CE          327           B     OPTCMD2                                                 MOS33270
                          328 *-------------------------------                                        MOS33280
                          329 *  TO OUTPUT OTHER OPTION NAMES & VALUES                                MOS33290
                          330 *                                                                       MOS33300
0328   41F0 07DE          331 OPTCMD8   BAL   LINK,CRLF                                               MOS33310
032C   2461               332           LIS   R6,1              SET LINE COUNTER                      MOS33320
032E   C820 0BC0          333           LDAI  R2,OPT+12         R2 POINTS TO THE NAME                 MOS33330
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0332  2436                334  OPTCMD9  LIS   R3,6                                          MOS33340
0334  D342 0000            335  OPTCMD10 LB    R4,0(R2)                                      MOS33350
0338  41F0 07EC            336           BAL   LINK,OUTCHR        OUTPUT OPTION NAME CHAR     MOS33360
033C  2621                337           AIS   R2,1                                          MOS33370
033E  2731                338           SIS   R3,1               6 CHARACTERS OUTPUT ?       MOS33380
0340  2026                339           BPS   OPTCMD10           NO,LOOP                     MOS33390
0342  C840 0020           340           LDAI  R4,C' '                                        MOS33400
0346  41F0 07EC            341           BAL   LINK,OUTCHR        OUTPUT ONE SPACE            MOS33410
034A  4852 0000            342           LH    R5,0(R2)           R5 = OPTION VALUE           MOS33420
034E  2404                343           LIS   R0,4                                           MOS33430
0350  41F0 06CC            344           BAL   LINK,R5HEX         WRITE OPTION VALUE IN HEX (4 DIGITS)  MOS33440
0354  D300 0110            345           LB    R0,IO                                          MOS33450
0358  2701                346           SIS   R0,1               CONSOLE = CRT ?             MOS33460
035A  213D                347           BNZS  OPTCMD12           BRANCH: NO.                 MOS33470
035C  2661                348           AIS   R6,1               INCREMENT LINE COUNTER.     MOS33480
035E  C560 0014            349           CLAI  R6,20              PAGE FULL ?                 MOS33490
0362  2189                350           BLS   OPTCMD12           NO, BRANCH                  MOS33500
0364  2460                351           LIS   R6,0               YES, INITIALIZE LINE COUNT  MOS33510
0366  41F0 087A            352  OPTCMD11 BAL   LINK,GETCHR                                   MOS33520
036A  274D                353           SIS   R4,13              CR ?                        MOS33530
036C  4330 01BE            354           BZ    OPTIN              NO, ACCEPT NEXT COMMAND     MOS33540
0370  2643                355           AIS   R4,3               LF ?                        MOS33550
0372  2036                356           BNZS  OPTCMD11           YES, GO PRINT NEXT PAGE     MOS33560
0374  41F0 07DE            357  OPTCMD12 BAL   LINK,CRLF          NO, CRLF                    MOS33570
0378  41F0 08D4            358           BAL   LINK,TSTBRK        EXIT IF 'BREAK' PRESSED.    MOS33580
037C  2626                359           AIS   R2,6                                           MOS33590
037E  C520 0C2C            360           CLAI  R2,OPTEND2         ALL PRINTING OPTIONS DONE ? MOS33600
0382  4280 0332            361           BL    OPTCMD9            NO,LOOP FOR NEXT ONE        MOS33610
0386  43C0 01CA            362           B     OPTIN1             TO ACCEPT NEXT COMMAND      MOS33620
                           363  *-----------------------------------                          MOS33630
038A  C510 0BB4            364  LOOK4    CLAI  R1,TEST            'TEST' OPTION ?             MOS33640
038E  4330 03B6            365           BE    TESTOP                                         MOS33650
                           366  *                                                            MOS33660
                           367  *  TO PROCESS COMMANDS OTHER THAN 'TEST', 'OPTION'.           MOS33670
                           368  *                                                            MOS33680
0392  274D                369           SIS   R4,13              OPT FOLLOWED BY CR ?        MOS33690
0394  033C                370           BZR   R12                YES, ERROR                  MOS33700
0396  41E0 0682            371           BAL   R14,OPTVAL         GET OPTION VALUE IN R6      MOS33710
039A  274D                372           SIS   R4,13              TERMINATED BY CR ?          MOS33720
039C  023C                373           BNZR  R12                IF NO, BRANCH               MOS33730
039E  48E1 0008            374           LH    R14,8(R1)          GET OPTION CHECK ROUTINE ADDRESS  MOS33740
03A2  2332                375           BZS   LOOK5                                          MOS33750
03A4  01FE                376           BALR  R15,R14            LINK TO OPTION CHECK ROUTINE  MOS33760
                           377  *                                 *  RETURN HERE IF OK  *     MOS33770
03A6  4061 0006            378  LOOK5    STH   R6,6(R1)           STORE OPTION VALUE          MOS33780
03AA  4300 01BE            379           B     OPTIN              ACCEPT NEXT COMMAND         MOS33790
                           380  *                                                            MOS33800
                           381  *-----------------------------------                    ***   MOS33810
                           382  *                                                            MOS33820
03AE  4561 000A            383  LEVELIN  CLH   R6,10(R1)          IS R6 > MAX VALUE ?   ***   MOS33830
03B2  022C                384           BPR   R12                YES, ERROR RETURN     ***   MOS33840
03B4  030F                385           BR    R15                NO, RETURN TO LOOK5   ***   MOS33850
                           386  *                                                            MOS33860
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                          387  *----------------------------------                                    MOS33870
                          388  *  TEST OPTION PROCESS ROUTINE                                         MOS33880
                          389  *                                                                      MOS33890
03B6   274D               390  TESTOP   SIS   R4,13             'TEST' FOLLOWED BY (CR) ?           MOS33900
03B8   2137               391           BNZS  TSTOP1                                                 MOS33910
03BA   4800 0D9E          392           LH    R0,DEFTESTS        YES, SET TEST OPTION TO             MOS33920
03BE   4000 0BBA          393           STH   R0,TEST+6          FIRST TEST WORD                     MOS33930
03C2   4300 01BE          394           B     OPTIN              TO ACCEPT NEXT COMMAND              MOS33940
                          395  *                                                                      MOS33950
03C6   4850 0DA0          396  TSTOP1   LH    R5,MAXTST                                              MOS33960
03CA   2470               397           LIS   R7,0               RESET TEST BIT ACCUMULATORS         MOS33970
03CC   2480               398           LIS   R8,0                                                   MOS33980
03CE   41E0 0682          399  TSTOP2   BAL   R14,OPTVAL         GET OPTION VALUE IN R6              MOS33990
03D2   0556               400           CLAR  R5,R6                                                  MOS34000
03D4   028C               401           BLR   R12                ERROR: INVALID TEST NUMBER          MOS34010
03D6   41E0 06BE          402           BAL   R14,UNARY          GET UNARY OPERAND IN R3             MOS34020
03DA   0673               403           OAR   R7,R3              SET CURRENT BIT                     MOS34030
03DC   274D               404  TSTOP4   SIS   R4,13             TERMINATED BY CR ?                  MOS34040
03DE   4230 03CE          405           BNZ   TSTOP2                                                  MOS34050
03E2   4070 0BBA          406           STH   R7,TEST+6          STORE VALID SELECTED TESTS          MOS34060
03E6   4300 01BE          407           B     OPTIN              TO ACCEPT NEXT COMMAND              MOS34070
                          408  *----------------------------------                                    MOS34080
                          409  *                                                                      MOS34090
03EA   41F0 07DE          410  RUNIT    BAL   LINK,CRLF                                              MOS34100
03EE   24F0               411           LIS   R15,0              RESET DU FLAGS                      MOS34110
03F0   40F0 0B12          412           STH   R15,WASDU                                              MOS34120
03F4   40F0 0B14          413           STH   R15,WASDU1                                             MOS34130
03F8   24CF               414           LIS   R0,15              TO FIND HIGHEST SELECTED TEST NO.   MOS34140
03FA   4810 0BBA          415           LH    R1,TEST+6          CHECK FIRST TEST HW                 MOS34150
03FE   9011               416  KEEP2    SRLS  R1,1                                                   MOS34160
0400   2184               417           BCS   FOUND2            R0 = F-0 = TEST NUMBER              MOS34170
0402   2701               418           SIS   R0,1                                                   MOS34180
0404   2213               419           BNMS  KEEP2              LOOP                                MOS34190
0406   030C               420           BR    R12                TEST NOT SELECTED                   MOS34200
0408   4000 0B10          421  FOUND2   STH   R0,SELTST          HIGHEST SELECTED TEST NUMBER  ***   MOS34210
                          422  *                                                                      MOS34220
                          423  *  RESET TEST PARAMETERS                                               MOS34230
                          424  *                                                                      MOS34240
040C   4800 0110          425           LH    R0,IC                                                  MOS34250
0410   4000 010A          426           STH   R0,IOSAVE          RESTORE USER'S I/O CHOICE           MOS34260
0414   41F0 07DE          427           BAL   LINK,CRLF                                              MOS34270
0418   41F0 0C64          428           BAL   LINK,INIT           LINK USER'S INITIALIZATION ROUTINE  MOS34280
                          429  *                                                                      MOS34290
041C   2400               430  INITRET  LIS   R0,0               RETURN HERE FROM INIT               MOS34300
041E   40C0 0B0C          431           STH   R0,ISITERR         RESET ERROR FLAG                    MOS34310
0422   4000 0B16          432           STH   R0,TOTAL           RESET TOTAL                         MOS34320
0426   4000 0B18          433           STH   R0,TOTERR          RESET TOTERR                        MOS34330
042A   4000 0B12          434           STH   R0,WASDU           RESET WASDU                         MOS34340
042E   C810 3030          435           LDAI  R1,C'00'                                               MOS34350
0432   4010 0B4A          436           STH   R1,MTESTNO         RESET THESE FLAGS TO C'00'          MOS34360
0436   4010 0B54          437           STH   R1,ETESTNO                                             MOS34370
043A   4010 0B56          438           STH   R1,ERRNO                                               MOS34380
043E   41F0 09D0          439           BAL   LINK,LCORE         SET UP LOW CORE                     MOS34390
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EXEC - ETPE R03-05 (16 BIT/STRIPPED AND MODIFIED)

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                         440  *                                                                    MOS34400
                         441  *  START SELECTION FROM TEST 0                                       MOS34410
                         442  *                                                                    MOS34420
0442   2400              443  KEEP3     LIS   R0,0                                                 MOS34430
0444   4000 0B1A         444            STH   R0,BTESTNO          RESET BINARY TEST NUMBER         MOS34440
0448   4000 0B1E         445            STH   R0,NEXTST           RESET NEXT TEST NUMBER           MOS34450
                         446  *                                                                    MOS34460
                         447  *  TO FIND THE NEXT SELECTED TEST.                                   MOS34470
                         448  *                                                                    MOS34480
044C   4820 0B1E         449  KEEP4     LH    R2,NEXTST           GET NEXT TEST NUMBER             MOS34490
0450   2408              450  KEEP41    LIS   R0,8                                                 MOS34500
0452   910C              451            SLHLS R0,12               R0 = X'8000'                     MOS34510
0454   CC02 0000         452            SRHL  R0,0(R2)            R0 = NEXT TEST BIT               MOS34520
0458   4400 0BBA         453  KEEP42    NH    R0,TEST+6           LOOK AT TEST HW 1                MOS34530
045C   2133              454            BNZS  KEEP5                                                MOS34540
045E   2621              455  KEEP43    AIS   R2,1                                                 MOS34550
0460   2208              456            BS    KEEP41              LOOP FOR NEXT TEST NUMBER        MOS34560
0462   4020 0B1A         457  KEEP5     STH   R2,BTESTNO          CURRENT TEST NUMBER              MOS34570
0466   0812              458            LDAR  R1,R2               R1 = TEST NO. IN BINARY          MOS34580
0468   2621              459            AIS   R2,1                                                 MOS34590
046A   4020 0B1E         460            STH   R2,NEXTST                                            MOS34600
046E   2402              461            LIS   R0,2                SET DIGITS TO PRINT = 2          MOS34610
0470   C820 0B4A         462            LDAI  R2,MTESTNO          R2 = A(MTESTNO)                  MOS34620
0474   41F0 06F6         463            BAL   LINK,HEXASC         STORE TEST NO. IN ASCII @ MTESTNO MOS34630
0478   4820 0B4A         464            LH    R2,MTESTNO                                           MOS34640
047C   4020 0B54         465            STH   R2,ETESTNO          STORE TEST NO. IN ASCII @ ETESTNO MOS34650
0480   41F0 08D4         466            BAL   LINK,TSTBRK         TEST BREAK                       MOS34660
0484   C850 0B44         467            LDAI  R5,TSTMSG                                            MOS34670
0488   41F0 0756         468            BAL   LINK,PRINT          PRINT 'TEST NN'                  MOS34680
048C   2400              469            LIS   R0,0                                                 MOS34690
048E   4000 0B0E         470            STH   R0,NOERR            RESET ERROR FLAG                 MOS34700
0492   4000 0B1C         471            STH   R0,COUNT            RESET COUNT                      MOS34710
0496   4810 0106         472  KEEP6     LH    R1,PSW              ENABLE INTERRUPTS  (30F0)       MOS34720
049A   9501              473            EPSR  R0,R1                                                MOS34730
049C   4820 0B1A         474            LH    R2,BTESTNO          R2 = TEST NUMBER                 MOS34740
04A0   9121              475            SLLS  R2,LADC                                              MOS34750
04A2   4812 0DA4         476            LDA   R1,TESTS(R2)                                         MOS34760
04A6   0301              477            BR    R1                  GO TO TEST MODULE                MOS34770
                         478  *---------------------------------                                   MOS34780
                         479  *                                                                    MOS34790
                         480  *  TEST MODULE END ROUTINE                                           MOS34800
                         481  *                                                                    MOS34810
04A8   C8F0 0A5A         482  TSTEND    LDAI  LINK,MM             *                          ***   MOS34820
04AC   40F0 003E         483            STH   LINK,X'3E'          RESTORE ETPE MM POINTER    ***   MOS34830
04B0   4810 0108         484            LH    R1,PSW2                                              MOS34840
04B4   9501              485            EPSR  R0,R1               DISABLE INT @ PROCESSOR LEVEL    MOS34850
04B6   4800 0B1C         486            LH    R0,COUNT                                             MOS34860
04BA   2601              487            AIS   R0,1                INCREMENT COUNT                  MOS34870
04BC   4000 0B1C         488            STH   R0,COUNT                                             MOS34880
04C0   41F0 08D4         489            BAL   LINK,TSTBRK         IF BREAK GO TO OPTIN       ***   MOS34890
04C4   4500 0BC6         490            CLH   R0,LOOP+6           IF COUNT > LOOP,                 MOS34900
04C8   2383              491            BNLS  KEEP7               GO TO NEXT TEST MODULE           MOS34910
04CA   4300 0496         492            B     KEEP6               OTHERWISE, REPEAT SAME TEST      MOS34920
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EXEC - ETPE R03-05 (16 BIT/STRIPPED AND MODIFIED)

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04CE  4800 0B0E        493  KEEP7    LH    R0,NOERR          LOOK @ ERROR FLAG                        MOS34930
04D2  2135             494           BNZS  KEEP71                                                   MOS34940
04D4  C850 0B6A        495           LDAI  R5,NOERMSG                                               MOS34950
04D8  41F0 0756        496           BAL   LINK,PRINT        PRINT "NO ERROR"                       MOS34960
04DC  4810 0B1A        497  KEEP71   LH    R1,BTESTNO        GET TEST NUMBER                        MOS34970
04E0  4510 0B10        498           CLH   R1,SELTST         IS THE LAST SELECTED TEST DONE ?       MOS34980
04E4  4280 044C        499           BL    KEEP4             NO, GO SELECT NEXT TEST                MOS34990
                       500  *                                                                        MOS35000
                       501  *  ALL THE SELECTED TESTS ARE NOW RUN                                    MOS35010
                       502  *                                                                        MOS35020
04E8  C8F0 0A5A        503  ABORT    LDAI  LINK,MM           COME HERE TO ABORT TEST SEQUENCE ***   MOS35030
04EC  40F0 003E        504           STH   LINK,X'3E'        RESTORE ETPE MM POINTER          ***   MOS35040
04F0  4810 0108        505           LH    R1,PSW2                                                  MOS35050
04F4  9501             506           EPSR  R0,R1             PSW = 30F0                             MOS35060
04F6  41F0 05DC        507           BAL   LINK,DISPLAY      DISPLAY TOTAL & TOTERR                 MOS35070
04FA  0B16             508           DC    Z(TOTAL),Z(TOTERR)                                       MOS35080
04FC  0B18
04FE  41F0 0958        509           BAL   LINK,TSTDU        RETURN WITH R1 = DU BIT                MOS35090
0502  4230 0564        510           BNZ   KEEP9             IF DU, DISPLAY TOTAL                   MOS35100
0506  4810 0B14        511           LH    R1,WASDU1         WAS IT EVER ?                          MOS35110
050A  4230 059A        512           BNZ   KEEP92            YES, PRINT TOTAL, TOTERR               MOS35120
050E  41F0 08D4        513           BAL   LINK,TSTBRK                                              MOS35130
0512  4810 0BD2        514           LH    R1,CONTIN+6       IF CONTIN = 0,                         MOS35140
0516  233E             515           BZS   ABORT3            GO ABORT TEST                    ***   MOS35150
0518  6110 0B16        516           AHM   R1,TOTAL          IF TOTAL < MAX                   ***   MOS35160
051C  4230 0442        517           BNZ   KEEP3             GO TO TEST 0                     ***   MOS35170
0520  2511             518           LCS   R1,1              OTHERWISE                        ***   MOS35180
0522  6110 0B16        519           AHM   R1,TOTAL          SET TOTAL TO MAX &               ***   MOS35190
0526  4300 0594        520           B     HALT9             HALT PROCESSOR                   ***   MOS35200
                       521  *                                                                        MOS35210
052A  C8F0 0A5A        522  ABORT1   LDAI  LINK,MM           *                                ***   MOS35220
052E  40F0 003E        523           STH   LINK,X'3E'        RESTORE ETPE MM POINTER          ***   MOS35230
                       524  *                                                                ***   MOS35240
0532  4810 0108        525  ABORT3   LH    R1,PSW2           *                                ***   MOS35250
0536  9501             526           EPSR  R0,R1             SET PSW = X'30F0'                ***   MOS35260
0538  41F0 098E        527           BAL   LINK,SETKB        KB DEVICE = LIST DEVICE                MOS35270
053C  C850 0B88        528           LDAI  R5,EOTMSG                                                MOS35280
0540  4050 0B0C        529           STH   R5,ISITERR        *                                ***   MOS35290
0544  41F0 0756        530           BAL   LINK,PRINT        'END OF TEST'                          MOS35300
0548  24F0             531           LIS   R15,0             *                                ***   MOS35310
054A  40F0 0B0C        532           STH   R15,ISITERR       *                                ***   MOS35320
                       533  *                                                                        MOS35330
054E  48F0 0BDE        534           LH    LINK,NOMSG+6      IF "NOMSG" IS SET TO A 1,              MOS35340
0552  4230 059A        535           BNZ   KEEP92            PRINT "TOTAL" & "TOTERR"               MOS35350
0556  48F0 0BEA        536           LH    LINK,SCOPE+6      *                                ***   MOS35360
055A  27F4             537           SIS   LINK,4            IF "SCOPE" = 4,                  ***   MOS35370
055C  4330 059A        538           BZ    KEEP92            PRINT "TOTAL" & "TOTERR"         ***   MOS35380
0560  4300 01BE        539           B     OPTIN                                                    MOS35390
                       540  *---------------------------------                                     MOS35400
                       541  *  ROUTINE INCREMENTS, DISPLAYS & CHECKS 'TOTAL'                        MOS35410
                       542  *                                                                        MOS35420
0564  4010 0B12        543  KEEP9    STH   R1,WASDU          SET 'WASDU' FLAG                       MOS35430
                       544  *                                                                        MOS35440
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EXEC - ETPE R03-05 (16 BIT/STRIPPED AND MODIFIED)

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0568  4810 0B16          545  ABORT2   LH    R1,TOTAL           INCREMENT TOTAL                        MOS35450
056C  2611               546           AIS   R1,1                                                      MOS35460
056E  4010 0B16          547           STH   R1,TOTAL                                                  MOS35470
0572  41F0 05DC          548  KEEP91   BAL   LINK,DISPLAY       DISPLAY "TOTAL" & "TOTERR"             MOS35480
0576  0B16               549           DC    Z(TOTAL),Z(TOTERR)                                        MOS35490
0578  0B18                                                                                             MOS35500
057A  4810 0B16          550           LH    R1,TOTAL                                                  MOS35500
057E  C510 7FFF          551           CLAI  R1,X'7FFF'         TOTAL < MAX RETAINABLE ?               MOS35510
0582  2389               552           BNLS  HALT9              NO, HALT                               MOS35520
0584  4800 0B1A          553           LH    R0,BTESTNO         R0 = CURRENT TEST NUMBER               MOS35530
0588  45C0 0B10          554           CLH   R0,SELTST          IS IT LAST TEST ?                      MOS35540
058C  4280 044C          555           BL    KEEP4              NO, GO TO NEXT TEST                    MOS35550
0590  4300 0442          556           B     KEEP3              YES, GO TO TEST 0                      MOS35560
                         557  *                                                                         MOS35570
0594  C810 80F0          558  HALT9    LDAI  R1,X'80F0'         (R1) = X'80F0'              ***        MOS35580
0598  9521               559           EPSR  R2,R1              HALT PROCESSOR                         MOS35590
                         560  *                                                                         MOS35600
                         561  *  WHEN EXE/RUN IS PRESSED, PRINT TOTAL & TOTERR                          MOS35610
                         562  *                                                                         MOS35620
059A  41F0 0958          563  KEEP92   BAL   LINK,TSTDU         SEE IF LIST DEV IS ON                  MOS35630
059E  2035               564           BNZS  HALT9              NO, HALT                               MOS35640
05A0  2400               565  KEEP10   LIS   R0,0                                                      MOS35650
05A2  4000 0B12          566           STH   R0,WASDU           RESET FLAG                             MOS35660
05A6  41F0 07DE          567           BAL   LINK,CRLF                                                 MOS35670
05AA  C850 0B5A          568           LDAI  R5,TOTMSG                                                 MOS35680
05AE  4050 0B0C          569           STH   R5,ISITERR                                                MOS35690
05B2  41F0 0756          570           BAL   LINK,PRINT         PRINT 'TOTAL   TOTERR'                 MOS35700
05B6  2404               571           LIS   R0,4               TO PRINT 4 HEX DIGITS                  MOS35710
05B8  4850 0B16          572           LH    R5,TOTAL                                                  MOS35720
05BC  41F0 06CC          573           BAL   LINK,R5HEX         PRINT TOTAL IN HEX                     MOS35730
05C0  2434               574           LIS   R3,4                                                      MOS35740
05C2  C840 0020          575           LDAI  R4,C' '            SPACE                                  MOS35750
05C6  41F0 07EC          576  KEEP101  BAL   LINK,OUTCHR        OUTPUT IT                              MOS35760
05CA  2731               577           SIS   R3,1                                                      MOS35770
05CC  2023               578           BPS   KEEP101            4 TIMES                                MOS35780
05CE  2404               579           LIS   R0,4               TO PRINT 4 HEX DIGITS                  MOS35790
05D0  4850 0B18          580           LH    R5,TOTERR                                                 MOS35800
05D4  41F0 06CC          581           BAL   LINK,R5HEX         PRINT TOTERR IN HEX                    MOS35810
05D8  4300 01BE          582           B     OPTIN              GO TO BEGINNING                        MOS35820
                         583  *---------------------------------                                       MOS35830
                         584  *  DISPLAY DATA ROUTINE                                                  MOS35840
05DC  2401               585  DISPLAY  LIS   R0,1               GET DISPLAY PANEL ADDRESS              MOS35850
05DE  DE00 010F          586           OC    R0,INCR            PUT PANEL IN INCREMENTAL MODE          MOS35860
05E2  481F 0002          587           LH    R1,2(LINK)         GET 2ND PARAMETER ADDRESS              MOS35870
05E6  4811 0000          588           LH    R1,0(R1)           GET DATA                               MOS35880
05EA  9411               589           EXBR  R1,R1                                                     MOS35890
05EC  9801               590           WHR   R0,R1              WRITE DATA                             MOS35900
05EE  481F 0000          591           LH    R1,0(LINK)         GET 1ST PARAMETER ADDRESS              MOS35910
05F2  4811 0000          592           LH    R1,0(R1)           GET DATA                               MOS35920
05F6  9411               593           EXBR  R1,R1                                                     MOS35930
05F8  9801               594           WHR   R0,R1              WRITE DATA                             MOS35940
05FA  DE00 010E          595           OC    R0,NORM            PUT PANEL IN NORMAL MODE               MOS35950
05FE  430F 0004          596           B     4(LINK)            RETURN                                 MOS35960
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                        597 *-----------------------------------                                  MOS35970
                        598 *  ERROR ROUTINES                   (OVERRIDE NOMSG OPTION)          MOS35980
                        599 *                                                                     MOS35990
0602  D000 1F00         600 ERR       STM   R0,ERRSAVE          STORE REGISTERS                  MOS36000
0606  4120 0620         601           BAL   R2,ERRCOM           RETURN IF LIST DEVICE IS ON      MOS36010
060A  41E0 0654         602           BAL   RET,ERR1            PRINT 'ERROR TTNN'               MOS36020
060E  2400              603 ERRCOM2   LIS   R0,0                 *                          ***  MOS36030
0610  4000 0B0C         604           STH   R0,ISITERR          RESET ERROR FLAG                 MOS36040
0614  4820 0106         605           LH    R2,PSW                                             MOS36050
0618  9502              606           EPSR  R0,R2                                              MOS36060
061A  D100 1F00         607           LH    R0,ERRSAVE          RESTORE REGISTERS                MOS36070
061E  030F              608           BR    LINK                RETURN TO TEST                   MOS36080
                        609 *                                                                     MOS36090
                        610 *  ETPE COMMON ERROR ROUTINE                                  ***     MOS36100
                        611 *                                                                     MOS36110
0620  4020 0B22         612 ERRCOM    STH   R2,COMRET                                            MOS36120
0624  4810 0108         613           LH    R1,PSW2                                            MOS36130
0628  9501              614           EPSR  R0,R1               DISABLE INT. @ PROCESSOR LEVEL   MOS36140
062A  41F0 0958         615           BAL   LINK,TSTDU          GET LIST DEVICE DU BIT IN R1     MOS36150
062E  2138              616           BNZS  ERRCOM1             BRANCH IF OFF-LINE               MOS36160
0630  4020 0B0C         617           STH   R2,ISITERR          SET ERROR FLAG                   MOS36170
0634  4020 0B0E         618           STH   R2,NOERR                                             MOS36180
0638  4820 0B22         619           LH    R2,COMRET                                          MOS36190
063C  0302              620           BR    R2                  GO, PRINT ERROR MESSAGE          MOS36200
                        621 *                                                                     MOS36210
063E  4810 0B18         622 ERRCOM1   LH    R1,TOTERR           LIST DEVICE IS OFF               MOS36220
0642  2611              623           AIS   R1,1                                                 MOS36230
0644  4010 0B18         624           STH   R1,TOTERR           INCREMENT TOTERR                 MOS36240
0648  C510 7FFF         625           CLAI  R1,X'7FFF'          TOTERR < MAX RETAINABLE ?        MOS36250
064C  4280 0572         626           BL    KEEP91              NO, ABORT CURRENT TEST & GOTO NEXT MOS36260
0650  4300 0594         627           B     HALT9               YES, HALT PROCESSOR              MOS36270
                        628 *-----------------------------------                                  MOS36280
                        629 * MESSAGE PRINT ROUTINES            (DO NOT OVERRIDE NOMSG OPTION)   MOS36290
                        630 *                                                                     MOS36300
                        631 *  TO PRINT 'ERROR TTNN'                                             MOS36310
                        632 *                                                                     MOS36320
0654  C850 0B4E         633 ERR1      LDAI  R5,ERRMSG                                            MOS36330
0658  41F0 0756         634           BAL   LINK,PRINT          PRINT 'ERROR TTNN'               MOS36340
                        635 *                                   TT = TEST NO., NN = ERROR NO.    MOS36350
065C  03CE              636           BR    RET                 RETURN                           MOS36360
                        637 *                                                              ***    MOS36370
                        638 *  TO PRINT 'PSW PPPP  LOC LLLL'                                      MOS36380
                        639 *                                                                     MOS36390
065E  24C4              640 ERRPL1    LIS   R0,4                SET UP DIGITS = 4                MOS36400
0660  4810 0AE0         641           LH    R1,OPSW             R1 = OLD PSW                     MOS36410
0664  C820 0B78         642           LDAI  R2,ASCIPSW                                           MOS36420
0668  41F0 06F6         643           BAL   LINK,HEXASC         CONVERT IT TO ASCII              MOS36430
066C  4810 0AE2         644           LH    R1,OLOC             R1= OLD LOC                      MOS36440
0670  C820 0B82         645           LDAI  R2,ASCILOC                                           MOS36450
0674  41F0 06F6         646           BAL   LINK,HEXASC         CONVERT IT TO ASCII              MOS36460
0678  C850 0B74         647           LDAI  R5,PSWMSG                                            MOS36470
067C  41F0 0756         648           BAL   LINK,PRINT          PRINT 'PSW PPPP  LOC LLLL'       MOS36480
0680  030E              649           BR    RET                 RETURN                           MOS36490
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                                650 * ********************************                                    MOS36500
                                651 *  TO OBTAIN OPTION VALUE IN R6    (16 BITS, TARGT 16)              MOS36510
                                652 *                                                                    MOS36520
0682  2460                      653 OPTVAL   LIS   R6,0               INITIALIZE ACCUMULATOR            MOS36530
0684  41F0 087A                 654          BAL   R15,GETCHR         GET A CHAR IN R4                  MOS36540
0688  24FF                      655 OPTVAL0  LIS   R15,15                                                MOS36550
068A  D44F 0B34                 656 OPTVAL1  CLB   R4,HEXTAB(R15)     SCAN TABLE                        MOS36560
068E  2334                      657          BES   OPTVAL2           MATCH                             MOS36570
0690  27F1                      658          SIS   R15,1                                               MOS36580
0692  2214                      659          BNMS  OPTVAL1                                             MOS36590
0694  03CC                      660          BR    R12               ERROR; VALUE NOT IN TABLE.        MOS36600
0696  9164                      661 CPTVAL2  SLLS  R6,4                SHIFT LEFT 4                      MOS36610
0698  066F                      662          OAR   R6,R15             OR IN CURRENT DIGIT               MOS36620
069A  41F0 087A                 663 OPTVAL3  BAL   R15,GETCHR         GET NEXT CHAR                     MOS36630
069E  C540 005F                 664          CLAI  R4,X'5F'          IS IT LEFT ARROW ?                MOS36640
06A2  2334                      665          BES   OPTVAL5           YES, BRANCH                       MOS36650
06A4  C540 0008                 666          CLAI  R4,X'08'          BACK SPACE ?                      MOS36660
06A8  2133                      667          BNES  OPTVAL4           NO, BRANCH                        MOS36670
06AA  9064                      668 OPTVAL5  SRLS  R6,4               YES, THROW AWAY LAST HEX ENTRY     MOS36680
06AC  2209                      669          BS    OPTVAL3                                             MOS36690
06AE  C540 000D                 670 OPTVAL4  CLAI  R4,13              EXIT IF CR                        MOS36700
06B2  033E                      671          BER   R14                                                 MOS36710
06B4  C540 002C                 672          CLAI  R4,X'2C'          OR COMMA                          MOS36720
06B8  4230 0688                 673          BNE   OPTVAL0           LOOP TO PROCESS                   MOS36730
06BC  030E                      674          BR    R14               RETURN                            MOS36740
                                675 *--------------------------------                                    MOS36750
                                676 * TO CONVERT (R6) FROM BINARY TO UNARY PATTERN, IN R3                 MOS36760
                                677 *                                                                    MOS36770
06BE  2431                      678 UNARY    LIS   R3,1               INITIALIZE                        MOS36780
06C0  C560 000F                 679 UNARY1   CLAI  R6,15              DONE ?                            MOS36790
06C4  033E                      680          BER   R14                RETURN                            MOS36800
06C6  0A33                      681          AAR   R3,R3              NO. SHIFT R3. (SLHLS  R3,1)  ****    MOS36810
06C8  2661                      682          AIS   R6,1               INCREMENT COUNTER                 MOS36820
06CA  2205                      683          BS    UNARY1                                              MOS36830
                                684 *--------------------------------                              ***   MOS36840
                                685 *  R5HEX PRINTS CONTENTS OF R5 IN HEX                                MOS36850
                                686 *        PRINTS UPTO 4 DIGITS      (8 DIGITS, TARGT 32)            MOS36860
                                687 *                                                                    MOS36870
06CC  D000 1F40                 688 R5HEX    STM   R0,RSAVE           STORE REGISTERS                   MOS36880
06D0  0820                      689          LDAR  R2,R0              R2 = NO. OF DIGITS TO BE PRINTED  MOS36890
06D2  2721                      690          SIS   R2,1                                                 MOS36900
06D4  4210 06F0                 691          BM    R5XB                                                 MOS36910
06D8  9122                      692          SLLS  R2,2               R2 = 4(DIGITS-1)                  MOS36920
06DA  0845                      693 R5X      LDAR  R4,R5                                                MOS36930
06DC  CC42 0000                 694          SRAL  R4,0(R2)                                             MOS36940
06E0  C440 000F                 695          NAI   R4,15              R4 = HEX DIGIT                    MOS36950
06E4  D344 0B34                 696          LB    R4,HEXTAB(R4)                                        MOS36960
06E8  41F0 07EC                 697 R5XA     BAL   R15,OUTCHR                                           MOS36970
06EC  2724                      698          SIS   R2,4                                                 MOS36980
06EE  221A                      699          BNMS  R5X                LOOP TILL ALL DIGITS              MOS36990
06F0  D100 1F40                 700 R5XB     LM    R0,RSAVE           RESTORE REGISTERS                 MOS37000
06F4  030F                      701          BR    LINK               RETURN                            MOS37010
                                702 *--------------------------------                              ***   MOS37020
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EXEC - ETPE R03-05 (16 BIT/STRIPPED AND MODIFIED)

```
                                703  *  TO CONVERT HEXADECIMAL DATA IN R1 TO ASCII CHAR & STORE @ 0(R2)      MOS37030
                                704  *                                                                      MOS37040
06F6   D000 1F40                705  HEXASC    STM   R0,RSAVE           STORE REGISTERS                   MOS37050
06FA   0830                     706            LDAR  R3,R0              R3 = DIGITS                       MOS37060
06FC   9132                     707            SLLS  R3,2                                                 MOS37070
06FE   2734                     708            SIS   R3,4               R3 = 4(DIGITS)-4                  MOS37080
0700   0841                     709  HEXASC1   LDAR  R4,R1              R4 = HEX DATA                     MOS37090
0702   CC43 0000                710            SRAL  R4,0(R3)                                             MOS37100
0706   C440 000F                711            NAI   R4,15              R4 = HEX DIGIT TO BE CONVERTED    MOS37110
070A   D344 0B34                712            LB    R4,HEXTAB(R4)                                        MOS37120
070E   D242 0000                713            STB   R4,0(R2)           STORE ASCII CHAR                  MOS37130
0712   2621                     714            AIS   R2,1                                                 MOS37140
0714   2734                     715            SIS   R3,4                                                 MOS37150
0716   221B                     716            BNMS  HEXASC1            LOOP TILL ALL DIGITS              MOS37160
0718   D100 1F40                717            LM    R0,RSAVE           RESTORE REGISTERS                 MOS37170
071C   030F                     718            BR    LINK               RETURN                            MOS37180
                                719  *-----------------------------------                                  MOS37190
                                720  *  TO CONVERT BINARY DATA IN R1 INTO DECIMAL DIGITS                   MOS37200
                                721  *     AND STORE THEM IN ASCII @ 0(R2)                                 MOS37210
                                722  *                                                                      MOS37220
071E   D000 1F40                723  DECASC    STM   R0,RSAVE                                              MOS37230
0722   0830                     724            LDAR  R3,R0              COPY DIGIT COUNT                  MOS37240
0724   9131                     725            SLLS  R3,LADC            & ESTABLISH DECTAB INDEX.         MOS37250
0726   2732                     726            SIS   R3,ADC                                               MOS37260
0728   2440                     727  $DEC1     LIS   R4,0               CLEAR MODULUS COUNTER             MOS37270
072A   4853 0B2A                728            LDA   R5,DECTAB(R3)      LOAD LARGEST REQ. POWER OF 10.    MOS37280
072E   0515                     729  $DEC2     CLAR  R1,R5              EXCEEDS TEST VALUE ?              MOS37290
0730   2188                     730            BLS   $DEC3              BRANCH IF YES.                    MOS37300
0732   0B15                     731            SAR   R1,R5              DECREMENT TEST VALUE              MOS37310
0734   2641                     732            AIS   R4,1               INCREMENT MODULUS COUNTER         MOS37320
0736   C540 000A                733            CLAI  R4,10              VALID DECIMAL DIGIT ?             MOS37330
073A   2086                     734            BLS   $DEC2              BRANCH IF YES; ELSE               MOS37340
073C   274A                     735            SIS   R4,10              FORCE VALID DIGIT,                MOS37350
073E   2208                     736            BS    $DEC2              REPEAT DECREMENT.                 MOS37360
0740   D344 0B34                737  $DEC3     LB    R4,HEXTAB(R4)      CONVERT MODULUS COUNT TO ASCII    MOS37370
0744   D242 0000                738            STB   R4,0(R2)           AND STORE AT DESTINATION MSB.     MOS37380
0748   2621                     739            AIS   R2,1               INCREMENT DESTINATION POINTER     MOS37390
074A   2732                     740            SIS   R3,ADC             DECREMENT DECTAB POINTER          MOS37400
074C   4310 0728                741            BNM   $DEC1              FALL THROUGH ON DECTAB UNDERFLOW. MOS37410
0750   D100 1F40                742            LM    R0,RSAVE           RESTORE USER'S REGISTERS          MOS37420
0754   030F                     743            BR    LINK               RETURN.                           MOS37430
                                744  *-----------------------------------                                  MOS37440
                                745  *  TO PRINT THE ASCII MESSAGE                                        MOS37450
                                746  *                                                                      MOS37460
0756   D000 1F40                747  PRINT     STM   R0,RSAVE           STORE REGISTERS                   MOS37470
075A   41F0 0958                748            BAL   LINK,TSTDU                                           MOS37480
075E   2337                     749            BZS   P1                                                   MOS37490
0760   4010 0B12                750            STH   R1,WASDU           SET DU FLAGS                      MOS37500
0764   4010 0B14                751            STH   R1,WASDU1                                           MOS37510
0768   4300 07D4                752            B     PRINT5             EXIT                              MOS37520
076C   4820 0B12                753  P1        LH    R2,WASDU                                             MOS37530
0770   4330 079E                754            BZ    P3                                                 MOS37540
0774   C810 0140                755            LDAI  R1,X'140'          DELAY CONSTANT                    MOS37550
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```
0778  C800 1000          756  P4       LDAI  R0,X'1000'                                  MOS37560
077C  2701                757  P5       SIS   R0,1                                       MOS37570
077E  2031                758           BNZS  P5                                         MOS37580
0780  2711                759           SIS   R1,1                                       MOS37590
0782  2035                760           BNZS  P4              LOOP TILL TIMEOUT          MOS37600
                          761  *                              (20 SEC FOR CRT WARM-UP)   MOS37610
0784  2440                762           LIS   R4,0                                       MOS37620
0786  4040 0B12           763           STH   R4,WASDU                                   MOS37630
078A  2541                764           LCS   R4,1            CHARACTER = X'FF'          MOS37640
078C  4040 0B14           765           STH   R4,WASDU1                                  MOS37650
0790  2434                766           LIS   R3,4                                       MOS37660
0792  41F0 07EC           767  P2       BAL   LINK,OUTCHR                                MOS37670
0796  2731                768           SIS   R3,1                                       MOS37680
0798  2023                769           BPS   P2                                       MOS37690
079A  4300 05A0           770           B     KEEP10          PRINT TOTAL, TOTERR        MOS37700
079E  48C0 0BDE           771  P3       LH    R0,NOMSG+6                                 MOS37710
07A2  2335                772           BZS   PRINT2          NO, PRINT ALL MESSAGES     MOS37720
07A4  4800 0B0C           773           LH    R0,ISITERR                                 MOS37730
07A8  4330 07D4           774           BZ    PRINT5          NOT AN ERROR MSG. EXIT     MOS37740
                          775  *                                                          MOS37750
07AC  D345 0000           776  PRINT2   LB    R4,0(R5)        GET A MESSAGE BYTE         MOS37760
07B0  41F0 07EC           777           BAL   LINK,OUTCHR     OUTPUT IT                  MOS37770
07B4  274D                778           SIS   R4,13           CR ?                       MOS37780
07B6  2333                779           BZS   PRINT3          MSG OVER                   MOS37790
07B8  2651                780           AIS   R5,1                                       MOS37800
07BA  2207                781           BS    PRINT2          LOOP FOR NEXT CHAR         MOS37810
07BC  244A                782  PRINT3   LIS   R4,10           LF                         MOS37820
07BE  D310 010B           783           LB    R1,IOSAVE+1     GET LIST DEV IDENTIFIER    MOS37830
07C2  2713                784           SIS   R1,3            LINE PRINTER ?             MOS37840
07C4  2335                785           BZS   PRINT3A         BRANCH IF YES.             MOS37850
07C6  41F0 07EC           786           BAL   LINK,OUTCHR     LF                         MOS37860
07CA  2541                787           LCS   R4,1            DEL                        MOS37870
07CC  2302                788           BS    PRINT3B                                    MOS37880
07CE  2441                789  PRINT3A  LIS   R4,1            YES, OUTPUT X'01'          MOS37890
07D0  41F0 07EC           790  PRINT3B  BAL   LINK,OUTCHR     TERMINAL CHARACTER         MOS37900
07D4  41F0 08D4           791  PRINT5   BAL   LINK,TSTBRK                                MOS37910
07D8  D100 1F40           792           LM    R0,RSAVE        RESTORE REGISTERS          MOS37920
07DC  030F                793           BR    LINK            RETURN                     MOS37930
                          794  *--------------------------------                         MOS37940
                          795  *  SMALL SUPPORT ROUTINES                                 MOS37950
                          796  *                                                          MOS37960
                          797  *  TO OUTPUT CR,LF TO LIST DEVICE                         MOS37970
                          798  *                                                          MOS37980
07DE  D000 1F40           799  CRLF     STM   R0,RSAVE        STORE REGISTERS            MOS37990
07E2  244D                800           LIS   R4,13                                      MOS38000
07E4  41F0 07EC           801           BAL   LINK,OUTCHR     OUTPUT CR                  MOS38010
07E8  4300 07BC           802           B     PRINT3          LINE FEED, RESTORE, RETURN MOS38020
                          803  *--------------------------------                         MOS38030
                          804  *  TO OUTPUT A CHARACTER TO THE LIST DEVICE                MOS38040
07EC  40F0 0B24           805  OUTCHR   STH   R15,OUT.SAV     SAVE RETURN ADDRESS        MOS38050
07F0  D300 010B           806           LB    R0,IOSAVE+1                                MOS38060
07F4  2704                807           SIS   R0,4                                       MOS38070
07F6  4230 0834           808           BNZ   OUTCHR2         BRANCH IF NOT CAROUSEL     MOS38080
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```
07FA  4000 0B20          809            STH   R0,PAUSE          *                                  ***   MOS38090
07FE  41F0 0958          810  OTC.0     BAL   LINK,TSTDU        ON LINE ?                                MOS38100
0802  4230 0870          811            BNZ   OUT0              NO, BRANCH                               MOS38110
0806  9D01               812            SSR   R0,R1             GET CAROUSEL STATUS                      MOS38120
0808  2386               813            BNCS  OTC.1             BRANCH IF CHAR. IS TO BE READ      ***   MOS38130
080A  4810 0B20          814            LH    R1,PAUSE          PAUSED NOW ?                             MOS38140
080E  2038               815            BNZS  OTC.0             YES, LOOP                                MOS38150
0810  4300 0834          816            B     OUTCHR2           NO, GO OUTPUT CHARACTER                  MOS38160
0814  9B01               817  OTC.1     RDR   R0,R1             GET CAROUSEL CHARACTER                   MOS38170
0816  C410 007F          818            NAI   R1,X'7F'                                                   MOS38180
081A  CB10 0012          819            SAI   R1,X'12'          DC2 ?                                    MOS38190
081E  2134               820            BNZS  OTC.3             NO, BRANCH                               MOS38200
0820  4010 0B20          821            STH   R1,PAUSE          YES, SET PAUSE FLAG                      MOS38210
0824  2308               822            BS    OUTCHR2           BRANCH                                   MOS38220
0826  2712               823  OTC.3     SIS   R1,2              DC4 ?                                    MOS38230
0828  4230 07FE          824            BNZ   OTC.0             NO, GO WAIT FOR DC2                      MOS38240
082C  40F0 0B20          825            STH   LINK,PAUSE        RESET PAUSE FLAG                         MOS38250
0830  4300 07FE          826            B     OTC.0             GO WAIT FOR DC2                          MOS38260
                         827  *                                                                          MOS38270
0834  4010 0B20          828  OUTCHR2   STH   R1,PAUSE          RESET FLAG                               MOS38280
0838  41F0 0958          829            BAL   LINK,TSTDU        OFF-LINE ?                               MOS38290
083C  4230 0870          830            BNZ   OUT0              BRANCH IF OFF-LINE                       MOS38300
0840  4110 09B8          831            BAL   R1,SETUP          SET UP FOR OUTPUT                        MOS38310
0844  9D01               832  OTC.4     SSR   R0,R1             WAIT FOR NOT BUSY                        MOS38320
0846  4230 0870          833            BTC   3,OUT0            BRANCH IF OFF-LINE                       MOS38330
084A  C510 000C          834            CLAI  R1,12             PASLA OFFLINE ?                          MOS38340
084E  4330 0870          835            BE    OUT0              BRANCH: YES.                             MOS38350
0852  C310 0008          836            TAI   R1,8              BUSY ?                                   MOS38360
0856  2039               837            BNZS  OTC.4             WAIT FOR NOT BUSY.                       MOS38370
0858  9A04               838            WDR   R0,R4             OUTPUT DATA BYTE                         MOS38380
085A  41F0 0958          839  OTC.5     BAL   LINK,TSTDU        DEVICE DU ?                              MOS38390
085E  2139               840            BNZS  OUT0              YES, BRANCH                              MOS38400
0860  D310 010B          841            LB    R1,IOSAVE+1                                                MOS38410
0864  0A11               842            AAR   R1,R1            (SLHLS  R1,1)                      ****  MOS38420
0866  D301 0111          843            LB    R0,IO+1(R1)       GET CONSOLE WRITE ADDRESS                MOS38430
086A  9D01               844            SSR   R0,R1                                                      MOS38440
086C  2089               845            BTBS  8,OTC.5           WAIT FOR NOT BUSY.                       MOS38450
086E  2303               846            BS    OUT1                                                       MOS38460
0870  4010 0B12          847  OUT0      STH   R1,WASDU          SET WASDU FLAG                           MOS38470
0874  48F0 0B24          848  OUT1      LH    LINK,OUT.SAV                                               MOS38480
0878  030F               849            BR    LINK              RETURN AS SET UP ABOVE                   MOS38490
                         850  *---------------------------------                                         MOS38500
                         851  *  TO GET A CHAR FROM KEYBOARD (IN REG R4)                                 MOS38510
                         852  *                                                                          MOS38520
087A  4140 099C          853  GETCHR    BAL   R4,KBREAD         PUT KB DEVICE IN READ MODE               MOS38530
087E  0890               854            LDAR  R9,R0             SAVE CONSOLE ADDRESS                     MOS38540
0880  9D04               855            SSR   R0,R4                                                      MOS38550
0882  2081               856            BTBS  8,1               IF BUSY, LOOP (POSSIBLE HANG)      ***   MOS38560
0884  9B04               857            RDR   R0,R4             READ A CHAR IN R4                        MOS38570
                         858  * TO ECHO RECEIVED CHARACTERS TO CONSOLE DEVICE IN FDX MODE                 MOS38580
0886  D400 011A          859  ECHO      CLB   R0,MICROBUS                                                 MOS38590
088A  233B               860            BES   ECHO1             IF MICROBUS, BRANCH                      MOS38600
088C  D390 0AEC          861            LB    R9,CONRD                                                   MOS38610
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```
0890  C590 00A9      862          CLAI  R9,X'A9'          CAROUSEL ?                          MOS38620
0894  2137           863          BNES  ECHRTN            YES, DO NOT ECHO                    MOS38630
0896  D390 0AEB      864          LB    R9,CONADR+1                                           MOS38640
089A  DD90 0AE4      865          SS    R9,SINK                                               MOS38650
089E  2082           866          BTBS  8,2                                                   MOS38660
08A0  9A94           867  ECHO1   WDR   R9,R4             ECHO RECEIVED BYTE                  MOS38670
08A2  C440 007F      868  ECHRTN  NAI   R4,X'7F'          REMOVE PARITY BIT                   MOS38680
08A6  030F           869          BR    LINK              RETURN                              MOS38690
                     870  *---------------------------------                                  MOS38700
                     871  *  TO OUTPUT '?' TO CONSOLE                                         MOS38710
                     872  *                                                                   MOS38720
08A8  41F0 07DE      873  QUESTN  BAL   LINK,CRLF                                            MOS38730
08AC  40F0 0B0C      874          STH   LINK,ISITERR        SET FLAG                          MOS38740
08B0  C850 0B96      875          LDAI  R5,QMSG                                               MOS38750
08B4  41F0 0756      876          BAL   LINK,PRINT          PRINT '?'                         MOS38760
08B8  2400           877          LIS   R0,0                                                  MOS38770
08BA  4000 0B0C      878          STH   R0,ISITERR                                            MOS38780
08BE  4300 01CA      879          B     OPTIN1              TO ACCEPT COMMAND INPUT           MOS38790
                     880  *---------------------------------                                  MOS38800
                     881  * IF BREAK KEY DEPRESSED, GO TO 'OPTIN' OR (BRKVECT); ELSE RETURN.  MOS38810
                     882  *   BUT IF "BREAK" & CONTIN = 1, GO TO ABORT1.                       MOS38820
                     883  *                                                                   MOS38830
08C2  D000 1F60      884  TSTBRKX STM   R0,16*ADC+RSAVE     STORE REGISTERS          ****    MOS38840
08C6  40F0 0B26      885          STH   LINK,BRK.SAV        SAVE RETURN ADDRESS      ****    MOS38850
08CA  C8F0 04A8      886          LDAI  LINK,TSTEND         GET TSTEND ADDRESS       ****    MOS38860
08CE  40F0 0B0A      887          STH   LINK,BRKVECT        PUT TSTEND IN VECTOR LOCATION ****MOS38870
08D2  2305           888          BS    TSTBRK6             BRANCH                   ****    MOS38880
                     889  *                                                                   MOS38890
                     890  *                                                                   MOS38900
08D4  D000 1F60      891  TSTBRK  STM   R0,16*ADC+RSAVE     STORE REGISTERS                   MOS38910
08D8  40F0 0B26      892          STH   LINK,BRK.SAV        SAVE RETURN ADDRESS               MOS38920
08DC  D300 0AEA      893  TSTBRK6 LB    R0,CONADR           GET KEYBOARD DEVICE ADR           MOS38930
08E0  9D01           894          SSR   R0,R1                                                 MOS38940
08E2  4210 0948      895          BTC   1,TSTBRK3           IF CLI OR MICROBUS DU, BRANCH     MOS38950
08E6  C510 000C      896          CLAI  R1,X'0C'                                              MOS38960
08EA  4330 0948      897          BE    TSTBRK3             IF PASLA DU, BRANCH               MOS38970
08EE  C310 0020      898          TAI   R1,X'20'            'BREAK' KEY PRESSED ?             MOS38980
08F2  4330 0948      899          BZ    TSTBRK3             NO, EXIT                          MOS38990
08F6  D320 0110      900          LB    R2,IO                                                 MOS39000
08FA  C520 0005      901          CLAI  R2,5                IS IT MICROBUS ?                  MOS39010
08FE  2139           902          BNES  TSTBRK4             NO, BRANCH                        MOS39020
0900  9B02           903  TSTBRK5 RDR   R0,R2                                                 MOS39030
0902  9D01           904          SSR   R0,R1                                                 MOS39040
0904  C310 0020      905          TAI   R1,X'20'                                              MOS39050
0908  4230 0900      906          BNZ   TSTBRK5                                               MOS39060
090C  4300 0934      907          B     TSTBRK2                                               MOS39070
0910  4820 0AE6      908  TSTBRK4 LH    R2,PASFLG           PASLA ?                           MOS39080
0914  233C           909          BZS   TSTBRK1             NO, BRANCH                        MOS39090
0916  C310 0008      910          TAI   R1,8                ALREADY ACKNOWLEDGED ?            MOS39100
091A  4230 0948      911          BNZ   TSTBRK3             BRANCH IF YES                     MOS39110
091E  9BC2           912          RDR   R0,R2                                                 MOS39120
0920  9D01           913          SSR   R0,R1                                                 MOS39130
0922  2281           914          BFBS  8,1                                                   MOS39140
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0924  0822           915           LDAR  R2,R2             ZERO CHARACTER ?                        MOS39150
0926  4230 0948      916           BNZ   TSTBRK3           BRANCH: JUST FRAMING ERROR              MOS39160
092A  2305           917           BS    TSTBRK2                                                   MOS39170
092C  9D01           918 TSTBRK1   SSR   R0,R1                                                     MOS39180
092E  C310 0020      919           TAI   R1,X'20'                                                  MOS39190
0932  2033           920           BNZS  TSTBRK1           WAIT FOR BREAK KEY RELEASE              MOS39200
0934  48F0 0BD2      921 TSTBRK2   LH    LINK,CONTIN+6     IF "CONTIN" = 1,                ***     MOS39210
0938  4230 0D08      922           BNZ   OPTIN2            BRANCH & ABORT TESTING          ****    MOS39220
093C  48F0 0B0A      923           LH    R15,BRKVECT       CHECK FOR SPECIAL ROUTINE               MOS39230
0940  4330 0D08      924           BZ    OPTIN2            BRK W/NO VECTOR: TO EXEC.       ****    MOS39240
0944  40F0 0B26      925           STH   R15,BRK.SAV       SET UP FOR EXIT                         MOS39250
0948  2400           926 TSTBRK3   LIS   R0,0                                                      MOS39260
094A  4000 0B0A      927           STH   R0,BRKVECT        DELETE VECTOR AFTER ONE SHOT.           MOS39270
094E  D100 1F60      928           LM    R0,16*ADC+RSAVE   RESTORE REGISTERS                       MOS39280
0952  48F0 0B26      929           LH    LINK,BRK.SAV      RESTORE RETURN ADDRESS                  MOS39290
0956  030F           930           BR    LINK              RETURN TO PROGRAM                       MOS39300
                     931 *---------------------------------                                        MOS39310
                     932 * SEE IF CURRENT LIST DEVICE OFF-LINE (R1, CC NON-ZERO IF OFF)           MOS39320
                     933 *                                                                         MOS39330
0958  2401           934 TSTDU     LIS   R0,1                                                      MOS39340
095A  4810 0AE8      935           LH    R1,PASFLG2                                                MOS39350
095E  2333           936           BZS   $TSTDU0                                                   MOS39360
0960  C800 00FC      937           LDAI  R0,X'FC'                                                  MOS39370
0964  D310 010B      938 $TSTDU0   LB    R1,IOSAVE+1       GET LIST DEVICE IDENTIFIER              MOS39380
0968  0A11           939           AAR   R1,R1             (R1) = 2,4,6,8,A... (SLHLS R1,1)****    MOS39390
096A  D311 0110      940           LB    R1,IO(R1)         GET LIST DEVICE ADDRESS                 MOS39400
096E  D210 0AE4      941           STB   R1,SINK           SAVE LIST DEVICE ADDRESS                MOS39410
0972  9D11           942           SSR   R1,R1             GRAB STATUS                             MOS39420
0974  0410           943           NAR   R1,R0                                                     MOS39430
0976  C310 0001      944           TAI   R1,1              CLI DU ?                                MOS39440
097A  2135           945           BNZS  $TSTDU2           YES, BRANCH                             MOS39450
097C  C510 000C      946           CLAI  R1,X'0C'          PASLA DU ?                              MOS39460
0980  2332           947           BES   $TSTDU2           YES, BRANCH                             MOS39470
0982  2511           948 $TSTDU1   LCS   R1,1              FORCE R1 FOR RETURN CC = 0              MOS39480
0984  D300 0AE4      949 $TSTDU2   LB    R0,SINK           RESTORE LIST DEVICE ADDRESS             MOS39490
0988  C710 FFFF      950           XAI   R1,-1             SET CONDITION CODE                      MOS39500
098C  030F           951           BR    LINK              RETURN                                  MOS39510
                     952 * ---------------------------------                                       MOS39520
                     953 * TO DIRECT INPUT AND OUTPUT TO CONSOLE DEVICE                           MOS39530
                     954 *                                                                         MOS39540
098E  D300 0110      955 SETKB     LB    R0,IO             GET KEYBOARD DEVICE                     MOS39550
0992  9410           956           EXBR  R1,R0                                                     MOS39560
0994  0610           957           OAR   R1,R0                                                     MOS39570
0996  4010 010A      958           STH   R1,IOSAVE         KB DEVICE = LIST DEVICE                 MOS39580
099A  03CF           959           BR    LINK              RETURN                                  MOS39590
                     960 *---------------------------------                                        MOS39600
                     961 *  TO PUT KEYBOARD DEVICE IN READ MODE                                    MOS39610
                     962 *                                                                         MOS39620
099C  D300 0AEA      963 KBREAD    LB    R0,CONADR                                                 MOS39630
09A0  DE00 0AEC      964           OC    R0,CONRD                                                  MOS39640
09A4  DB00 0AE4      965           RD    R0,SINK                                                   MOS39650
09A8  4890 0AE6      966           LH    R9,PASFLG         PASLA ?                                 MOS39660
09AC  4200 09AC      967           NOP   *                 FOR SPECIAL KB DEVICE                   MOS39670
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09B0   2333             968  TTYGET   BZS   KBXIT              NO, RETURN                          MOS39680
09B2   DE00 0B04         969           OC    R0,CONRQ2S                                             MOS39690
09B6   03C4              970  KBXIT    BR    R4                 RETURN                              MOS39700
                         971  *----------------------------------                              ***   MOS39710
                         972  *  LIST DEVICE SET UP ROUTINE                                          MOS39720
                         973  *                                                                      MOS39730
09B8   4010 0B28         974  SETUP    STH   R1,SET.RTN                                            MOS39740
09BC   D310 010B         975           LB    R1,IOSAVE+1        GET LIST DEVICE IDENTIFIER          MOS39750
09C0   0A11              976           AAR   R1,R1              HW INDEX      (SLHLS  R1,1)   ****  MOS39760
09C2   D3C1 0111         977           LB    R0,IO+1(R1)        GET LIST DEVICE ADDRESS             MOS39770
09C6   DEC1 0AED         978           OC    R0,CONWRT(R1)                                          MOS39780
09CA   4810 0B28         979           LH    R1,SET.RTN                                             MOS39790
09CE   0301              980           BR    R1                 RETURN                              MOS39800
                         981  * **********************************                              ***   MOS39810
                         982  *  LOW CORE SET UP ROUTINE                                             MOS39820
                         983  *                                                                      MOS39830
09D0   2410              984  LCORE    LIS   R1,0                                                   MOS39840
09D2   2422              985           LIS   R2,2                                                   MOS39850
09D4   C830 004E         986           LDAI  R3,X'4E'                                               MOS39860
09D8   24C0              987           LIS   R0,0                                                   MOS39870
09DA   4840 0020         988           LH    R4,X'20'           SAVE CONSOLE STATUS                 MOS39880
09DE   4001 0000         989  ZERO1    STH   R0,0(R1)                                               MOS39890
09E2   C110 09DE         990           BXLE  R1,ZERO1           ZERO CORE FROM 0 THRU X'4F'         MOS39900
09E6   4040 0020         991           STH   R4,X'20'           RESTORE CONSOLE STATUS              MOS39910
09EA   C830 0A22         992           LDAI  R3,II                                                  MOS39920
09EE   4030 0036         993           STH   R3,X'36'           ILL INST INT NEW PSW LOC            MOS39930
09F2   C840 0A5A         994           LDAI  R4,MM                                                  MOS39940
09F6   4040 003E         995           STH   R4,X'3E'           M. M. INT NEW PSW LOC               MOS39950
09FA   C840 1F40         996           LDAI  R4,RSAVE                                               MOS39960
                         997  *                                                                      MOS39970
                         998  *  SET UP LOW CORE FOR 16 BIT MACHINE                                  MOS39980
                         999  *                                                                      MOS39990
09FE   4040 0022        1000           STH   R4,X'22'           REG SAVE POINTER                    MOS40000
0A02   030F             1001           BR    LINK               RETURN                              MOS40010
                        1002  *----------------------------------                              ***   MOS40020
                        1003  *  SPURIOUS INTERRUPT HANDLERS                                         MOS40030
                        1004  *                                                                      MOS40040
0A04   40E0 0AE0        1005  COMM     STH   R14,OPSW                                               MOS40050
0A08   40F0 0AE2        1006           STH   R15,OLOC                                               MOS40060
0A0C   4800 0108        1007  COMM1    LH    R0,PSW2                                                MOS40070
0A10   9520             1008           EPSR  R2,R0              NO INT. , REG SET 15                MOS40080
0A12   41E0 0602        1009           BAL   LINK,ERR           PRINT 'ERROR XXFN'                  MOS40090
0A16   40F0 0B0C        1010           STH   LINK,ISITERR       FORCE PRINT                         MOS40100
0A1A   41E0 065E        1011           BAL   RET,ERRPL1         PRINT 'PSW PPPP  LOC LLLL'          MOS40110
0A1E   43C0 01CA        1012           B     OPTIN1             ENTER COMMAND MODE                  MOS40120
                        1013  *                                                                      MOS40130
                        1014  *  ILLEGAL INSTRUCTION INTERRUPT TRAP                                  MOS40140
                        1015  *                                                                      MOS40150
0A22   C820 0A5A        1016  II       LDAI  R2,MM              *                           ***   MOS40160
0A26   4020 003E        1017           STH   R2,X'3E'           RESTORE ETPE MM POINTER     ***   MOS40170
0A2A   C820 4632        1018           LDAI  R2,C'F2'                                               MOS40180
0A2E   4020 0B56        1019           STH   R2,ERRNO           SET ERROR NUMBER = F2               MOS40190
0A32   48E0 0030        1020           LH    R14,X'30'          OLD PSW                             MOS40200
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EXEC - ETPE R03-05 (16 BIT/STRIPPED AND MODIFIED)

```
0A36  48F0 0032        1021          LH    R15,X'32'          OLD LOC                              MOS40210
0A3A  4300 0A04        1022  II32    B     COMM               *                          ***       MOS40220
                       1023  *                                                                     MOS40230
                       1024  *  MACHINE MALFUNCTION INTERRUPT TRAP                                 MOS40240
                       1025  *                                                                     MOS40250
0A3E  95EE             1026  MM0     EPSR  R14,R14            CAPTURE MMINT PSW          ***       MOS40260
0A40  C820 0A5A        1027          LDAI  R2,MM              *                          ***       MOS40270
0A44  4020 003E        1028          STH   R2,X'3E'           RESTORE ETPE MM POINTER    ***       MOS40280
0A48  08AE             1029          LDAR  R10,R14            *                          ***       MOS40290
0A4A  C4A0 000F        1030          NAI   R10,X'000F'        MASK OFF CC ONLY           ***       MOS40300
0A4E  C3A0 0006        1031          TAI   R10,6              CC = MEMORY ERROR ?        ***       MOS40310
0A52  2337             1032          BZS   MM1                NO, BRANCH                 ***       MOS40320
0A54  41F0 1C66        1033          BAL   LINK,PARERR        YES, PRINT ERROR (PARITY)  ***       MOS40330
0A58  2304             1034          BS    MM1                *                          ***       MOS40340
                       1035  *                                                                     MOS40350
0A5A  95AA             1036  MM      EPSR  R10,R10            CAPTURE MMINT PSW                    MOS40360
0A5C  C4A0 000F        1037          NAI   R10,X'000F'        MASK OFF CC ONLY           ***       MOS40370
0A60  C820 4633        1038  MM1     LDAI  R2,C'F3'                                                MOS40380
0A64  4020 0B56        1039          STH   R2,ERRNO           SET ERROR NUMBER F3                  MOS40390
0A68  48E0 0038        1040          LH    R14,X'38'          OLD PSW (16 BIT PROCESSOR)           MOS40400
0A6C  48F0 003A        1041          LH    R15,X'3A'          OLD LOC                              MOS40410
0A70  C4E0 FFF0        1042  MM32    NAI   R14,X'FFF0'                                             MOS40420
0A74  06EA             1043          OAR   R14,R10            R14 = COMPOSITE PSW                  MOS40430
0A76  40E0 0AE0        1044          STH   R14,OPSW                                                MOS40440
0A7A  40F0 0AE2        1045          STH   R15,OLOC                                                MOS40450
0A7E  C810 7FFF        1046          LDAI  R1,X'7FFF'                                              MOS40460
0A82  2711             1047  MM16    SIS   R1,1               TIMEOUT                              MOS40470
0A84  2021             1048          BPS   MM16                                                    MOS40480
0A86  C800 80F0        1049          LDAI  R0,X'80F0'         R0 = X'80F0'               ***       MOS40490
0A8A  9520             1050          EPSR  R2,R0              HALT PROCESSOR                       MOS40500
                       1051  *                                                                     MOS40510
                       1052  *    WHEN EXE/RUN IS DEPRESSED, ERROR MSG IS PRINTED.                 MOS40520
                       1053  *                                                                     MOS40530
0A8C  D320 0110        1054  MMCOM   LB    R2,IO              GET CONSOLE IO POINTER               MOS40540
0A90  2725             1055          SIS   R2,5               IS CONSOLE ON MICRO-IO BUS ?         MOS40550
0A92  2334             1056          BZS   MMCOMA             YES, BRANCH                          MOS40560
0A94  4820 0AE6        1057          LH    R2,PASFLG          IS CONSOLE ON PASLA ?      ****      MOS40570
0A98  233C             1058          BZS   MMCOM1             NO, BRANCH                 ****      MOS40580
0A9A  D310 0110        1059  MMCOMA  LB    R1,IO              YES, GET CONSOLE DEVICE IDENT ****   MOS40590
0A9E  0A11             1060          AAR   R1,R1              SET INDEX     (SLHLS  R1,1)  ****   MOS40600
0AA0  D321 0110        1061          LB    R2,IO(R1)          GET CONSOLE DEVICE ADDRESS ****      MOS40610
0AA4  DE21 0AF8        1062          OC    R2,CON2ND(R1)      ISSUE CONSOLE SPEED COMMAND ****     MOS40620
0AA8  DE20 0AEC        1063          OC    R2,CONRD           ISSUE CONSOLE READ COMMAND ****      MOS40630
0AAC  DB20 0AE4        1064          RD    R2,SINK            DUMMY READ TO SET BUSY     ****      MOS40640
                       1065  *                                                                     MOS40650
0AB0  D310 0111        1066  MMCOM1  LB    R1,IO+1            GET LIST DEVICE POINTER              MOS40660
0AB4  2715             1067          SIS   R1,5               IS LIST DEVICE ON MICRO-IO BUS ?     MOS40670
0AB6  2334             1068          BZS   MMCOM1A            YES, BRANCH                          MOS40680
0AB8  4810 0AE8        1069          LH    R1,PASFLG2         IS LIST DEVICE ON PASLA ?  ****      MOS40690
0ABC  233E             1070          BZS   MMCOM2             NO, BRANCH                 ****      MOS40700
0ABE  D310 0111        1071  MMCOM1A LB    R1,IO+1            YES, GET LIST DEVICE POINTER ****    MOS40710
0AC2  D320 0110        1072          LB    R2,IO              GET CONSOLE POINTER        ****      MOS40720
0AC6  0512             1073          CLAR  R1,R2              CONSOLE = LIST DEVICE ?    ****      MOS40730
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EXEC - ETPE R03-05 (16 BIT/STRIPPED AND MODIFIED)

```
0AC8  2338            1074          BES   MMCOM2            YES, BRANCH                          ****  MOS40740
0ACA  0A11            1075          AAR   R1,R1             NO, SET INDEX   (SLHLS  R1,1)      ****  MOS40750
0ACC  D321 0111       1076          LB    R2,IO+1(R1)       GET LIST DEVICE ADDRESS              ****  MOS40760
0AD0  DE21 0AF8       1077          CC    R2,LST2ND(R1)     ISSUE LIST SPEED COMMAND             ****  MOS40770
0AD4  DE21 0AED       1078          OC    R2,LSTWRT(R1)     ISSUE LIST WRITE COMMAND             ****  MOS40780
                      1079  *                                                                      ****  MOS40790
0AD8  4300 0A0C       1080  MMCOM2  B     COMM1             *                                    ****  MOS40800
                      1081  * ********************************                                       MOS40810
                      1082  *  ETPE CONSTANTS & TABLES                                             MOS40820
                      1083  *                                                                      MOS40830
0AE0                  1084          ALIGN 8                                                        MOS40840
                      1085  *---------------------------------                                    MOS40850
0AE0  0000            1086  OPSW    DCX   0                                                        MOS40860
0AE2  0000            1087  CLOC    DCX   0                                                        MOS40870
                      1088  *---------------------------------                                    MOS40880
0AE4  00              1089  SINK    DB    0                 BIT BUCKET                           MOS40890
0AE5  00              1090          DB    *                                                      MOS40900
0AE6  0000            1091  PASFLG  DCX   0                 SET WHEN CONSOLE ON PASLA/PALM       MOS40910
0AE8  0000            1092  PASFLG2 DCX   0                 SET WHEN LIST DEVICE ON PASLA        MOS40920
                      1093  *---------------------------------                                    MOS40930
                      1094  *  ETPE IO COMMANDS                                                    MOS40940
                      1095  *                                                                      MOS40950
0AEA  0000            1096  CONADR  DCX   0                 CONSOLE DEVICE ADDRESS               MOS40960
0AEC  0000            1097  CONRD   DCX   0                 CONSOLE READ/WRITE COMMANDS          MOS40970
      0000 0AED       1098  CONWRT  EQU   CONRD+1                                                  MOS40980
      0000 0AED       1099  LSTWRT  EQU   CONWRT            LIST DEVICE WRITE COMMAND            MOS40990
0AEE  B1A3            1100  CRTRD   DCX   B1A3              FOR CRT                              MOS41000
0AF0  A4D8            1101  CLIFRD  DCX   A4D8              *   CURRENT LOOP INTERFACE           MOS41010
0AF2  0080            1102  LPWRT   DCX   0080              *   LINE PRINTER                     MOS41020
0AF4  A1A3            1103  CARRD   DCX   A1A3              *   CAROUSEL 300                     MOS41030
0AF6  8202            1104  MREADC  DCX   8202              *   MICROBUS                         MOS41040
                      1105  *                                                                      MOS41050
0AF8  0000            1106  CON2ND  DCX   0                 2ND COMMAND; ENABLE READ COMMAND     MOS41060
      0000 0AF8       1107  LST2ND  EQU   CON2ND            LIST DEVICE SPEED COMMAND            MOS41070
      0000 0AF9       1108  CONENRD EQU   CON2ND+1                                                 MOS41080
0AFA  F871            1109  CRT2ND  DCX   F871              FOR CRT                              MOS41090
0AFC  0064            1110  CLIF2ND DCX   0064              *   CURRENT LOOP INTERFACE           MOS41100
0AFE  0000            1111          DCX   0                 *   DUMMY HW FOR LP                  MOS41110
0B00  F061            1112  CAR2ND  DCX   F061              *   CAROUSEL 300                     MOS41120
0B02  0300            1113          DCX   0300              *   DUMMY HW FOR MICROBUS            MOS41130
                      1114  *                                                                      MOS41140
0B04  00              1115  CONRQ2S DB    0                 CONSOLE REQUEST TO SEND CMD          MOS41150
0B05  33              1116  CRTRQ2S DB    X'33'             FOR CRT                              MOS41160
0B06  00              1117          DB    0                 *   DUMMY BYTE FOR CLI               MOS41170
0B07  00              1118          DB    0                 *   DUMMY BYTE FOR LP                MOS41180
0B08  23              1119  CARRQ2S DB    X'23'             *   CAROUSEL 300                     MOS41190
0B09  00              1120          DB    0                 *   DUMMY BYTE FOR MICROBUS          MOS41200
0B0A                  1121          DB    *                                                      MOS41210
                      1122  *---------------------------------                                    MOS41220
0B0A  0000            1123  BRKVECT DC    Z(0)              BREAK KEY VECTOR                     MOS41230
0B0C  0000            1124  ISITERR DCX   0                                                      MOS41240
0B0E  0000            1125  NOERR   DCX   0                                                      MOS41250
0B10  0000            1126  SELTST  DCX   0                 HIGHEST SELECTED TEST NUMBER         MOS41260
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EXEC - ETPE R03-05 (16 BIT/STRIPPED AND MODIFIED)

```
0B12  0000                1127  WASDU    DCX   0                  1 IF KEYBOARD DEVICE WAS OFF            MOS41270
0B14  0000                1128  WASDU1   DCX   0                  NON-ZERO IF TOTAL,TOTERR TO PRINT       MOS41280
0B16  0000                1129  TOTAL    DCX   0                  NO. OF TIMES THE SELECTED TESTS RUN     MOS41290
0B18  0000                1130  TOTERR   DCX   0                  TOTAL ERRORS DETECTED WHILE DU          MOS41300
0B1A  0000                1131  BTESTNO  DCX   0                  CURRENT TEST NO. IN BINARY              MOS41310
0B1C  0000                1132  COUNT    DCX   0                                                          MOS41320
0B1E  0000                1133  NEXTST   DCX   0                  NEXT TEST NUMBER                        MOS41330
0B20  0000                1134  PAUSE    DCX   0                                                          MOS41340
                          1135  *---------------------------------                                   ***  MOS41350
0B22  0000                1136  COMRET   DCX   0                  COMMON ERROR RETURN ADDRESS             MOS41360
0B24  0000                1137  OUT.SAV  DCX   0                  OUTCHR RETURN ADDRESS                   MOS41370
0B26  0000                1138  BRK.SAV  DCX   0                  TSTBRK RETURN ADDRESS                   MOS41380
0B28  0000                1139  SET.RTN  DCX   0                  SETUP RETURN ADDRESS                    MOS41390
                          1140  *                                                                         MOS41400
0B2A  0001                1141  DECTAB   DC    1,10,100,1000,10000                                        MOS41410
0B2C  000A
0B2E  0064
0B30  03F8
0B32  2710
0B34  3031 3233 3435 3637 1142  HEXTAB   DB    C'0123456789ABCDEF'                                        MOS41420
0B3C  3839 4142 4344 4546
0B44                      1143            DB    *                                                          MOS41430


                          1145  *---------------------------------                                        MOS41450
                          1146  *  ETPE MESSAGES                                                          MOS41460
                          1147  *                                                                         MOS41470
0B44  5445 5354 2020 2A2A 1148  TSTMSG   DC    C'TEST  **',X'0D00'                                        MOS41480
0B4C  0D00
      0000 0B4A           1149  MTESTNO  EQU   TSTMSG+6                                                  MOS41490
0B4E  4552 524F 5220 2A2A 1150  ERRMSG   DC    C'ERROR ****',X'0D00'                                      MOS41500
0B56  2A2A
0B58  0D00
      00C0 0B54           1151  ETESTNO  EQU   ERRMSG+6            STORED BY ETPE                        MOS41510
      0000 0B56           1152  ERRNC    EQU   ERRMSG+8            STORE ERRNO AS CHARACTER CONSTANT     MOS41520
0B5A  544F 5441 4C20 2020 1153  TOTMSG   DC    C'TOTAL   TOTERR',X'0D00'                                  MOS41530
0B62  544F 5445 5252
0B68  0D00
0B6A  4E4F 2045 5252 4F52 1154  NOERMSG  DC    C'NO ERROR',X'0D00'                                        MOS41540
0B72  0D00
0B74  5053 5720 2A2A 2A2A 1155  PSWMSG   DC    C'PSW ****  LOC ****',X'0D00'                              MOS41550
0B7C  2020 4C4F 4320 2A2A
0B84  2A2A
0B86  0D00
      00C0 0B78           1156  ASCIPSW  EQU   PSWMSG+4                                                  MOS41560
      0000 0B7E           1157  LOCMSG   EQU   PSWMSG+10                                                 MOS41570
      0000 0B82           1158  ASCILOC  EQU   PSWMSG+14                                                 MOS41580
0B88  454E 4420 4F46 2054 1159  EOTMSG   DC    C'END OF TEST',X'0D00'                                     MOS41590
0B90  4553 5420
0B94  0D00
0B96  3FCD                1160  QMSG     DC    X'3F0D'                                                    MOS41600
0B98  2ACD                1161  AMSG     DC    X'2A0D'                                                    MOS41610
```

EXEC - ETPE R03-05 (16 BIT/STRIPPED AND MODIFIED)

```
0B9A   FFFF                1162  BRKMSG   DC    X'FFFF',X'FFFF',C'BREAK TERMINATION ',X'FFFF',X'0D0A'      MOS41620
0B9C   FFFF
0B9E   4252 4541 4B20 5445
0BA6   524D 494E 4154 494F
0BAE   4E20
0BB0   FFFF
0BB2   0D0A
```

EXEC - ETPE R03-05 (16 BIT/STRIPPED AND MODIFIED)

```
                                1165  * ************************************************************************  MOS41650
                                1166  *                                                                           MOS41660
                                1167  *  OPTION/COMMAND TABLE                                                     MOS41670
                                1168  *                                                                           MOS41680
      0000 0BB4                 1169  OPT       EQU   *                                                          MOS41690
0BB4  5445 5354 2020            1170  TEST      DC    C'TEST  ',X'F800',X'0',X'0' *          0 TO A            MOS41700
0BBA  F800
0BBC  0000
0BBE  00C0
0BC0  4C4F 4F50 2020            1171  LOOP      DC    C'LOOP  ',X'0',Z(LEVELIN),X'7FFF' *    MAX=X'7FFF'       MOS41710
0BC6  0000
0BC8  03AE
0BCA  7FFF
0BCC  434F 4E54 494E            1172  CONTIN    DC    C'CONTIN',X'0',Z(LEVELIN),X'1' *       0 OR 1            MOS41720
0BD2  0000
0BD4  03AE
0BD6  00C1
0BD8  4E4F 4D53 4720            1173  NOMSG     DC    C'NOMSG ',X'0',Z(LEVELIN),X'1' *       0 OR 1            MOS41730
0BDE  00C0
0BE0  03AE
0BE2  0001
0BE4  5343 4F50 4520            1174  SCOPE     DC    C'SCOPE ',X'0',Z(LEVELIN),X'5' *       MAX = 5           MOS41740
0BEA  0000
0BEC  03AE
0BEE  00C5
0BF0  4441 5441 2020            1175  DATA      DC    C'DATA  ',X'FFFF',X'0',X'0' *          0 TO FFFF         MOS41750
0BF6  FFFF
0BF8  0000
0BFA  0000
0BFC  504F 554E 4420            1176  POUND     DC    C'POUND ',X'A',X'0',X'0' *             1 TO FFFF         MOS41760
0C02  000A
0C04  0000
0C06  00C0
0C08  4C4F 5048 5953            1177  LOPHYS    DC    C'LOPHYS',X'0',Z(LEVELIN),X'6' *        0 TO 6          MOS41770
0C0E  0000
0C10  03AE
0C12  0006
0C14  4849 5048 5953            1178  HIPHYS    DC    C'HIPHYS',X'6',Z(LEVELIN),X'6' *        0 TO 6          MOS41780
0C1A  0006
0C1C  03AE
0C1E  0006
0C20  434F 4E20 2020            1179  CONSOLE   DC    C'CON   ',X'0',Z(CON),X'0' *                        ****  MOS41790
0C26  0000
0C28  0C5E
0C2A  0000
      0000 0C2C                 1180  OPTEND2   EQU   *                                                        MOS41800
      0000 0C2C                 1181  OPTEND    EQU   OPTEND2                                                  MOS41810
                                1182  *                                                                        MOS41820
                                1183  * ************************************************************************  MOS41830
                                1184  *                                                                        MOS41840
0C2C  4C4F 4C49 4D20            1185  LOLIM     DC    C'LOLIM ',X'8000',X'0',X'FFFC' *  8000                MOS41850
0C32  8000
0C34  0000
```

```
0C36   FFFC
0C38   4849 4C49 4D20      1186  HILIM    DC    C'HILIM ',X'FFFF',X'0',X'FFFF' *        FFFF              MOS41860
0C3E   FFFF
0C40   0000
0C42   FFFF
                           1187  *                                                                          MOS41870
                           1188  * ************************************************************************ MOS41880
                           1189  *                                                                          MOS41890
0C44   4F50 5449 4F4E      1190  OPTION   DC    C'OPTION',X'0',X'0',X'0'                                   MOS41900
0C4A   0000
0C4C   0000
0C4E   0000
0C50   5255 4E20 2020      1191  RUN      DC    C'RUN   ',X'0',X'0',X'0'                                   MOS41910
0C56   0000
0C58   0000
0C5A   0000
0C5C   FFFF                1192           DC    -1                                                         MOS41920
                           1193  * ************************************************************************ MOS41930
                           1194  *                                                                   ****   MOS41940
0C5E   8800                1195  CON      DCX   8800              RETURN TO CONSOLE (ILLEGAL)      ****   MOS41950
0C60   4300 01BE           1196           B     OPTIN             RETURN TO EXEC                   ****   MOS41960
                           1197  *                                                                   ****   MOS41970
                           1198  * ************************************************************************ MOS41980
                           1199  *                                                                          MOS41990
0C64   48E0 0C0E           1200  INIT     LH    R14,LOPHYS+6      GET LOW PYHSICAL SEGMENT                 MOS42000
0C68   C4E0 0007           1201           NAI   R14,7             MASK TO ONE DIGIT                        MOS42010
0C6C   C5E0 0007           1202           CLAI  R14,7             IS DIGIT VALID ?                         MOS42020
0C70   2132                1203           BNES  INIT6             YES, BRANCH                              MOS42030
0C72   24E6                1204           LIS   R14,6             NO, LOAD A VALID DIGIT                   MOS42040
0C74   40E0 0C0E           1205  INIT6    STH   R14,LOPHYS+6      RESTORE LOW PHYSICAL SEGMENT             MOS42050
0C78   48E0 0C1A           1206           LH    R14,HIPHYS+6      GET HIGH PHYSICAL SEGMENT                MOS42060
0C7C   C4E0 0007           1207           NAI   R14,7             MASK TO ONE DIGIT                        MOS42070
0C80   C5E0 0007           1208           CLAI  R14,7             IS DIGIT VALID ?                         MOS42080
0C84   2132                1209           BNES  INIT7             YES, BRANCH                              MOS42090
0C86   24E6                1210           LIS   R14,6             NO, LOAD A VALID DIGIT                   MOS42100
0C88   40E0 0C1A           1211  INIT7    STH   R14,HIPHYS+6      RESTORE HIGH PHYSICAL SEGMENT            MOS42110
0C8C   24E0                1212           LIS   R14,0             START AT BLOCK 0                         MOS42120
                           1213  *                                                                          MOS42130
0C8E   33CE                1214  INIT3    LPSR  R14               LOAD PSW (0:15)                          MOS42140
0C90   24E0                1215           LIS   R14,0             LOAD 0 DATA PATTERN                      MOS42150
                           1216  *                                                                          MOS42160
0C92   C810 8000           1217           LDAI  R1,X'8000'        *  INITIALIZE                            MOS42170
0C96   40E1 0000           1218  INIT5    STH   R14,0(R1)         *  ALL OF                                MOS42180
0C9A   2612                1219           AIS   R1,2              *  MEMORY                                MOS42190
0C9C   2033                1220           BNZS  INIT5             *  UNDER TEST                            MOS42200
                           1221  *                                                                          MOS42210
0C9E   95EE                1222           EPSR  R14,R14           GRAB PRESENT PSW                         MOS42220
0CA0   90E4                1223           SRHLS R14,4             SHIFT PHYSICAL SEGMENT                   MOS42230
0CA2   C4E0 0007           1224           NAI   R14,7             MASK OFF ONLY PHYSICAL SEGMENT           MOS42240
0CA6   45E0 0C1A           1225           CLH   R14,HIPHYS+6      PHY. SEG. = MAX ?                        MOS42250
0CAA   2335                1226           BES   INIT4             YES, BRANCH                              MOS42260
0CAC   26E1                1227           AIS   R14,1             NO, INCREMENT                            MOS42270
0CAE   91E4                1228           SLHLS R14,4             SHIFT PHYSICAL SEGMENT                   MOS42280
```

```
0CB0  4300 0C8E          1229          B     INIT3              BRANCH TO CONTINUE                        MOS42290
                         1230  *                                                                          MOS42300
0CB4  48E0 0C3E          1231  INIT4   LH    R14,HILIM+6        IS HILIM = 0 ?                            MOS42310
0CB8  233D               1232          BZS   INIT1              YES, SKIP LIMIT CHECK                     MOS42320
0CBA  48E0 0C32          1233          LH    R14,LOLIM+6        IS LOLIM = 0 ?                            MOS42330
0CBE  233A               1234          BZS   INIT1              YES, SKIP LIMIT CHECK                     MOS42340
0CC0  C5E0 8000          1235          CLAI  R14,X'8000'        IS LOLIM > OR = X'8000' ?                 MOS42350
0CC4  4280 0CF2          1236          BL    HILOPRT            NO, BRANCH TO ERROR PRINTOUT              MOS42360
0CC8  45E0 0C3E          1237          CLH   R14,HILIM+6        IS LOLIM < OR = HILIM ?                   MOS42370
0CCC  2333               1238          BES   INIT1              YES, BRANCH                               MOS42380
0CCE  4380 0CF2          1239          BNL   HILOPRT            NO, BRANCH TO ERROR PRINTOUT              MOS42390
                         1240  *                                                                          MOS42400
0CD2  48E0 0BBA          1241  INIT1   LH    R14,TEST+6                                                   MOS42410
0CD6  C6E0 8000          1242          OAI   R14,X'8000'        FORCE TEST 0                              MOS42420
0CDA  40E0 0BBA          1243          STH   R14,TEST+6         WHEN "RUN" IS ENTERED                     MOS42430
0CDE  C3E0 0040          1244          TAI   R14,X'40'          IS TEST 9 SELECTED ?                      MOS42440
0CE2  2334               1245          BZS   INIT2              NO, BRANCH                                MOS42450
0CE4  C3E0 0020          1246          TAI   R14,X'20'          YES, IS TEST A ALSO SELECTED ?            MOS42460
0CE8  213D               1247          BNZS  ILTSTPRT           YES, BRANCH                               MOS42470
                         1248  *                                                                          MOS42480
0CEA  24E1               1249  INIT2   LIS   R14,1              NO                                        MOS42490
0CEC  DEE0 010E          1250          OC    R14,NORM           PUT DISPLAY IN NORMAL MODE                MOS42500
0CF0  030F               1251          BR    LINK               RETURN TO CALLER                          MOS42510
                         1252  *                                                                          MOS42520
                         1253  *                                                                          MOS42530
0CF2  C850 1DBA          1254  HILOPRT LDAI  R5,HILOMSG         PRINT: "LOLIM > HILIM IS ILLEGAL"         MOS42540
                         1255  *                                                                          MOS42550
0CF6  4050 0B0C          1256  HILOPRT1 STH  R5,ISITERR         FORCE PRINTING                            MOS42560
0CFA  41F0 0756          1257          BAL   LINK,PRINT         UNCONDITIONALLY PRINT:                    MOS42570
0CFE  4300 01BE          1258          B     OPTIN              ABORT TESTING SEQUENCE                    MOS42580
                         1259  *                                                                          MOS42590
0D02  C850 1DD4          1260  ILTSTPRT LDAI R5,TSTREJ          PRINT: "ILLEGAL TEST SEQUENCE"            MOS42600
0D06  22C8               1261          BS    HILOPRT1           BRANCH                                    MOS42610
                         1262  *                                                                          MOS42620
                         1263  * ************************************************************************ MOS42630
                         1264  *                                                                   ****   MOS42640
0D08  C850 0B9A          1265  OPTIN2  LDAI  R5,BRKMSG          PRINT: "BREAK TERMINATION"        ****   MOS42650
0D0C  22CB               1266          BS    HILOPRT1           BRANCH                            ****   MOS42660
                         1267  *                                                                   ****   MOS42670
                         1268  * ************************************************************************ MOS42680
0D0E  4810 0C0E          1269  LOSET   LH    R1,LOPHYS+6        GET LOWEST SEGMENT NUMBER                 MOS42690
0D12  C410 0007          1270          NAI   R1,X'0007'         MASK IT                                   MOS42700
0D16  2441               1271          LIS   R4,1               LOAD DISPLAY ADDRESS                      MOS42710
0D18  DE40 010F          1272          OC    R4,INCR            PUT DISPLAY IN INCREMENTAL MODE           MOS42720
0D1C  9451               1273          EXBR  R5,R1                                                      MOS42730
0D1E  2430               1274          LIS   R3,0                                                       MOS42740
0D20  9843               1275          WHR   R4,R3              DUMMY WRITE                               MOS42750
0D22  9845               1276          WHR   R4,R5              DISPLAY SEGMENT UNDER TEST                MOS42760
0D24  DE40 010E          1277          OC    R4,NORM            PUT DISPLAY IN NORMAL MODE                MOS42770
0D28  9114               1278          SLHLS R1,4               SHIFT INTO PSW POSITION                   MOS42780
0D2A  9522               1279          EPSR  R2,R2              GRAB CURRENT PSW                          MOS42790
0D2C  C420 FF0F          1280          NAI   R2,X'FF0F'         MASK IT                                   MOS42800
0D30  0621               1281          OAR   R2,R1              FORCE LOWEST PHYSICAL SEGMENT NUMBER      MOS42810
```

EXEC - ETPE R03-05 (16 BIT/STRIPPED AND MODIFIED)

```
0D32  9532              1282          EPSR  R3,R2              ESTABLISH LOWEST SEGMENT              MOS42820
0D34  03CF              1283          BR    LINK               RETURN                                MOS42830
                        1284  *-----------------------------------                                  MOS42840
0D36  9511              1285  ENDCHK  EPSR  R1,R1               GRAB CURRENT PSW                      MOS42850
0D38  4820 0C1A         1286          LH    R2,HIPHYS+6        GET HIGHEST PHYSICAL SEGMENT          MOS42860
0D3C  C420 0007         1287          NAI   R2,X'0007'         MASK IT                               MOS42870
0D40  0831              1288          LDAR  R3,R1                                                    MOS42880
0D42  9034              1289          SRHLS R3,4               SHIFT CURRENT SEGMENT TO 3 LSB'S      MOS42890
0D44  C430 0007         1290          NAI   R3,X'0007'         MASK IT                               MOS42900
0D48  0532              1291          CLAR  R3,R2              HAS HIGHEST SEGMENT BEEN REACHED ?    MOS42910
0D4A  4360 04A8         1292          BNL   TSTEND             YES, BRANCH (TO EXEC)                 MOS42920
0D4E  2631              1293          AIS   R3,1               NO, INCREMENT SEGMENT NUMBER          MOS42930
0D50  2441              1294          LIS   R4,1               LOAD DISPLAY ADDRESS                  MOS42940
0D52  DE40 010F         1295          OC    R4,INCR            PUT DISPLAY IN INCREMENTAL MODE       MOS42950
0D56  9453              1296          EXBR  R5,R3                                                    MOS42960
0D58  2460              1297          LIS   R6,0                                                     MOS42970
0D5A  9846              1298          WHR   R4,R6              DUMMY WRITE                           MOS42980
0D5C  9845              1299          WHR   R4,R5              DISPLAY ADDRESSED SEGMENT             MOS42990
0D5E  DE40 010E         1300          OC    R4,NORM            PUT DISPLAY IN NORMAL MODE            MOS43000
0D62  9134              1301          SLHLS R3,4               SHIFT NEW SEGMENT INTO POSITION       MOS43010
0D64  C410 FF0F         1302          NAI   R1,X'FF0F'         MASK OFF PRESENT PSW                  MOS43020
0D68  0613              1303          CAR   R1,R3              FORCE NEXT SEGMENT NUMBER             MOS43030
0D6A  9541              1304          EPSR  R4,R1              ESTABLISH NEW PHYSICAL SEGMENT        MOS43040
0D6C  03CF              1305          BR    LINK               RETURN                                MOS43050
                        1306  * ********************************************************************* MOS43060
0D6E  5331 3620 3139 2D32 1307  TITLE   DC    C'S16 19-221 MOS MEMORY TEST PART 2 '                  MOS43070
0D76  3231 204D 4F53 204D
0D7E  454D 4F52 5920 5445
0D86  5354 2050 4152 5420
0D8E  3220
0D90  3036 2D32 3134 4630 1308          DC    C'06-214F01R00'    TEST PROGRAM NUMBER                   MOS43080
0D98  3152 3030
0D9C  0DCA              1309          DC    X'0D0A'                                                  MOS43090
                        1310  *                                                                      MOS43100
0D9E  F800              1311  DEFTESTS DCX  F800               DEFINES TESTS 0,1,2,3, & 4            MOS43110
                        1312  *                                AS DEFAULT TESTS                      MOS43120
                        1313  *                                                                      MOS43130
0DA0  000A              1314  MAXTST  DCX   A                  DEFINES TESTS 0,1,2,3,4,5,6,7,8,9&A   MOS43140
                        1315  *                                AS LEGAL TEST NUMBERS.                MOS43150

                        1317  *                                                                      MOS43170
                        1318  *  TESTS TABLE                                                         MOS43180
                        1319  *                                                                      MOS43190
0DA4                    1320          ALIGN 4                                                        MOS43200
0DA4  0DEA              1321  TESTS   DC    A(TEST0)           MEMORY SEARCH TEST                    MOS43210
0DA6  0E1A              1322          DC    A(TEST1)           BIT SET-RESET TEST                    MOS43220
0DA8  0E9E              1323          DC    A(TEST2)           MARCHING PATTERN TEST                 MOS43230
0DAA  0FAA              1324          DC    A(TEST3)           0 & 1 WALK TEST                       MOS43240
0DAC  105C              1325          DC    A(TEST4)           DOUBLE OPERATION COLUMN DISTURB TEST  MOS43250
0DAE  11E2              1326          DC    A(TEST5)           SHORT COUNT RELOCATABLE               MOS43260
                        1327  *                                HAMMER DISTURB TEST                   MOS43270
```

EXEC - ETPE R03-05 (16 BIT/STRIPPED AND MODIFIED)

```
0DB0   12E4          1328           DC    A(TEST6)          DIAGONAL GALPAT TEST                    MOS43280
0DB2   147A          1329           DC    A(TEST7)          MEMORY HOLD TEST                        MOS43290
0DB4   1624          1330           DC    A(TEST8)          LONG COUNT RELOCATABLE                  MOS43300
                     1331  *                                 HAMMER DISTURB TEST                     MOS43310
0DB6   1766          1332           DC    A(TEST9)          ECC DISTURB TEST                        MOS43320
0DB8   19EC          1333           DC    A(TESTA)          PARITY DISTURB TEST                     MOS43330
                     1334  *                                                                         MOS43340
                     1335  * ************************************************************************ MOS43350
                     1336  *        END   ETPE R03-05 (MODIFIED)                                ***    MOS43360
```

TEST 0

```
                        1338  *       TEST 0                    MEMORY SEARCH TEST                    MOS43380
                        1339  *                                                                       MOS43390
                        1340  *       PURPOSE:                                                        MOS43400
                        1341  *             THIS UTILITY ENABLES THE USER TO LIST LIMITS OF            MOS43410
                        1342  *             MEMORY UNDER TEST.                                        MOS43420
                        1343  *                                                                       MOS43430
                        1344  *       ASSUMPTIONS:                                                    MOS43440
                        1345  *             MINIMUM MEMORY ALLOWABLE IS 64K BYTES.                    MOS43450
                        1346  *                                                                       MOS43460
                        1347  *       DESIGN SPECIFICATIONS:                                          MOS43470
                        1348  *             MEMORY LIMITS ARE FORCED TO THE SECOND 32KB.               MOS43480
                        1349  *             LOW PHYSICAL SEGMENT TO HIGH PHYSICAL SEGMENT             MOS43490
                        1350  *             ADDRESSES ARE PRINTED OUT.                                MOS43500
                        1351  *                                                                       MOS43510
                        1352  *       OPTIONS:                                                        MOS43520
                        1353  *             NONE                                                      MOS43530
                        1354  *                                                                       MOS43540
                        1355  *       HOW TO RUN THE TEST:                                            MOS43550
                        1356  *             ENTER "RUN" AND THE AVAILABLE MEMORY LOCATIONS WILL        MOS43560
                        1357  *             BE PRINTED ON THE LIST DEVICE.                            MOS43570
                        1358  *                                                                       MOS43580
                        1359  *       NOTE: THIS TEST RESETS "LOLIM" AND "HILIM" TO CORRESPOND TO     MOS43590
                        1360  *             THE BLOCK OF MEMORY PRINTED OUT.                          MOS43600

0DBA   24F0             1362  TEST0   LIS   LINK,0                                                   MOS43620
0DBC   95EF             1363          EPSR  R14,LINK          CLEAR PSW                             MOS43630
0DBE   C860 8000        1364          LDAI  R6,X'8000'                                              MOS43640
0DC2   4060 0C32        1365          STH   R6,LOLIM+6        ESTABLISH LOLIM = X'8000'             MOS43650
0DC6   2404             1366          LIS   R0,4                                                    MOS43660
0DC8   0816             1367          LDAR  R1,R6                                                   MOS43670
0DCA   C820 1E5D        1368          LDAI  R2,LOMSG+1                                              MOS43680
0DCE   41F0 06F6        1369          BAL   LINK,HEXASC       PUT LOLIM IN AVAIL. MEM. MESSAGE      MOS43690
                        1370  *                                                                       MOS43700
0DD2   C880 FFFF        1371          LDAI  R8,X'FFFF'                                              MOS43710
0DD6   4080 0C3E        1372          STH   R8,HILIM+6        STORE HILIM IN MEMORY                 MOS43720
0DDA   0818             1373          LDAR  R1,R8                                                   MOS43740
0DDC   C820 1E63        1374          LDAI  R2,HIMSG+1                                              MOS43750
0DE0   41F0 06F6        1375          BAL   LINK,HEXASC       PUT HILIM IN AVAIL. MEM. MESSAGE      MOS43760
0DE4   2401             1376          LIS   R0,1                                                    MOS43770
0DE6   4810 0C0E        1377          LH    R1,LOPHYS+6                                             MOS43780
0DEA   C410 0007        1378          NAI   R1,7                                                    MOS43790
0DEE   C820 1E5C        1379          LDAI  R2,LOMSG                                                MOS43800
0DF2   41F0 06F6        1380          BAL   LINK,HEXASC       PUT LOWEST PHYSICAL SEGMENT           MOS43810
                        1381  *                               INTO MEMORY LIMITS MESSAGE            MOS43820
0DF6   4810 0C1A        1382          LH    R1,HIPHYS+6                                             MOS43830
0DFA   C410 0007        1383          NAI   R1,7                                                    MOS43840
0DFE   C820 1E62        1384          LDAI  R2,HIMSG                                                MOS43850
0E02   41F0 06F6        1385          BAL   LINK,HEXASC       PUT HIGHEST PHYSICAL SEGMENT          MOS43860
                        1386  *                               INTO MEMORY LIMITS MESSAGE            MOS43870
0E06   C850 1DA8        1387          LDAI  R5,ASMEMMSG                                             MOS43880
                        1388  *                                                                       MOS43890
```

TEST 0

```
0E0A   41F0 0756          1389  PRTLIM   BAL   LINK,PRINT          PRINT ASSIGNED MEMORY MESSAGE          MOS43900
0E0E   C850 1E5C          1390           LDAI  R5,LOMSG                                               MOS43910
0E12   41F0 0756          1391           BAL   LINK,PRINT          PRINT MEMORY LIMITS                  MOS43920
0E16   4300 04CE          1392           B     KEEP7                                                   MOS43930
                          1393  * ************************************************************************ MOS43940
                          1394  *        END   TEST 0                                                    MOS43950
```

TEST 1

```
                        1396  *       TEST 1                  BIT SET - RESET TEST                    MOS43970
                        1397  *                                                                       MOS43980
                        1398  *       PURPOSE:                                                        MOS43990
                        1399  *             THIS TEST INSURES THAT ALL BITS IN THE AREA OF MEMORY      MOS44000
                        1400  *             BEING TESTED CAN BE BOTH SET AND RESET.                   MOS44010
                        1401  *                                                                       MOS44020
                        1402  *       ASSUMPTIONS:                                                    MOS44030
                        1403  *             MINIMUM 64KB MOS MEMORY                                   MOS44040
                        1404  *                                                                       MOS44050
                        1405  *       DESIGN SPECIFICATIONS:                                          MOS44060
                        1406  *             1. A WRITE AND THEN A READ IS EXECUTED TO ALL MEMORY       MOS44070
                        1407  *                WITHIN THE "LOLIM" AND "HILIM" LIMITS.                 MOS44080
                        1408  *             2. IF AN ERROR IS DETECTED, THE "SCOPE" OPTION             MOS44090
                        1409  *                DICTATES HOW THE PROGRAM WILL REACT.                   MOS44100
                        1410  *                                                                       MOS44110
                        1411  *       OPTIONS:                                                        MOS44120
                        1412  *             LOPHYS - LOW PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST    MOS44130
                        1413  *             HIPHYS - HIGH PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST   MOS44140
                        1414  *                 (FAILING PHYSICAL SEGMENT = MSB OF TASK PSW)          MOS44150
                        1415  *             SCOPE - ERROR OPTION MODE                                 MOS44160
                        1416  *                 0 - PRINT ERROR DATA AND SKIP TO NEXT TEST            MOS44170
                        1417  *                 1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST    MOS44180
                        1418  *                 2 - PRINT ERROR DATA AND CONTINUE TEST                MOS44190
                        1419  *                 3 - PRINT ERROR DATA AND HALT                         MOS44200
                        1420  *                 4 - IGNORE ERROR                                      MOS44210
                        1421  *                 5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST        MOS44220
                        1422  *                                                                       MOS44230
                        1423  *       HOW TO RUN THE TEST:                                            MOS44240
                        1424  *             1  ENTER THE "SCOPE", "LOPHYS", & "HIPHYS" OPTIONS VIA    MOS44250
                        1425  *                THE CONSOLE DEVICE.                                    MOS44260
                        1426  *             2. ENTER "RUN" AND THE TEST WILL EXECUTE.                  MOS44270

0E1A  41F0 0D0E         1428  TEST1   BAL   LINK,LOSET          ESTABLISH LOWEST PHYSICAL SEGMENT       MOS44290
                        1429  *                                                                       MOS44300
0E1E  4860 0C32         1430  TEST1A  LH    R6,LOLIM+6          INITIALIZE MEMORY LIMITS              MOS44310
0E22  4880 0C3E         1431          LH    R8,HILIM+6                                                MOS44320
0E26  C460 7FFE         1432          NAI   R6,X'7FFE'                                                MOS44330
0E2A  C480 7FFF         1433          NAI   R8,X'7FFF'                                                MOS44340
0E2E  2472              1434          LIS   R7,2                                                      MOS44350
0E30  2411              1435          LIS   R1,1                LOAD DISPLAY ADDRESS                  MOS44360
0E32  2531              1436          LCS   R3,1                                                      MOS44370
                        1437  *                                                                       MOS44380
0E34  4036 8000         1438  STORE11 STH   R3,X'8000'(R6)      STORE BACKGROUND OF ALL 1'S           MOS44390
0E38  C160 0E34         1439          BXLE  R6,STORE11                                                MOS44400
0E3C  C840 3031         1440          LDAI  R4,C'01'                                                  MOS44410
0E40  4040 0B56         1441          STH   R4,ERRNO            ERRNO = C'01'                         MOS44420
0E44  4860 0C32         1442          LH    R6,LOLIM+6                                                MOS44430
0E48  C460 7FFE         1443          NAI   R6,X'7FFE'                                                MOS44435
                        1444  *                                                                       MOS44440
0E4C  41F0 08C2         1445  READ11  BAL   LINK,TSTBRKX        IF "BREAK" GO TO TSTEND ELSE RETURN   MOS44450
0E50  4846 8000         1446          LH    R4,X'8000'(R6)      LOAD DATA FROM LOC                    MOS44460
```

TEST 1

```
0E54  0543          1447           CLAR  R4,R3              IS DATA AT LOC. OK ?                    MOS44470
0E56  2139          1448           BNES  RTN11F             YES, BRANCH                             MOS44480
0E58  C160 0E4C     1449  RTN11    BXLE  R6,READ11          CONTINUE UNTIL DONE                     MOS44490
0E5C  4860 0C32     1450           LH    R6,LOLIM+6                                                  MOS44500
0E60  C460 7FFE     1451           NAI   R6,X'7FFE'                                                  MOS44510
0E64  2430          1452           LIS   R3,0                                                        MOS44520
0E66  2304          1453           BS    STORE10             BRANCH                                  MOS44530
                    1454  *                                                                          MOS44540
0E68  41F0 1C74     1455  RTN11F   BAL   LINK,ERROR           ERROR ROUTINE                           MOS44550
0E6C  220A          1456           BS    RTN11               RETURN                                  MOS44560
                    1457  *                                                                          MOS44570
0E6E  4036 8000     1458  STORE10  STH   R3,X'8000'(R6)      STORE BACKGROUND OF ALL 0'S             MOS44580
0E72  C160 0E6E     1459           BXLE  R6,STORE10                                                  MOS44590
0E76  6110 0B56     1460           AHM   R1,ERRNO             ERRNO = C'02'                           MOS44600
0E7A  4860 0C32     1461           LH    R6,LOLIM+6                                                  MOS44610
0E7E  C460 7FFE     1462           NAI   R6,X'7FFE'                                                  MOS44615
                    1463  *                                                                          MOS44620
0E82  41F0 08C2     1464  READ10   BAL   LINK,TSTBRKX        IF "BREAK" GO TO TSTEND ELSE RETURN     MOS44630
0E86  4846 8000     1465           LH    R4,X'8000'(R6)      LOAD DATA FROM LOC                      MOS44640
0E8A  2137          1466           BNZS  RTN10F              IF DATA NOT 0, BRANCH (DATA NG)         MOS44650
0E8C  C160 0E82     1467  RTN10    BXLE  R6,READ10           CONTINUE UNTIL DONE                     MOS44660
                    1468  *                                                                          MOS44670
0E90  41F0 0D36     1469           BAL   LINK,ENDCHK          IF END OF TEST, RETURN TO EXEC          MOS44680
0E94  4300 0E1E     1470           B     TEST1A               ELSE BRANCH TO CONTINUE TEST            MOS44690
                    1471  *                                                                          MOS44700
0E98  41F0 1C74     1472  RTN10F   BAL   LINK,ERROR           ERROR ROUTINE                           MOS44710
0E9C  2208          1473           BS    RTN10               RETURN                                  MOS44720
                    1474  *                                                                          MOS44730
                    1475  * ************************************************************************ MOS44740
                    1476  *        END   TEST 1                                                       MOS44750
```

TEST 2

```
                                1478  *       TEST 2                  MARCHING PATTERN TEST                   MOS44770
                                1479  *                                                                       MOS44780
                                1480  *       PURPOSE:                                                        MOS44790
                                1481  *             THIS TEST CHECKS THAT THREE DIFFERENT BASE PATTERNS        MOS44800
                                1482  *             CAN BE WRITTEN, COMPLEMENTED, AND MARCHED THROUGH THE     MOS44810
                                1483  *             AVAILABLE MEMORY WITHOUT ERROR.                           MOS44820
                                1484  *                                                                       MOS44830
                                1485  *       ASSUMPTIONS:                                                    MOS44840
                                1486  *             MINIMUM 64KB MOS MEMORY                                   MOS44850
                                1487  *                                                                       MOS44860
                                1488  *       DESIGN SPECIFICATIONS:                                          MOS44870
                                1489  *             1. (IN ASCENDING ORDER) WRITE AND READ THE BASE PATTERN.   MOS44880
                                1490  *             2. (IN DESCENDING ORDER) WRITE AND READ THE COMPLEMENT     MOS44890
                                1491  *                PATTERN.                                               MOS44900
                                1492  *                                                                       MOS44910
                                1493  *       OPTIONS:                                                        MOS44920
                                1494  *             LOPHYS - LOW PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST    MOS44930
                                1495  *             HIPHYS - HIGH PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST   MOS44940
                                1496  *                 (FAILING PHYSICAL SEGMENT = MSB OF TASK PSW)          MOS44950
                                1497  *             SCOPE - ERROR OPTION MODE                                 MOS44960
                                1498  *                 0 - PRINT ERROR DATA AND SKIP TO NEXT TEST            MOS44970
                                1499  *                 1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST    MOS44980
                                1500  *                 2 - PRINT ERROR DATA AND CONTINUE TEST                MOS44990
                                1501  *                 3 - PRINT ERROR DATA AND HALT                         MOS45000
                                1502  *                 4 - IGNORE ERROR                                      MOS45010
                                1503  *                 5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST        MOS45020
                                1504  *                                                                       MOS45030
                                1505  *       HOW TO RUN THE TEST:                                            MOS45040
                                1506  *             1  ENTER THE "SCOPE", "LOPHYS", & HIPHYS" OPTIONS VIA     MOS45050
                                1507  *                THE CONSOLE DEVICE.                                    MOS45060
                                1508  *             2. ENTER "RUN" AND THE TEST WILL EXECUTE.                 MOS45070

0E9E  41F0 0D0E                 1510  TEST2   BAL   LINK,LOSET       ESTABLISH LOWEST PHYSICAL SEGMENT       MOS45090
                                1511  *                                                                       MOS45100
0EA2  2411                      1512  TEST2A  LIS   R1,1              LOAD DISPLAY ADDRESS                    MOS45110
0EA4  C840 0A3E                 1513          LDAI  R4,MM0                                                    MOS45120
0EA8  4040 003E                 1514          STH   R4,X'3E'          SET NEW MM POINTER                      MOS45130
0EAC  24A0                      1515          LIS   R10,0                                                     MOS45140
0EAE  25B1                      1516          LCS   R11,1                                                     MOS45150
0EB0  24D0                      1517          LIS   R13,0             W/BACKGROUND = 0'S                      MOS45160
0EB2  41E0 0EE4                 1518          BAL   R14,CHKLOC        DO A SINGLE DISTURB TEST (MIN-MAX)      MOS45170
                                1519  *                                                                       MOS45180
0EB6  25A1                      1520          LCS   R10,1                                                     MOS45190
0EB8  24B0                      1521          LIS   R11,0             W/BACKGROUND = F'S                      MOS45200
0EBA  41E0 0EE4                 1522          BAL   R14,CHKLOC        DO A SINGLE DISTURB TEST (MIN-MAX)      MOS45210
                                1523  *                                                                       MOS45220
0EBE  24D2                      1524          LIS   R13,2             W/BACKGROUND = A'S                      MOS45230
0EC0  41E0 0EE4                 1525          BAL   R14,CHKLOC        DO A SINGLE DISTURB TEST (MIN-MAX)      MOS45240
                                1526  *                                                                       MOS45250
0EC4  24A0                      1527          LIS   R10,0                                                     MOS45260
0EC6  25B1                      1528          LCS   R11,1             W/BACKGROUND = 5'S                      MOS45270
```

TEST 2

```
0EC8  41E0 0EE4          1529          BAL   R14,CHKLOC          DO A SINGLE DISTURB TEST (MIN-MAX)     MOS45280
                         1530  *                                                                        MOS45290
0ECC  C8D0 0100          1531          LDAI  R13,X'100'          W/BACKGROUND =128-0'S,128-F'S,..       MOS45300
0ED0  41E0 0EE4          1532          BAL   R14,CHKLOC          DO A SINGLE DISTURB TEST (MIN-MAX)     MOS45310
                         1533  *                                                                        MOS45320
0ED4  25A1               1534          LCS   R10,1                                                      MOS45330
0ED6  24E0               1535          LIS   R11,0               W/BACKGROUND =128-F'S,128-0'S,..       MOS45340
0ED8  41E0 0EE4          1536          BAL   R14,CHKLOC          DO A SINGLE DISTURB TEST (MIN-MAX)     MOS45350
                         1537  *                                                                        MOS45360
0EDC  41F0 0D36          1538          BAL   LINK,ENDCHK         IF END OF TEST, RETURN TO EXEC         MOS45370
0EE0  4300 0EA2          1539          B     TEST2A              ELSE BRANCH TO CONTINUE TEST           MOS45380
                         1540  *                                                                        MOS45390
                         1541  * ********************************************************************** MOS45400
                         1542  *                                                                        MOS45410
0EE4  4860 0C32          1543  CHKLOC  LH    R6,LOLIM+6          INITIALIZE MEMORY LIMITS               MOS45420
0EE8  4880 0C3E          1544          LH    R8,HILIM+6                                                 MOS45430
0EEC  C460 7FFE          1545          NAI   R6,X'7FFE'                                                 MOS45440
0EF0  C480 7FFF          1546          NAI   R8,X'7FFF'                                                 MOS45450
0EF4  2472               1547          LIS   R7,2                                                       MOS45460
                         1548  *                                                                        MOS45470
0EF6  083A               1549  CHKLOC1 LDAR  R3,R10              STORE APPROPRIATE BACKGROUND PATTERN   MOS45480
0EF8  C36D 0000          1550          TAI   R6,0(R13)                                                  MOS45490
0EFC  2332               1551          BZS   CHKLOC2                                                    MOS45500
0EFE  083B               1552          LDAR  R3,R11                                                     MOS45510
0F00  4036 8000          1553  CHKLOC2 STH   R3,X'8000'(R6)      IN MEMORY                              MOS45520
0F04  C160 0EF6          1554          BXLE  R6,CHKLOC1          FROM LOLIM TO HILIM                    MOS45530
0F08  4860 0C32          1555          LH    R6,LOLIM+6                                                 MOS45540
0F0C  C460 7FFE          1556          NAI   R6,X'7FFE'                                                 MOS45550
                         1557  *                                                                        MOS45560
0F10  C840 3033          1558  CHKLOC3 LDAI  R4,C'03'                                                   MOS45570
0F14  4040 0B56          1559          STH   R4,ERRNO            ERRNO = C'03'                          MOS45580
0F18  41F0 08C2          1560          BAL   LINK,TSTBRKX        IF "BREAK" GO TO TSTEND ELSE RETURN    MOS45590
0F1C  083A               1561          LDAR  R3,R10              GET APPROPRIATE BACKGROUND PATTERN     MOS45600
0F1E  C36D 0000          1562          TAI   R6,0(R13)                                                  MOS45610
0F22  2332               1563          BZS   CHKLOC4                                                    MOS45620
0F24  083B               1564          LDAR  R3,R11                                                     MOS45630
0F26  4846 8000          1565  CHKLOC4 LH    R4,X'8000'(R6)      GET DATA FROM LOC UNDER TEST           MOS45640
0F2A  0543               1566          CLAR  R4,R3               EQUAL ?                                MOS45650
0F2C  213E               1567          BNES  CHKLOC5F            NO, BRANCH                             MOS45660
0F2E  C730 FFFF          1568  CHKLOC5 XAI   R3,-1               COMPLEMENT DATA PATTERN                MOS45670
0F32  4036 8000          1569          STH   R3,X'8000'(R6)      STORE C.D.P. AT LOC                    MOS45680
0F36  6110 0B56          1570          AHM   R1,ERRNO            ERRNO = C'04'                          MOS45690
0F3A  4846 8000          1571          LH    R4,X'8000'(R6)      GET DATA FROM LOC UNDER TEST           MOS45700
0F3E  0543               1572          CLAR  R4,R3               DATA = C.D.P. ?                        MOS45710
0F40  2131               1573          BNES  CHKLOC6             NO, BRANCH                             MOS45720
0F42  C160 0F10          1574  CHKLOC6 BXLE  R6,CHKLOC3          CONTINUE UNTIL DONE(INCREMENTING)      MOS45730
0F46  23C7               1575          BS    CHKLOC6A            BRANCH                                 MOS45740
                         1576  *---------------------------------                                       MOS45750
0F48  41F0 1C74          1577  CHKLOC5F BAL  LINK,ERROR          ERROR  ROUTINE                         MOS45760
0F4C  22CF               1578          BS    CHKLOC5             RETURN                                 MOS45770
                         1579  *                                                                        MOS45780
0F4E  41F0 1C74          1580  CHKLOC6F BAL  LINK,ERROR          ERROR  ROUTINE                         MOS45790
0F52  22C8               1581          BS    CHKLOC6             RETURN                                 MOS45800
```

TEST 2

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                                1582  *-----------------------------------                                    MOS45810
0F54   4860 0C3E                1583  CHKLOC6A LH     R6,HILIM+6                                             MOS45820
0F58   C460 7FFE                1584           NAI    R6,X'7FFE'                                             MOS45830
0F5C   4880 0C32                1585           LH     R8,LOLIM+6          ESTABLISH MEMORY LIMITS            MOS45840
0F60   C480 7FFE                1586           NAI    R8,X'7FFE'                                             MOS45850
0F64   2572                     1587           LCS    R7,2                                                   MOS45860
                                1588  *                                                                      MOS45870
0F66   083B                     1589  CHKLOC7  LDAR   R3,R11              GET C.D.P. FOR LOC UNDER TEST      MOS45880
0F68   C36D 0000                1590           TAI    R6,0(R13)                                              MOS45890
0F6C   2332                     1591           BZS    CHKLOC8                                                MOS45900
0F6E   083A                     1592           LDAR   R3,R10                                                 MOS45910
0F70   C840 3035                1593  CHKLOC8  LDAI   R4,C'05'                                              MOS45920
0F74   4040 0B56                1594           STH    R4,ERRNO             ERRNO = C'05'                     MOS45930
0F78   41E0 08C2                1595           BAL    LINK,TSTBRKX         IF "BREAK" GO TO TSTEND ELSE RETURN MOS45940
0F7C   4846 8000                1596           LH     R4,X'8000'(R6)       GET DATA FROM LOC UNDER TEST      MOS45950
0F80   0543                     1597           CLAR   R4,R3                DATA = C.D.P. ?                   MOS45960
0F82   213E                     1598           BNES   CHKLOC9F             NO, BRANCH                        MOS45970
0F84   C730 FFFF                1599  CHKLOC9  XAI    R3,-1                COMPLEMENT C.D.P. (O.D.P.)        MOS45980
0F88   4036 8000                1600           STH    R3,X'8000'(R6)       STORE PATTERN AT LOC              MOS45990
0F8C   6110 0B56                1601           AHM    R1,ERRNO             ERRNO = C'06'                     MOS46000
0F90   4846 8000                1602           LH     R4,X'8000'(R6)       GET DATA FROM LOC UNDER TEST      MOS46010
0F94   0543                     1603           CLAR   R4,R3                DATA = O.D.P. ?                   MOS46020
0F96   2137                     1604           BNES   CHKLOC1F             NO, BRANCH                        MOS46030
0F98   C060 0F66                1605  CHKLOC10 BXH    R6,CHKLOC7           CONTINUE UNTIL DONE(DECREMENTING) MOS46040
0F9C   030E                     1606           BR     R14                  RETURN                            MOS46050
                                1607  *-----------------------------------                                    MOS46060
0F9E   41F0 1C74                1608  CHKLOC9F BAL    LINK,ERROR           ERROR ROUTINE                     MOS46070
0FA2   220F                     1609           BS     CHKLOC9              RETURN                            MOS46080
                                1610  *                                                                      MOS46090
0FA4   41F0 1C74                1611  CHKLOC1F BAL    LINK,ERROR           ERROR ROUTINE                     MOS46100
0FA8   2208                     1612           BS     CHKLOC10             RETURN                            MOS46110
                                1613  *                                                                      MOS46120
                                1614  * ********************************************************************** MOS46130
                                1615  *        END    TEST 2                                                 MOS46140
```

TEST 3

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                        1617  *       TEST 3                    0 & 1 WALK TEST                          MOS46160
                        1618  *                                                                          MOS46170
                        1619  *       PURPOSE:                                                         MOS46180
                        1620  *            THIS TEST WALKS A 0 THROUGH A FIELD OF 1'S AND A 1           MOS46190
                        1621  *            THROUGH A FIELD OF 0'S.                                     MOS46200
                        1622  *                                                                        MOS46210
                        1623  *       ASSUMPTIONS:                                                     MOS46220
                        1624  *            MINIMUM 64KB MOS MEMORY                                     MOS46230
                        1625  *                                                                        MOS46240
                        1626  *       DESIGN SPECIFICATIONS:                                           MOS46250
                        1627  *            1. WITH A BACKGROUND OF ALL 1'S, A 0 IS WALKED THROUGH      MOS46260
                        1628  *               EACH HALFWORD OF MEMORY. A READ AND COMPARE IS DONE       MOS46270
                        1629  *               ON EACH LOCATION.                                         MCS46280
                        1630  *            2. WITH A BACKGROUND OF ALL 0'S, A 1 IS WALKED THROUGH      MOS46290
                        1631  *               EACH HALFWORD OF MEMORY. A COMPARE IS DONE ON EACH         MOS46300
                        1632  *               LOCATION.                                                 MOS46310
                        1633  *                                                                         MOS46320
                        1634  *       OPTIONS:                                                         MOS46330
                        1635  *            LOPHYS - LOW PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST      MOS46340
                        1636  *            HIPHYS - HIGH PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST     MOS46350
                        1637  *                (FAILING PHYSICAL SEGMENT = MSB OF TASK PSW)            MOS46360
                        1638  *            SCOPE - ERROR OPTION MODE                                   MOS46370
                        1639  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST              MOS46380
                        1640  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST      MOS46390
                        1641  *                2 - PRINT ERROR DATA AND CONTINUE TEST                  MOS46400
                        1642  *                3 - PRINT ERROR DATA AND HALT                           MOS46410
                        1643  *                4 - IGNORE ERROR                                        MOS46420
                        1644  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST          MOS46430
                        1645  *                                                                        MOS46440
                        1646  *       HOW TO RUN THE TEST:                                             MOS46450
                        1647  *            1. ENTER THE "SCOPE", "LOPHYS", & "HIPHYS" OPTIONS VIA      MOS46460
                        1648  *               THE CONSOLE DEVICE.                                       MOS46470
                        1649  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                    MOS46480

0FAA  41F0 0D0E         1651  TEST3     BAL   LINK,LOSET          ESTABLISH LOWEST PHYSICAL SEGMENT      MOS46500
                        1652  *                                                                          MOS46510
0FAE  2411              1653  TEST3A    LIS   R1,1                LOAD DISPLAY ADDRESS                   MOS46520
0FB0  4860 0C32         1654            LH    R6,LOLIM+6          INITIALIZE MEMORY LIMITS               MOS46530
0FB4  4880 0C3E         1655            LH    R8,HILIM+6                                                 MOS46540
0FB8  C460 7FFE         1656            NAI   R6,X'7FFE'                                                 MOS46550
0FBC  C480 7FFF         1657            NAI   R8,X'7FFF'                                                 MOS46560
0FC0  2472              1658            LIS   R7,2                                                       MOS46570
0FC2  C840 0A3E         1659            LDAI  R4,MM0                                                     MOS46580
0FC6  4040 003E         1660            STH   R4,X'3E'            SET NEW MM POINTER                     MOS46590
0FCA  2531              1661            LCS   R3,1                                                       MOS46600
                        1662  *                                                                          MOS46610
0FCC  4036 8000         1663  STORE31   STH   R3,X'8000'(R6)      STORE BACKGROUND OF ALL 1'S            MOS46620
0FD0  C160 0FCC         1664            BXLE  R6,STORE31                                                 MOS46630
0FD4  4860 0C32         1665            LH    R6,LOLIM+6                                                 MOS46640
0FD8  C840 3037         1666            LDAI  R4,C'07'                                                   MOS46650
0FDC  4040 0B56         1667            STH   R4,ERRNO            ERRNO = C'07'                          MOS46660
```

TEST 3

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                                1668  *                                                                      MOS46670
0FE0   C8D0 0010                1669  T3S1     LDAI   R13,16                                                MOS46680
0FE4   41F0 08C2                1670           BAL    LINK,TSTBRKX       IF "BREAK" GO TO TSTEND ELSE RETURN  MOS46690
0FE8   C8C0 8000                1671           LDAI   R12,X'8000'        LOAD R12 (BIT 0 SET)                 MOS46700
0FEC   2581                     1672  T3S2     LCS    R3,1               SET ALL BITS IN R3                   MOS46710
0FEE   073C                     1673           XAR    R3,R12             RESET A BIT (0-15) IN R3             MOS46720
0FF0   4036 8000                1674           STH    R3,X'8000'(R6)     STORE DATA AT LOC                    MOS46730
0FF4   4846 8000                1675           LH     R4,X'8000'(R6)     GET DATA FROM LOC                    MOS46740
0FF8   0543                     1676           CLAR   R4,R3              DATA EQUAL ?                         MOS46750
0FFA   213C                     1677           BNES   T3S3F              NO, BRANCH                           MOS46760
0FFC   90C1                     1678  T3S3     SRHLS  R12,1              WALK 0 THRU HALFWORD OF 1'S          MOS46770
0FFE   27D1                     1679           SIS    R13,1              DONE W/THIS HALFWORD ?               MOS46780
1000   203A                     1680           BNZS   T3S2               NO, BRANCH UNTIL FINISHED            MOS46790
1002   C160 0FE0                1681           BXLE   R6,T3S1            CONTINUE UNTIL DONE (INCREMENTING    MOS46800
1006   4860 0C32                1682           LH     R6,LOLIM+6                                              MOS46810
100A   C460 7FFE                1683           NAI    R6,X'7FFE'                                              MOS46820
100E   2430                     1684           LIS    R3,0                                                    MOS46830
1010   2304                     1685           BS     STORE30            BRANCH                               MOS46840
                                1686  *                                                                      MOS46850
1012   41F0 1C74                1687  T3S3F    BAL    LINK,ERROR         ERROR ROUTINE                        MOS46860
1016   22CD                     1688           BS     T3S3               RETURN                               MOS46870
                                1689  *                                                                      MOS46880
1018   4036 8000                1690  STORE30  STH    R3,X'8000'(R6)     STORE BACKGROUND OF ALL 0'S          MOS46890
101C   C160 1018                1691           BXLE   R6,STORE30                                            MOS46900
1020   4860 0C32                1692           LH     R6,LOLIM+6                                              MOS46910
1024   C460 7FFE                1693           NAI    R6,X'7FFE'                                              MOS46920
1028   6110 0B56                1694           AHM    R1,ERRNO           ERRNO = C'08'                        MOS46930
                                1695  *                                                                      MOS46940
102C   C8D0 0010                1696  T3S4     LDAI   R13,16                                                MOS46950
1030   41F0 08C2                1697           BAL    LINK,TSTBRKX       IF "BREAK" GO TO TSTEND ELSE RETURN  MOS46960
1034   C830 8000                1698           LDAI   R3,X'8000'         LOAD R3 (BIT 0 SET)                  MOS46970
                                1699  *                                                                      MOS46980
1038   4036 8000                1700  T3S5     STH    R3,X'8000'(R6)     STORE DATA AT LOC                    MOS46990
103C   4846 8000                1701           LH     R4,X'8000'(R6)     GET DATA FROM LOC                    MOS47000
1040   0543                     1702           CLAR   R4,R3              DATA EQUAL ?                         MOS47010
1042   213A                     1703           BNES   T3S6F              NO, BRANCH                           MOS47020
1044   9031                     1704  T3S6     SRHLS  R3,1               WALK BIT THRU HALFWORD               MOS47030
1046   27D1                     1705           SIS    R13,1              DONE W/THIS HALFWORD ?               MOS47040
1048   2038                     1706           BNZS   T3S5               NO, BRANCH UNTIL FINISHED            MOS47050
104A   C160 102C                1707           BXLE   R6,T3S4            CONTINUE UNTIL DONE (INCREMENTING)   MOS47060
                                1708  *                                                                      MOS47070
104E   41F0 0D36                1709           BAL    LINK,ENDCHK        IF END OF TEST, RETURN TO EXEC       MOS47080
1052   4300 0FAE                1710           B      TEST3A             ELSE BRANCH TO CONTINUE TEST         MOS47090
                                1711  *                                                                      MOS47100
1056   41F0 1C74                1712  T3S6F    BAL    LINK,ERROR         ERROR ROUTINE                        MOS47110
105A   22CB                     1713           BS     T3S6               RETURN                               MOS47120
                                1714  *                                                                      MOS47130
                                1715  * ********************************************************************** MOS47140
                                1716  *        END    TEST 3                                                  MOS47150
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TEST 4

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                        1718  *       TEST 4                      DOUBLE OPERATION COLUMN DISTURB TEST   MOS47170
                        1719  *                                                                          MOS47180
                        1720  *       PURPOSE:                                                           MOS47190
                        1721  *            THIS TEST CHECKS THAT A DOUBLE OPERATION ON AN ADJACENT       MOS47200
                        1722  *            COLUMN DOES NOT DISTURB THE TEST COLUMN.                      MOS47210
                        1723  *                                                                          MOS47220
                        1724  *       ASSUMPTIONS:                                                       MOS47230
                        1725  *            MINIMUM 64KB MOS MEMORY                                       MOS47240
                        1726  *                                                                          MOS47250
                        1727  *       DESIGN SPECIFICATIONS:                                             MOS47260
                        1728  *            1. WITH 6 DIFFERENT BACKROUND PATTERSN, A W-R-WC-             MOS47270
                        1729  *               RC-W-R-WC-RC SERIES IS EXECUTED AT EACH LOCATION.          MOS47280
                        1730  *            2. A COMPARE IS DONE UPON EACH READ OPERATION.                MOS47290
                        1731  *            3. A TEST (COMPARISON) OF THE REST OF MEMORY IS DONE          MOS47300
                        1732  *               AFTER EACH SERIES OF OPERATIONS.                           MOS47310
                        1733  *                                                                          MOS47320
                        1734  *       OPTIONS:                                                           MOS47330
                        1735  *            LOPHYS - LOW PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST        MOS47340
                        1736  *            HIPHYS - HIGH PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST       MOS47350
                        1737  *                (FAILING PHYSICAL SEGMENT = MSB OF TASK PSW)              MOS47360
                        1738  *            SCOPE - ERROR OPTION MODE                                     MOS47370
                        1739  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST                MOS47380
                        1740  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST        MOS47390
                        1741  *                2 - PRINT ERROR DATA AND CONTINUE TEST                    MOS47400
                        1742  *                3 - PRINT ERROR DATA AND HALT                             MOS47410
                        1743  *                4 - IGNORE ERROR                                          MOS47420
                        1744  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST            MOS47430
                        1745  *                                                                          MOS47440
                        1746  *       HOW TO RUN THE TEST                                                MOS47450
                        1747  *            1. ENTER THE "SCOPE", "LOPHYS", & "HIPHYS" OPTIONS VIA        MOS47460
                        1748  *               THE CONSOLE DEVICE.                                        MOS47470
                        1749  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                     MOS47480

105C  41F0 0D0E         1751  TEST4     BAL   LINK,LOSET          ESTABLISH LOWEST PHYSICAL SEGMENT      MOS47500
1060  2411              1752  TEST4A    LIS   R1,1                LOAD DISPLAY ADDRESS                   MOS47510
1062  24A0              1753            LIS   R10,0                                                      MOS47520
1064  25B1              1754            LCS   R11,1                                                     MOS47530
1066  24D0              1755            LIS   R13,0               W/BACKGROUND = 0'S                     MOS47540
1068  41E0 1082         1756            BAL   R14,CHKCOL          DO A DOUBLE OPERATION COLUMN           MOS47550
                        1757  *                                   DISTURB AND COMPLEMENT TEST            MOS47560
106C  24D2              1758            LIS   R13,2               W/BACKGROUND = 5'S                     MOS47570
106E  41E0 1082         1759            BAL   R14,CHKCOL          DO A DOUBLE OPERATION COLUMN           MOS47580
                        1760  *                                   DISTURB AND COMPLEMENT TEST            MOS47590
1072  C8D0 0100         1761            LDAI  R13,X'100'          W/BACKGROUND =128-0'S,128-F'S,..       MOS47600
1076  41E0 1082         1762            BAL   R14,CHKCOL          DO A DOUBLE OPERATION COLUMN           MOS47610
                        1763  *                                   DISTURB AND COMPLEMENT TEST            MOS47620
107A  41F0 0D36         1764            BAL   LINK,ENDCHK         IF END OF TEST, RETURN TO EXEC         MOS47630
107E  43C0 1060         1765            B     TEST4A              ELSE BRANCH TO CONTINUE TEST           MOS47640
                        1766  * ********************************************************************     MOS47650
1082  4860 0C32         1767  CHKCOL    LH    R6,LOLIM+6          INITIALIZE MEMORY LIMITS               MOS47660
1086  4880 0C3E         1768            LH    R8,HILIM+6                                                 MOS47670
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TEST 4

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108A  C460 7FFE          1769           NAI   R6,X'7FFE'                                    MOS47680
108E  C480 7FFF          1770           NAI   R8,X'7FFF'                                    MOS47690
1092  2472               1771           LIS   R7,2                                          MOS47700
1094  083A               1772  CHKCOL1  LDAR  R3,R10          GET PROPER BACKGROUND PATTERN  MOS47710
1096  C36D 0000          1773           TAI   R6,0(R13)                                     MOS47720
109A  2332               1774           BZS   CHKCOL2                                       MOS47730
109C  083B               1775           LDAR  R3,R11                                        MOS47740
109E  4036 8000          1776  CHKCOL2  STH   R3,X'8000'(R6)  STORE BACKGROUND PATTERN      MOS47750
10A2  C160 1094          1777           BXLE  R6,CHKCOL1      TO ALL OF MEMORY UNDER TEST   MOS47760
10A6  4860 0C32          1778           LH    R6,LOLIM+6                                    MOS47770
10AA  C460 7FFE          1779           NAI   R6,X'7FFE'                                    MOS47780
                         1780  *                                                            MOS47790
10AE  C840 3033          1781  CHKCOL3  LDAI  R4,C'03'                                     MOS47800
10B2  4040 0B56          1782           STH   R4,ERRNO          ERRNO = C'03'               MOS47810
10B6  41F0 08C2          1783           BAL   LINK,TSTBRKX      IF "BREAK" GO TO TSTEND ELSE RETURN MOS47820
10BA  083A               1784           LDAR  R3,R10            GET ORIGINAL DATA PATTERN (O.D.P.) MOS47830
10BC  C36D 0000          1785           TAI   R6,0(R13)                                     MOS47840
10C0  2332               1786           BZS   CHKCOL4                                       MOS47850
10C2  083B               1787           LDAR  R3,R11                                        MOS47860
10C4  4846 8000          1788  CHKCOL4  LH    R4,X'8000'(R6)  GET DATA FROM LOC            MOS47870
10C8  0543               1789           CLAR  R4,R3           DATA EQUAL ?                  MOS47880
10CA  4230 11A2          1790           BNE   CHKCOL5F          YES, BRANCH                 MOS47890
10CE  C730 FFFF          1791  CHKCOL5  XAI   R3,-1            COMPLEMENT DATA PATTERN (C.D.P.) MOS47900
10D2  4036 8000          1792           STH   R3,X'8000'(R6)    STORE C.D.P. AT LOC         MOS47910
10D6  6110 0B56          1793           AHM   R1,ERRNO          ERRNO = C'04'               MOS47920
10DA  4846 8000          1794           LH    R4,X'8000'(R6)  GET DATA FROM LOC            MOS47930
10DE  0543               1795           CLAR  R4,R3           DATA EQUAL ?                  MOS47940
10E0  4230 11AA          1796           BNE   CHKCOL6F          NO, BRANCH                  MOS47950
10E4  C730 FFFF          1797  CHKCOL6  XAI   R3,-1            COMPLEMENT C.D.P. (O.D.P.)  MOS47960
10E8  4036 8000          1798           STH   R3,X'8000'(R5)    STORE O.D.P. AT LOC         MOS47970
10EC  C840 3039          1799           LDAI  R4,C'09'                                      MOS47980
10F0  4040 0B56          1800           STH   R4,ERRNO          ERRNO = C'09'               MOS47990
10F4  4846 8000          1801           LH    R4,X'8000'(R6)  GET DATA FROM LOC            MOS48000
10F8  0543               1802           CLAR  R4,R3           DATA EQUAL ?                  MOS48010
10FA  4230 11B2          1803           BNE   CHKCOL7F          NO, BRANCH                  MOS48020
10FE  C730 FFFF          1804  CHKCOL7  XAI   R3,-1            COMPLEMENT O.D.P.(C.D.P.)   MOS48030
1102  4036 8000          1805           STH   R3,X'8000'(R6)    STORE C.D.P. AT LOC         MOS48040
1106  C840 3041          1806           LDAI  R4,C'0A'                                      MOS48050
110A  4040 0B56          1807           STH   R4,ERRNO          ERRNO = C'0A'               MOS48060
110E  4846 8000          1808           LH    R4,X'8000'(R6)  GET DATA FROM LOC            MOS48070
1112  0543               1809           CLAR  R4,R3           DATA EQUAL ?                  MOS48080
1114  4230 11BA          1810           BNE   CHKCOL8F          NO, BRANCH                  MOS48090
1118  C160 10AE          1811  CHKCOL8  BXLE  R6,CHKCOL3      CONTINUE UNTIL DONE(INCREMENTING MOS48100
111C  4860 0C3E          1812           LH    R6,HILIM+6      INITIALIZE MEMORY LIMITS      MOS48110
1120  C460 7FFE          1813           NAI   R6,X'7FFE'      (HILIM MUST BE EVEN)          MOS48120
1124  4880 0C32          1814           LH    R8,LOLIM+6                                    MOS48130
1128  C480 7FFE          1815           NAI   R8,X'7FFE'                                    MOS48140
112C  2572               1816           LCS   R7,2                                          MOS48150
                         1817  *                                                            MOS48160
112E  083B               1818  CHKCOL9  LDAR  R3,R11          GET COMPLEMENT DATA PATTERN(C.D.P.) MOS48170
1130  C36D 0000          1819           TAI   R6,0(R13)                                     MOS48180
1134  2332               1820           BZS   CHKCOLA                                       MOS48190
1136  083A               1821           LDAR  R3,R10                                        MOS48200
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TEST 4

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1138  C840 3035          1822  CHKCOLA  LDAI  R4,C'05'                                                    MOS48210
113C  4040 0B56          1823           STH   R4,ERRNO          ERRNO = C'05'                             MOS48220
1140  41F0 08C2          1824           BAL   LINK,TSTBRKX      IF "BREAK" GO TO TSTEND ELSE RETURN       MOS48230
1144  4846 8000          1825           LH    R4,X'8000'(R6)    GET DATA FROM LOC                         MOS48240
1148  0543               1826           CLAR  R4,R3             DATA EQUAL ?                              MOS48250
114A  4230 11C2          1827           BNE   CHKCOLBF          NO, BRANCH                                MOS48260
114E  C730 FFFF          1828  CHKCOLB  XAI   R3,-1             COMPLEMENT C.D.P.(O.D.P.)                 MOS48270
1152  4036 8000          1829           STH   R3,X'8000'(R6)    STORE O.D.P. AT LOC                       MOS48280
1156  6110 0B56          1830           AHM   R1,ERRNO          ERRNO = C'06'                             MOS48290
115A  4846 8000          1831           LH    R4,X'8000'(R6)    GET DATA FROM LOC                         MOS48300
115E  0543               1832           CLAR  R4,R3             DATA EQUAL ?                              MOS48310
1160  4230 11CA          1833           BNE   CHKCOLCF          NO, BRANCH                                MOS48320
1164  C730 FFFF          1834  CHKCOLC  XAI   R3,-1             COMPLEMENT O.D.P. (C.D.P.)                MOS48330
1168  4036 8000          1835           STH   R3,X'8000'(R6)    STORE C.D.P. AT LOC                       MOS48340
116C  C840 3042          1836           LDAI  R4,C'0B'                                                    MOS48350
1170  4040 0B56          1837           STH   R4,ERRNO          ERRNO = C'0B'                             MOS48360
1174  4846 8000          1838           LH    R4,X'8000'(R6)    GET DATA FROM LOC                         MOS48370
1178  0543               1839           CLAR  R4,R3             DATA EQUAL ?                              MOS48380
117A  213E               1840           BNES  CHKCOLDF          NO, BRANCH                                MOS48390
117C  C730 FFFF          1841  CHKCOLD  XAI   R3,-1             COMPLEMENT C.D.P.(O.D.P.)                 MOS48400
1180  4036 8000          1842           STH   R3,X'8000'(R6)    STORE O.D.P. AT LOC                       MOS48410
1184  6110 0B56          1843           AHM   R1,ERRNO          ERRNO = C'0C'                             MOS48420
1188  4846 8000          1844           LH    R4,X'8000'(R6)    GET DATA FROM LOC                         MOS48430
118C  0543               1845           CLAR  R4,R3             DATA EQUAL ?                              MOS48440
118E  2137               1846           BNES  CHKCOLEF          NO, BRANCH                                MOS48450
1190  C060 112E          1847  CHKCOLE  BXH   R6,CHKCOL9        CONTINUE UNTIL DONE(DECREMENTING)         MOS48460
1194  030E               1848           BR    R14               RETURN                                    MOS48470
                         1849  *-----------------------------------                                       MOS48480
1196  41F0 1C74          1850  CHKCOLDF BAL   LINK,ERROR        ERROR ROUTINE                             MOS48490
119A  220F               1851           BS    CHKCOLD           RETURN                                    MOS48500
                         1852  *                                                                         MOS48510
119C  41F0 1C74          1853  CHKCOLEF BAL   LINK,ERROR        ERROR  ROUTINE                            MOS48520
11A0  2208               1854           BS    CHKCOLE           RETURN                                    MOS48530
                         1855  *                                                                         MOS48540
11A2  41F0 1C74          1856  CHKCOL5F BAL   LINK,ERROR        ERROR ROUTINE                             MOS48550
11A6  4300 10CE          1857           B     CHKCOL5           RETURN                                    MOS48560
                         1858  *                                                                         MOS48570
11AA  41F0 1C74          1859  CHKCOL6F BAL   LINK,ERROR        ERROR ROUTINE                             MOS48580
11AE  4300 10E4          1860           B     CHKCOL6           RETURN                                    MOS48590
                         1861  *                                                                         MOS48600
11B2  41F0 1C74          1862  CHKCOL7F BAL   LINK,ERROR        ERROR ROUTINE                             MOS48610
11B6  4300 10FE          1863           B     CHKCOL7           RETURN                                    MOS48620
                         1864  *                                                                         MOS48630
11BA  41F0 1C74          1865  CHKCOL8F BAL   LINK,ERROR        ERROR ROUTINE                             MOS48640
11BE  4300 1118          1866           B     CHKCOL8           RETURN                                    MOS48650
                         1867  *                                                                         MOS48660
11C2  41F0 1C74          1868  CHKCOLBF BAL   LINK,ERROR        ERROR ROUTINE                             MOS48670
11C6  4300 114E          1869           B     CHKCOLB           RETURN                                    MOS48680
                         1870  *                                                                         MOS48690
11CA  41F0 1C74          1871  CHKCOLCF BAL   LINK,ERROR        ERROR ROUTINE                             MOS48700
11CE  4300 1164          1872           B     CHKCOLC           RETURN                                    MOS48710
                         1873  * ************************************************************************ MOS48720
                         1874  *        END   TEST 4                                                      MOS48730
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TEST 5

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                        1876  *       TEST 5                  SHORT COUNT RELOCATABLE          MOS48750
                        1877  *                               HAMMER DISTURB TEST              MOS48760
                        1878  *                                                                MOS48770
                        1879  *       PURPOSE:                                                 MOS48780
                        1880  *            THIS TEST EXECUTES A SMALL, RELOCATABLE PROGRAM      MOS48790
                        1881  *            (16 HALFWORDS) THROUGHOUT MEMORY, LOOKING FOR "SOFT" MOS48800
                        1882  *            FAILURES.                                           MOS48810
                        1883  *                                                                MOS48820
                        1884  *       ASSUMPTIONS:                                             MOS48830
                        1885  *            MINIMUM 64KB MOS MEMORY                             MOS48840
                        1886  *                                                                MOS48850
                        1887  *       DESIGN SPECIFICATIONS:                                   MOS48860
                        1888  *            1. THE TEST PROGRAM MUST USE 16 HALFWORDS HEAVILY,  MOS48870
                        1889  *               DUE TO THE INTERNAL CHIP ADDRESSING SCHEME.       MOS48880
                        1890  *            2. THE TEST RUNS WITH A BACKGROUND PATTERN EQUAL TO  MOS48890
                        1891  *               THE CONTENTS OF "DATA".                          MOS48900
                        1892  *            3. THE TEST LOOPS 10 TIMES(INTERNAL TO THE MODULE). MOS48910
                        1893  *            4. THE ROUTINE (ROUTIN) IS EXECUTED 10 TIMES. THE ENTIRE MOS48920
                        1894  *               ROUTINE IS THEN RELOCATED IN MEMORY AND EXECUTED 10 MOS48930
                        1895  *               TIMES. "ROUTIN" IS MOVED UP IN MEMORY UNTIL THE LAST MOS48940
                        1896  *               TEST HALFWORD IS IN THE LAST MEMORY HALFWORD.     MOS48950
                        1897  *                                                                MOS48960
                        1898  *       OPTIONS:                                                 MOS48970
                        1899  *            LOPHYS - LOW PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST MOS48980
                        1900  *            HIPHYS - HIGH PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST MOS48990
                        1901  *                (FAILING PHYSICAL SEGMENT = MSB OF TASK PSW)     MOS49000
                        1902  *            DATA  - 16-BIT DATA PATTERN USED AS BACKGROUND       MOS49010
                        1903  *            POUND - NUMBER OF TIMES A'S & 5'S ARE POUNDED IN MEMORY MOS49020
                        1904  *            SCOPE - ERROR OPTION MODE                           MOS49030
                        1905  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST       MOS49040
                        1906  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST MOS49050
                        1907  *                2 - PRINT ERROR DATA AND CONTINUE TEST           MOS49060
                        1908  *                3 - PRINT ERROR DATA AND HALT                    MOS49070
                        1909  *                4 - IGNORE ERROR                                 MOS49080
                        1910  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST   MOS49090
                        1911  *                                                                MOS49100
                        1912  *       HOW TO RUN THE TEST:                                     MOS49110
                        1913  *            1. ENTER THE "SCOPE", "LOPHYS", & "HIPHYS" OPTIONS VIA MOS49120
                        1914  *               THE CONSOLE DEVICE.                              MOS49130
                        1915  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.           MOS49140

11D2  41F0 0D0E         1917  TEST5   BAL   LINK,LOSET        ESTABLISH LOWEST PHYSICAL SEGMENT MOS49160
                        1918  *                                                                MOS49170
11D6  4860 0C32         1919  TEST5A  LH    R6,LOLIM+6       INITIALIZE MEMORY LIMITS          MOS49180
11DA  4880 0C3E         1920          LH    R8,HILIM+6                                         MOS49190
11DE  C460 7FFE         1921          NAI   R6,X'7FFE'                                         MOS49200
11E2  C480 7FFF         1922          NAI   R8,X'7FFF'                                         MOS49210
11E6  0856              1923          LDAR  R5,R6                                              MOS49220
11E8  0898              1924          LDAR  R9,R8                                              MOS49230
11EA  2472              1925          LIS   R7,2                                               MOS49240
11EC  2411              1926          LIS   R1,1             LOAD DISPLAY ADDRESS              MOS49250
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TEST 5

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11EE  C8A0 5555      1927          LDAI  R10,X'5555'                                    MOS49260
11F2  C8B0 AAAA      1928          LDAI  R11,X'AAAA'                                    MOS49270
11F6  2521           1929          LCS   R2,1                                           MOS49280
                     1930  *                                                            MOS49290
11F8  4026 8000      1931  T5S1    STH   R2,X'8000'(R6)      STORE BACKGROUND OF ALL 1'S MOS49300
11FC  C160 11F8      1932          BXLE  R6,T5S1                                        MOS49310
1200  08E5           1933          LDAR  R6,R5                                          MOS49320
1202  41E0 1220      1934          BAL   R14,SFTSET          DO SHORT HAMMER DISTURB TEST MOS49330
                     1935  *                                                            MOS49340
1206  08E5           1936          LDAR  R6,R5               INITIALIZE MEMORY LIMITS   MOS49350
1208  2420           1937          LIS   R2,0                                           MOS49360
                     1938  *                                                            MOS49370
120A  4026 8000      1939  T5S2    STH   R2,X'8000'(R6)      STORE BACKGROUND OF ALL 0'S MOS49380
120E  C160 120A      1940          BXLE  R6,T5S2                                        MOS49390
1212  08E5           1941          LDAR  R6,R5                                          MOS49400
1214  41E0 1220      1942          BAL   R14,SFTSET          DO SHORT HAMMER DISTURB TEST MOS49410
                     1943  *                                                            MOS49420
1218  41F0 0D36      1944          BAL   LINK,ENDCHK         IF END OF TEST, RETURN TO EXEC MOS49430
121C  4300 11D6      1945          B     TEST5A              ELSE BRANCH TO CONTINUE TEST MOS49440
                     1946  *                                                            MOS49450
                     1947  * ********************************************************** MOS49460
                     1948  *                                                            MOS49470
1220  48C0 0C02      1949  SFTSET  LH    R12,POUND+6         LOAD EXECUTION COUNTER     MOS49480
1224  41F0 08C2      1950          BAL   LINK,TSTBRKX        IF "BREAK" GO TO TSTEND ELSE RETURN MOS49490
1228  D000 1EE0      1951          STM   R0,MOSSAVE+32       SAVE REGISTERS 0-F         MOS49500
122C  0816           1952          LDAR  R1,R6                                          MOS49510
122E  D120 12AC      1953          LM    R2,STLOOP           RELOCATE PROGRAM IN MEMORY MOS49520
1232  DC21 7FE2      1954          STM   R2,X'8000'+STLOOP-ENDMOV5(R1)                  MOS49530
1236  48F0 12C8      1955          LH    R15,STLOOP+28                                  MOS49540
123A  40F1 7FFE      1956          STH   R15,X'8000'+STLOOP-ENDMOV5+28(R1)              MOS49550
123E  2441           1957          LIS   R4,1                                           MOS49560
1240  9461           1958          EXBR  R6,R1                                          MOS49570
1242  C660 0080      1959          OAI   R6,X'0080'          RECTIFY ADDRESS FOR DISPLAY MOS49580
1246  9846           1960          WHR   R4,R6               WRITE PRESENT ADDRESS TO DISPLAY MOS49590
1248  D100 1EE0      1961          LM    R0,MOSSAVE+32       RESTORE REGISTERS 0-F      MOS49600
124C  41D6 7FE2      1962          BAL   R13,STLOOP-ENDMOV5+X'8000'(R6) *   BRANCH TO "STLOOP" MOS49610
                     1963  *                                                            MOS49620
                     1964  *       TEST BACKGROUND PATTERN                              MOS49630
                     1965  *                                                            MOS49640
1250  D000 1EE0      1966  BGTST   STM   R0,MOSSAVE+32                                  MOS49650
1254  C840 3045      1967          LDAI  R4,C'0E'                                       MOS49660
1258  4040 0B56      1968          STH   R4,ERRNO            ERRNO = C'0E'              MOS49670
125C  0832           1969          LDAR  R3,R2               LOAD BACKGROUND PATTERN    MOS49680
125E  08C6           1970          LDAR  R12,R6              SAVE LOC UNDER TEST        MOS49690
1260  0886           1971          LDAR  R8,R6                                          MOS49700
1262  C880 0020      1972          SAI   R8,ENDMOV5-STLOOP+2 ESTABLISH START OF SUB-2   MOS49710
1266  0865           1973          LDAR  R6,R5               GET START OF BACKGROUND TEST AREA MOS49720
1268  0568           1974          CLAR  R6,R8               IS LOLIM NOT < START OF SUB-2 ? MOS49730
126A  238B           1975          BNLS  BGTST3              NO, BRANCH TO TEST HIGH MEMORY MOS49740
126C  4846 8000      1976  BGTST1  LH    R4,X'8000'(R6)      GET DATA FROM BACKGROUND LOC MOS49750
1270  0543           1977          CLAR  R4,R3               DATA EQUAL ?               MOS49760
1272  2134           1978          BNES  BGTST2.5                                       MOS49770
1274  C160 126C      1979  BGTST2  BXLE  R6,BGTST1           CONTINUE LOW BACKGROUND TESTING MOS49780
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TEST 5

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1278  23C4             1980          BS    BGTST3                                                  MOS49790
                       1981  *                                                                     MOS49800
127A  41F0 1C74        1982  BGTST2.5 BAL  LINK,ERROR          PRINT ERROR TTOE                  MOS49810
127E  22C5             1983          BS    BGTST2                                                  MOS49820
                       1984  *                                                                     MOS49830
1280  086C             1985  BGTST3   LDAR R6,R12              RESTORE LOC UNDER TEST            MOS49840
1282  2662             1986          AIS   R6,2                START AT LOC+2 AFTER SUB           MOS49850
1284  0889             1987          LDAR  R8,R9               GET END OF BACKGROUND TEST AREA    MOS49860
1286  0568             1988          CLAR  R6,R8               IS BG LOC < OR = TEST LOC ?        MOS49870
1288  238B             1989          BNLS  BGTST6              NO, BRANCH TO TEST NEXT LOC        MOS49880
128A  4846 8000        1990  BGTST4   LH    R4,X'8000'(R6)     GET DATA FROM BG LOC               MOS49890
128E  0543             1991          CLAR  R4,R3               DATA EQUAL ?                       MOS49900
1290  2134             1992          BNES  BGTST5.5                                               MOS49910
1292  C160 128A        1993  BGTST5   BXLE  R6,BGTST4          CONTINUE HIGH BACKGROUND TESTING   MOS49920
1295  23C4             1994          BS    BGTST6                                                  MOS49930
                       1995  *                                                                     MOS49940
1298  41F0 1C74        1996  BGTST5.5 BAL  LINK,ERROR          PRINT ERROR TTOE                  MOS49950
129C  22C5             1997          BS    BGTST5                                                  MOS49960
                       1998  *                                                                     MOS49970
129E  D100 1EE0        1999  BGTST6   LM    R0,MOSSAVE+32      RESTORE REGISTERS                  MOS49980
12A2  4026 7FE2        2000  BGTST7   STH   R2,X'8000'+STLOOP-ENDMOV5(R6) * RESTORE BKGND PAT AT LOC.  MOS49990
12A6  C160 1220        2001          BXLE  R6,SFTSET           CONTINUE UNTIL DONE (INCREMENTING) MOS50000
12AA  030E             2002          BR    R14                                                     MOS50010
                       2003  * ********************************************************************  MOS50020
                       2004  *                                                                     MOS50030
12AC  40A6 8000        2005  STLOOP   STH   R10,X'8000'(R6)    STORE FIRST DATA PATTERN           MOS50040
12B0  45A6 8000        2006          CLH   R10,X'8000'(R6)    DATA EQUAL ?                       MOS50050
12B4  4230 12CA        2007          BNE   FITERR1             NO,BRANCH TO ERROR                 MOS50060
12B8  40B6 8000        2008  LOPRTN1  STH   R11,X'8000'(R6)    YES, STORE SECOND DATA PATTERN     MOS50070
12BC  45B6 8000        2009          CLH   R11,X'8000'(R6)    DATA EQUAL?                        MOS50080
12C0  4230 12CE        2010          BNE   FITERR2             NO, BRANCH TO ERROR                MOS50090
12C4  27C1             2011  LOPRTN2  SIS   R12,1              YES, DECREMENT POUND COUNTER       MOS50100
12C6  203D             2012          BNZS  STLOOP              BRANCH IF NOT DONE                 MOS50110
12C8  030D             2013          BR    R13                 RETURN                             MOS50120
      00C0 12CA        2014  ENDMOV5  EQU   *                   (R6)                               MOS50130
                       2015  *                                                                     MOS50140
                       2016  * ********************************************************************  MOS50150
                       2017  *                                                                     MOS50160
12CA  083A             2018  FITERR1  LDAR  R3,R10             LOAD EXPECTED DATA                 MOS50170
12CC  23C2             2019          BS    FITERR3                                                 MOS50180
                       2020  *                                                                     MOS50190
12CE  083B             2021  FITERR2  LDAR  R3,R11                                                MOS50200
                       2022  *                                                                     MOS50210
12D0  C840 3044        2023  FITERR3  LDAI  R4,C'0D'                                              MOS50220
12D4  4040 0B56        2024          STH   R4,ERRNO            ERRNO = C'0D'                      MOS50230
12D8  4846 8000        2025          LH    R4,X'8000'(R6)                                         MOS50240
12DC  41F0 1C74        2026          BAL   LINK,ERROR                                             MOS50250
12E0  4300 12A2        2027          B     BGTST7              RETURN                             MOS50260
                       2028  * ********************************************************************  MOS50270
                       2029  *       END   TEST 5                                                  MOS50280
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TEST 6

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                        2031  *       TEST 6                    DIAGONAL GALPAT TEST                    MOS50300
                        2032  *                                                                         MOS50310
                        2033  *       PURPOSE:                                                          MOS50320
                        2034  *            THE TEST RUNS A GALLOPING PATTERN ON ALL DIAGONALS OF       MOS50330
                        2035  *            EACH 16K RAM AND CHECKS THAT NO BACKGROUND LOCATIONS        MOS50340
                        2036  *            HAVE CHANGED DURING THE DIAGONAL TEST.                      MOS50350
                        2037  *                                                                         MOS50360
                        2038  *       ASSUMPTIONS:                                                      MOS50370
                        2039  *            MINIMUM 64KB MOS MEMORY                                    MOS50380
                        2040  *                                                                         MOS50390
                        2041  *       DESIGN SPECIFICATIONS:                                            MOS50400
                        2042  *            1. THE TEST IS EXECUTED FOR EACH OF THE SIX BACKGROUND      MOS50410
                        2043  *               PATTERNS.                                               MOS50420
                        2044  *            2. AN ALTERNATE R-W-R-W-R-W-R-W-R(ETC) IS DONE TO A TEST    MOS50430
                        2045  *               CELL AND FOLLOWING CELLS ON THE DIAGONAL SUCESSIVELY.    MOS50440
                        2046  *            3. THE TEST CELL IS MOVED ONE CELL UP THE DIAGONAL AND      MOS50450
                        2047  *               THE PROCEDURE IS REPEATED.                              MOS50460
                        2048  *            4. AFTER THE DIAGONAL IS COMPLETED, THE BACKROUND           MOS50470
                        2049  *               PATTERN IN THE REST OF EACH 16K CHIP AS TESTED.          MOS50480
                        2050  *            5. THE DIAGONAL IS THEN MOVED AND 2-4 IS REPEATED           MOS50490
                        2051  *               UNTIL ALL DIAGONALS HAVE BEEN TRAVERSED.                MOS50500
                        2052  *                                                                         MOS50510
                        2053  *       OPTIONS:                                                          MOS50520
                        2054  *            LOPHYS - LOW PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST     MOS50530
                        2055  *            HIPHYS - HIGH PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST    MOS50540
                        2056  *                (FAILING PHYSICAL SEGMENT = MSB OF TASK PSW)            MOS50550
                        2057  *            SCOPE - ERROR OPTION MODE                                  MOS50560
                        2058  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST             MOS50570
                        2059  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST     MOS50580
                        2060  *                2 - PRINT ERROR DATA AND CONTINUE TEST                 MOS50590
                        2061  *                3 - PRINT ERROR DATA AND HALT                          MOS50600
                        2062  *                4 - IGNORE ERROR                                       MOS50610
                        2063  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST         MOS50620
                        2064  *                                                                       MOS50630
                        2065  *       HOW TO RUN THE TEST:                                            MOS50640
                        2066  *            1. ENTER THE "SCOPE", "LOPHYS", & "HIPHYS" OPTIONS VIA      MOS50650
                        2067  *               THE CONSOLE DEVICE.                                     MOS50660
                        2068  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                   MOS50670

12E4  41F0 0DDE         2070  TEST6   BAL   LINK,LOSET          ESTABLISH LOWEST PHYSICAL SEGMENT       MOS50690
                        2071  *                                                                         MOS50700
12E8  2410              2072  TEST6A  LIS   R1,0                FORCE TO LOLIM OF X'8000'               MOS50710
12EA  4010 1EB4         2073          STH   R1,VLOLIM           ESTABLISH VIRTUAL LOLIM                 MOS50720
12EE  C810 7FFF         2074          LDAI  R1,X'7FFF'                                                  MOS50730
12F2  4010 1EB6         2075  T6SX    STH   R1,VHILIM           ESTABLISH VIRTUAL HILIM OF X'FFFF'      MOS50740
12F6  C850 1E42         2076          LDAI  R5,T6MSG                                                    MOS50750
12FA  41F0 0756         2077          BAL   LINK,PRINT          PRINT LIMITS UNDER DIAG. GALPAT TEST    MOS50760
12FE  C850 1E5C         2078          LDAI  R5,LOMSG                                                    MOS50770
1302  41F0 0756         2079          BAL   LINK,PRINT                                                  MOS50780
1306  2411              2080          LIS   R1,1                LOAD DISPLAY ADDRESS                    MOS50790
1308  C820 0102         2081          LDAI  R2,X'102'           LOAD CELL INCREMENT VALUE               MOS50800
```

TEST 6

```
130C  C890 00FE        2082          LDAI  R9,X'FE'          LOAD TOP OF COLUMN MASK VALUE          MOS50810
1310  C8C0 7FFE        2083          LDAI  R12,X'7FFE'       LOAD CHIP LIMIT MASK                   MOS50820
1314  24A0             2084          LIS   R10,0                                                    MOS50830
1316  25B1             2085          LCS   R11,1                                                    MOS50840
1318  24D0             2086          LIS   R13,0             W/BACKGROUND = 0'S                     MOS50850
131A  41E0 134C        2087          BAL   R14,TEST6ALL      DO DIAGONAL GALPAT TEST                MOS50860
                       2088  *                                                                      MOS50870
131E  25A1             2089          LCS   R10,1                                                    MOS50880
1320  24E0             2090          LIS   R11,0             W/BACKGROUND = F'S                     MOS50890
1322  41E0 134C        2091          BAL   R14,TEST6ALL      DO DIAGONAL GALPAT TEST                MOS50900
                       2092  *                                                                      MOS50910
1326  24D2             2093          LIS   R13,2             W/BACKGROUND = A'S/CHIP                MOS50920
1328  41E0 134C        2094          BAL   R14,TEST6ALL      DO DIAGONAL GALPAT TEST                MOS50930
                       2095  *                                                                      MOS50940
132C  24A0             2096          LIS   R10,0                                                    MOS50950
132E  25B1             2097          LCS   R11,1             W/BACKGROUND = 5'S/CHIP                MOS50960
1330  41E0 134C        2098          BAL   R14,TEST6ALL      DO DIAGONAL GALPAT TEST                MOS50970
                       2099  *                                                                      MOS50980
1334  C8D0 0100        2100          LDAI  R13,X'100'        W/BACKGROUND =128-0'S,128-F'S,..       MOS50990
1338  41E0 134C        2101          BAL   R14,TEST6ALL      DO DIAGONAL GALPAT TEST                MOS51000
                       2102  *                                                                      MOS51010
133C  25A1             2103          LCS   R10,1                                                    MOS51020
133E  24E0             2104          LIS   R11,0             W/BACKGROUND =128-F'S,128-0'S,..       MOS51030
1340  41F0 134C        2105          BAL   R14,TEST6ALL      DO DIAGONAL GALPAT TEST                MOS51040
                       2106  *                                                                      MOS51050
1344  41F0 0D36        2107          BAL   LINK,ENDCHK       IF END OF TEST, RETURN TO EXEC         MOS51060
1348  43C0 12E8        2108          B     TEST6A            ELSE BRANCH TO CONTINUE TEST           MOS51070
                       2109  *                                                                      MOS51080
                       2110  * ********************************************************************** MOS51090
                       2111  *                                                                      MOS51100
134C  4860 1EB4        2112  TEST6ALL LH   R6,VLOLIM         LOAD AVAILABLE MEMORY LIMITS           MOS51110
1350  4880 1EB6        2113          LH    R8,VHILIM                                                MOS51120
1354  2472             2114          LIS   R7,2                                                     MOS51130
                       2115  *                                                                      MOS51140
1356  083A             2116  T6S1    LDAR  R3,R10            GET APPROPRIATE BACKGROUND PATTERN     MOS51150
1358  C36D 0000        2117          TAI   R6,0(R13)                                                MOS51160
135C  2332             2118          BZS   T6S2                                                     MOS51170
135E  083B             2119          LDAR  R3,R11                                                   MOS51180
1360  4036 8000        2120  T6S2    STH   R3,X'8000'(R6)    STORE BACKGROUND PATTERN               MOS51190
1364  C160 1356        2121          BXLE  R6,T6S1           TO ALL AVAILABLE MEMORY                MOS51200
1368  083A             2122          LDAR  R3,R10                                                   MOS51210
136A  C36D 0000        2123          TAI   R6,0(R13)                                                MOS51220
136E  2332             2124          BZS   T6S2.5                                                   MOS51230
1370  083B             2125          LDAR  R3,R11                                                   MOS51240
1372  4036 8000        2126  T6S2.5  STH   R3,X'8000'(R6)    STORE BG AT LAST LOC                   MOS51250
1376  4850 1EB4        2127          LH    R5,VLOLIM         INITIALIZE BIAS                        MOS51260
                       2128  *                                                                      MOS51270
137A  2400             2129  T6S3    LIS   R0,0              R0 = X0                                MOS51280
137C  0880             2130  T6S4    LDAR  R8,R0             R8 = TEST CELL                         MOS51290
137E  0870             2131  T6S5    LDAR  R7,R0             R7 = RUNNING CELL                      MOS51300
1380  0578             2132  T6S6    CLAR  R7,R8             RUNNING CELL = TEST CELL ?             MOS51310
1382  4330 13CE        2133          BE    INCRRC            YES, INCREMENT THE RUNNING CELL        MOS51320
1386  0865             2134          LDAR  R6,R5             R5 = BIAS                              MOS51330
```

TEST 6

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1388  0A68           2135          AAR   R6,R8             R6 = TEST CELL                          MOS51340
138A  083B           2136          LDAR  R3,R11            LOAD COMPLEMENT DATA PATTERN(C.D.P.)    MOS51350
138C  C36D 0000      2137          TAI   R6,0(R13)                                                 MOS51360
1390  2332           2138          BZS   T6S7                                                      MOS51370
1392  083A           2139          LDAR  R3,R10                                                    MOS51380
1394  4036 8000      2140  T6S7    STH   R3,X'8000'(R6)    STORE C.D.P. AT TEST CELL LOC          MOS51390
1398  C840 3130      2141          LDAI  R4,C'10'                                                  MOS51400
139C  4040 0B56      2142          STH   R4,ERRNO          ERRNO = C'10'                           MOS51410
13A0  4846 8000      2143          LH    R4,X'8000'(R6)    GET TEST CELL DATA                      MOS51420
13A4  0543           2144          CLAR  R4,R3             DATA EQUAL TO C.D.P. ?                  MOS51430
13A6  4230 13E0      2145          BNE   T6ER10            NO, BRANCH - OTHERWISE                  MOS51440
13AA  4036 8000      2146  T6S8    STH   R3,X'8000'(R6)    STORE C.D.P. AT TC LOC                  MOS51450
13AE  0865           2147          LDAR  R6,R5             R5 = BIAS                               MOS51460
13B0  0A67           2148          AAR   R6,R7             R6 = RUNNING CELL                       MOS51470
13B2  6110 0B56      2149          AHM   R1,ERRNO          ERRNO = C'11'                           MOS51480
13B6  083A           2150          LDAR  R3,R10            LOAD O.D.P. AT RUNNING CELL LOC         MOS51490
13B8  C36D 0000      2151          TAI   R6,0(R13)                                                 MOS51500
13BC  2332           2152          BZS   T6S9                                                      MOS51510
13BE  083B           2153          LDAR  R3,R11                                                    MOS51520
13C0  4846 8000      2154  T6S9    LH    R4,X'8000'(R6)    GET RUNNING CELL DATA                   MOS51530
13C4  0543           2155          CLAR  R4,R3             RC DATA = BACKGROUND DATA ?             MOS51540
13C6  4230 13F0      2156          BNE   T6ER11            NO, BRANCH - OTHERWISE                  MOS51550
13CA  4036 8000      2157  T6S10   STH   R3,X'8000'(R6)    STORE O.D.P. AT RUNNING CELL LOC        MOS51560
                     2158  *                                                                       MOS51570
13CE  0867           2159  INCRRC  LDAR  R6,R7             R6 = RUNNING CELL                       MOS51580
13D0  0469           2160          NAR   R6,R9                                                     MOS51590
13D2  0569           2161          CLAR  R6,R9             RUNNING CELL = TOP OF COLUMN ?          MOS51600
13D4  4330 1400      2162          BE    INCRTC            YES, INCREMENT THE TEST CELL            MOS51610
13D8  0A72           2163          AAR   R7,R2             NO, INCREMENT RUNNING CELL (+X'102')    MOS51620
13DA  047C           2164          NAR   R7,R12            STAY WITHIN CHIP (SECOND 16KB)          MOS51630
13DC  4300 1380      2165          B     T6S6              CONTINUE TESTING                        MOS51640
                     2166  *                                                                       MOS51650
13E0  CA60 8000      2167  T6ER10  AAI   R6,X'8000'                                                MOS51660
13E4  41F0 1C74      2168          BAL   LINK,ERROR        PRINT ERROR TT10                        MOS51670
13E8  CB60 8000      2169          SAI   R6,X'8000'                                                MOS51680
13EC  4300 13AA      2170          B     T6S8              RETURN                                  MOS51690
                     2171  *                                                                       MOS51700
13F0  CA60 8000      2172  T6ER11  AAI   R6,X'8000'                                                MOS51710
13F4  41F0 1C74      2173          BAL   LINK,ERROR        PRINT ERROR TT11                        MOS51720
13F8  CB60 8000      2174          SAI   R6,X'8000'                                                MOS51730
13FC  4300 13CA      2175          B     T6S10             RETURN                                  MOS51740
                     2176  *                                                                       MOS51750
1400  0865           2177  INCRTC  LDAR  R6,R5             R5 = BIAS                               MOS51760
1402  0668           2178          OAR   R6,R8             R6 = TEST CELL                          MOS51770
1404  083A           2179          LDAR  R3,R10            GET APPROPRIATE BACKGROUND PATTERN      MOS51780
1406  C36D 0000      2180          TAI   R6,0(R13)                                                 MOS51790
140A  2332           2181          BZS   INCRTC1                                                   MOS51800
140C  083B           2182          LDAR  R3,R11                                                    MOS51810
140E  4036 8000      2183  INCRTC1 STH   R3,X'8000'(R6)    RESTORE TEST CELL TO BACKGROUND PATRN   MOS51820
1412  0469           2184          NAR   R6,R9                                                     MOS51830
1414  0569           2185          CLAR  R6,R9             TEST CELL = TOP OF COLUMN ?             MOS51840
1416  2335           2186          BES   INCRX0            YES, INCREMENT X0                       MOS51850
1418  0A82           2187          AAR   R8,R2             NO, INCREMENT TEST, CELL (+X'102')      MOS51860
```

TEST 6

```
141A  048C            2188          NAR   R8,R12            STAY WITHIN CHIP (SECOND 16KB)        MOS51870
141C  43C0 137E       2189          B     T6S5              CONTINUE TEST                         MOS51880
                      2190  *                                                                     MOS51890
1420  41E0 08C2       2191  INCRX0  BAL   LINK,TSTBRKX       IF "BREAK" GO TO TSTEND ELSE RETURN   MOS51900
                      2192  *                                                                     MOS51910
1424  D000 1EE0       2193  CKBG60  STM   R0,MOSSAVE+32      SAVE REGISTERS                        MOS51920
1428  0865            2194          LDAR  R6,R5               ESTABLISH LO OF 16K CHIP              MOS51930
142A  C880 7FFE       2195          LDAI  R8,X'7FFE'          ESTABLISH HI OF 16K CHIP              MOS51940
142E  2472            2196  CKBG66  LIS   R7,2                LOAD INCREMENT VALUE                  MOS51950
1430  C840 3045       2197          LDAI  R4,C'0E'                                                  MOS51960
1434  4040 0856       2198          STH   R4,ERRNO            ERRNO = C'0E'                         MOS51970
                      2199  *                                                                     MOS51980
1438  063A            2200  CKBG61  LDAR  R3,R10              GET APPROPRIATE BACKGROUND PATTERN    MOS51990
143A  C36D 0000       2201          TAI   R6,0(R13)                                                 MOS52000
143E  2332            2202          BZS   CKBG62                                                    MOS52010
1440  063B            2203          LDAR  R3,R11                                                    MOS52020
1442  4846 8000       2204  CKBG62  LH    R4,X'8000'(R6)      LOAD BACKGROUND PATTERN               MOS52030
1446  0543            2205          CLAR  R4,R3               DATA EQUAL ?                          MOS52040
1448  2134            2206          BNES  CKBG64              NO, BRANCH                            MOS52050
144A  C160 1438       2207  CKBG63  BXLE  R6,CKBG61           CONTINUE UNTIL DONE                   MOS52060
144E  23C8            2208          BS    CKBG65                                                    MOS52070
                      2209  *                                                                     MOS52080
1450  CA60 8000       2210  CKBG64  AAI   R6,X'8000'                                               MOS52090
1454  41F0 1C74       2211          BAL   LINK,ERROR                                                MOS52100
1458  CB60 8000       2212          SAI   R6,X'8000'                                               MOS52110
145C  2209            2213          BS    CKBG63                                                    MOS52120
                      2214  *                                                                     MOS52130
145E  D100 1EE0       2215  CKBG65  LM    R0,MOSSAVE+32       RESTORE REGISTERS                     MOS52140
1462  CA00 0100       2216          AAI   R0,X'100'           INCREMENT X0                          MOS52150
1466  9480            2217          EXBR  R8,R0                                                     MOS52160
1468  C680 0080       2218          CAI   R8,X'0080'          FORCE CORRECT ADDRESS                 MOS52170
146C  2471            2219          LIS   R7,1                                                      MOS52180
146E  9878            2220          WHR   R7,R8               DISPLAY ADDRESS UNDER TEST            MOS52190
1470  C500 8000       2221          CLAI  R0,X'8000'          IS THIS THE LAST DIAGONAL ?           MOS52200
1474  4280 137C       2222          BL    T6S4                NO, BRANCH                            MOS52210
                      2223  *                                                                     MOS52220
1478  030E            2224  INCRBIAS BR   R14                 YES, RETURN                           MOS52230
                      2225  *                                                                     MOS52240
                      2226  * ***************************************************************     MOS52250
                      2227  *       END   TEST 6                                                  MOS52260
```

TEST 7

```
                        2229  *       TEST 7                    MEMORY HOLD TEST                          MOS52280
                        2230  *                                                                           MOS52290
                        2231  *       PURPOSE                                                           MOS52300
                        2232  *            THIS TEST CHECKS THE ABILITY OF THE MOS MEMORY REFRESH        MOS52310
                        2233  *            CIRCUIT TO OPERATE IN THE EVENT OF A POWER FAILURE.           MOS52320
                        2234  *                                                                           MOS52330
                        2235  *       ASSUMPTIONS:                                                      MOS52340
                        2236  *            MINIMUM 64KB MOS MEMORY & BATTERY BACK-UP POWER SUPPLY.*      MOS52350
                        2237  *                                                                           MOS52360
                        2238  *       DESIGN SPECIFICATIONS:                                            MOS52370
                        2239  *            1. A BACKGROUND PATTERN IS WRITTEN TO ALL MEMORY.             MOS52380
                        2240  *            2. POWER IS REMOVED FOR 30 SECONDS(MINIMUM).                 MOS52390
                        2241  *            3. UPON RESTART, THE PROGRAM READS MEMORY 8 TIMES             MOS52400
                        2242  *               CHECKING FOR ERRORS.                                      MOS52410
                        2243  *                                                                           MOS52420
                        2244  *       OPTIONS                                                           MOS52430
                        2245  *            LOPHYS - LOW PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST       MOS52440
                        2246  *            HIPHYS - HIGH PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST      MOS52450
                        2247  *                (FAILING PHYSICAL SEGMENT = MSB OF TASK PSW)              MOS52460
                        2248  *            SCOPE - ERROR OPTION MODE                                    MOS52470
                        2249  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST               MOS52480
                        2250  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST       MOS52490
                        2251  *                2 - PRINT ERROR DATA AND CONTINUE TEST                   MOS52500
                        2252  *                3 - PRINT ERROR DATA AND HALT                            MOS52510
                        2253  *                4 - IGNORE ERROR                                         MOS52520
                        2254  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST           MOS52530
                        2255  *                                                                           MOS52540
                        2256  *       HOW TO RUN THE TEST:                                              MOS52550
                        2257  *            1. ENTER THE "SCOPE", "LOPHYS", & "HIPHYS" OPTIONS VIA       MOS52560
                        2258  *               THE CONSOLE DEVICE.                                       MOS52570
                        2259  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                     MOS52580

147A  41F0 0D0E         2261  TEST7   BAL   LINK,LOSET          ESTABLISH LOWEST PHYSICAL SEGMENT         MOS52600
                        2262  *                                                                           MOS52610
147E  4860 0C32         2263  TEST7A  LH    R6,LOLIM+6          INITIALIZE MEMORY LIMITS                  MOS52620
1482  4880 0C3E         2264          LH    R8,HILIM+6                                                    MOS52630
1486  C460 7FFE         2265          NAI   R6,X'7FFE'                                                    MOS52640
148A  C480 7FFF         2266          NAI   R8,X'7FFF'                                                    MOS52650
148E  2788              2267          SIS   R8,8                                                          MOS52660
1490  2478              2268          LIS   R7,8                                                          MOS52670
1492  2411              2269          LIS   R1,1                LOAD DISPLAY ADDRESS                      MOS52680
1494  24A0              2270          LIS   R10,0               LOAD 4 DATA PATTERNS                      MOS52690
1496  25B1              2271          LCS   R11,1                                                         MOS52700
1498  C8C0 AAAA         2272          LDAI  R12,X'AAAA'                                                   MOS52710
149C  C8D0 5555         2273          LDAI  R13,X'5555'                                                   MOS52720
                        2274  *                                                                           MOS52730
14A0  40A6 8000         2275  T7S1    STH   R10,X'8000'(R6)                                               MOS52740
14A4  40B6 8002         2276          STH   R11,X'8002'(R6)                                               MOS52750
14A8  40C6 8004         2277          STH   R12,X'8004'(R6)                                               MOS52760
14AC  40D6 8006         2278          STH   R13,X'8006'(R6)     STORE DATA PATTERNS                       MOS52770
14B0  C160 14A0         2279          BXLE  R6,T7S1             FROM LOLIM TO HILIM                       MOS52780
```

TEST 7

```
14B4  41F0 15FE          2280          BAL   LINK,ENDCHK1       IF END, BRANCH TO *+4                MOS52790
14B8  4300 147E          2281          B     TEST7A             ELSE BRANCH TO CONTINUE TEST         MOS52800
14BC  C850 1506          2282          LDAI  R5,T7MM1                                                MOS52810
14C0  4050 003E          2283          STH   R5,X'3E'           SET VECTOR FOR MM ON POWER DOWN      MOS52820
14C4  C850 1F20          2284          LDAI  R5,MMSAVE                                               MOS52830
14C8  4050 0022          2285          STH   R5,X'22'           SET T7 MM REG. SAVE POINTER          MOS52840
14CC  9555               2286          EPSR  R5,R5                                                   MOS52850
14CE  C450 FFF0          2287          NAI   R5,X'FFF0'         MASK OFF CC TO ZERO                  MOS52860
14D2  4050 003C          2288          STH   R5,X'3C'                                                MOS52870
                         2289  *                                                                     MOS52880
                         2290  *                                                                     MOS52890
14D6  C850 1E6A          2291  T7OUTMSG LDAI  R5,T7MSG          UNCONDITIONALLY PRINT:               MOS52900
14DA  4050 0B0C          2292          STH   R5,ISITERR                                              MOS52910
14DE  41F0 0756          2293          BAL   LINK,PRINT         "POWER DOWN PROC. FOR 30 SECONDS"    MOS52920
14E2  2450               2294          LIS   R5,0                                                    MOS52930
14E4  4050 0B0C          2295          STH   R5,ISITERR                                              MOS52940
14E8  25F1               2296          LCS   R14,1              ESTABLISH WAIT COUNTERS              MOS52950
14EA  C820 0080          2297  T7S2    LDAI  R2,128                                                  MOS52960
                         2298  *                                                                     MOS52970
14EE  2721               2299  T7S3    SIS   R2,1                                                    MOS52980
14F0  2031               2300          BNZS  T7S3               WAIT 256* SF INSTRUCTION TIMES       MOS52990
14F2  C8F0 15F5          2301          LDAI  LINK,T7END                                              MOS53000
14F6  40F0 0B0A          2302          STH   LINK,BRKVECT                                            MOS53010
14FA  41F0 08D4          2303          BAL   LINK,TSTBRK        IF "BREAK" GO TO T7END ELSE RETURN   MOS53020
14FE  27E1               2304          SIS   R14,1                                                   MOS53030
1500  203B               2305          BNZS  T7S2               WAIT 30 SECONDS FOR MM               MOS53040
1502  4300 14D6          2306          B     T7OUTMSG           ON POWER DOWN                        MOS53050
                         2307  *                                                                     MOS53060
                         2308  * ************************************************************************ MOS53070
                         2309  *                                                                     MOS53080
1506  C8E0 151C          2310  T7MM1   LDAI  R14,T7MM2          SET VECTOR FOR MM                    MOS53090
150A  40E0 003E          2311          STH   R14,X'3E'          ON POWER UP                          MOS53100
150E  95EE               2312          EPSR  R14,R14                                                 MOS53110
1510  C6E0 8000          2313          OAI   R14,X'8000'        SET THE WAIT BIT                     MOS53120
1514  C4E0 FFF0          2314          NAI   R14,X'FFF0'        MASK OFF CC TO ZERO                  MOS53130
1518  95FE               2315          EPSR  R15,R14            WAIT FOR MM  (PSW = X'80F0')         MOS53140
151A  220A               2316          BS    T7MM1              BRANCH ON RUN W/O SECOND MM          MOS53150
                         2317  *                                                                     MOS53160
                         2318  * ************************************************************************ MOS53170
                         2319  *                                                                     MOS53180
151C  D3E0 0110          2320  T7MM2   LB    R14,IO             GET CONSOLE DEVICE POINTER           MOS53190
1520  27F5               2321          SIS   R14,5              IS CONSOLE ON MICRO-IC BUS ?         MOS53200
1522  2334               2322          BZS   T7MM2A             YES, BRANCH                          MOS53210
1524  48E0 0AE6          2323          LH    R14,PASFLG         NO, IS CONSOLE ON PASLA ?            MOS53220
1528  233C               2324          BZS   T7MM3              NO, BRANCH                           MOS53230
152A  48E0 0110          2325  T7MM2A  LH    R14,IO             YES, GET CONSOLE DEVICE POINTER      MOS53240
152E  0AEE               2326          AAR   R14,R14            SET INDEX                            MOS53250
1530  D34E 0110          2327          LB    R4,IO(R14)         GET CONSOLE ADDRESS                  MOS53260
1534  DE4E 0AF8          2328          OC    R4,CON2ND(R14)     ISSUE CONSOLE SPEED COMMAND          MOS53270
1538  DE40 0AEC          2329          OC    R4,CONRD           ISSUE CONSOLE READ COMMAND           MOS53280
153C  DF40 0AE4          2330          RD    R4,SINK            DUMMY READ TO SET BUSY               MOS53290
                         2331  *                                                                     MOS53300
1540  D3E0 0111          2332  T7MM3   LB    R14,IO+1           GET LIST DEVICE POINTER              MOS53310
```

TEST 7

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1544  27E5           2333           SIS   R14,5              IS CONSOLE ON MICRO-IO BUS ?          MOS53320
1546  2334           2334           BZS   T7MM3A             YES, BRANCH                           MOS53330
1548  48E0 0AE8      2335           LH    R14,PASFLG2        NO, IS LIST DEVICE ON PASLA ?         MOS53340
154C  233E           2336           BZS   T7MMCOM            NO, BRANCH                            MOS53350
154E  D3E0 0111      2337  T7MM3A   LB    R14,IO+1           GET LIST DEVICE POINTER               MOS53360
1552  D340 0110      2338           LB    R4,IC              GET CONSOLE POINTER                   MOS53370
1556  05E4           2339           CLAR  R14,R4             CONSOLE = LIST DEVICE ?               MOS53380
1558  2339           2340           BES   T7MMCOM            YES, BRANCH                           MOS53390
155A  0AEE           2341           AAR   R14,R14            NO, SET INDEX                         MOS53400
155C  D34E 0111      2342           LB    R4,IC+1(R14)       GET LIST DEVICE ADDRESS               MOS53410
1560  DE4E 0AF8      2343           OC    R4,LST2ND(R14)     ISSUE LIST SPEED COMMAND              MOS53420
1564  DE4E 0AED      2344           OC    R4,LSTWRT(R14)     ISSUE LIST WRITE COMMAND              MOS53430
                     2345  *                                                                       MOS53440
1568  48E0 0108      2346  T7MMCOM  LH    R14,PSW2                                                 MOS53450
156C  950E           2347           EPSR  R0,R14             PSW = X'30F0'                         MOS53460
156E  41F0 0D0E      2348           BAL   LINK,LOSET         ESTABLISH LOWEST PHYSICAL SEGMENT     MOS53470
1572  C840 0A3E      2349  T7MM4    LDAI  R4,MM0                                                   MOS53480
1576  4040 003E      2350           STH   R4,X'3E'           SET NEW MM POINTER                    MOS53490
157A  C840 1F40      2351           LDAI  R4,RSAVE                                                 MOS53500
157E  4040 0022      2352           STH   R4,X'22'           RESTORE ETPE MM POINTER               MOS53510
1582  24E8           2353           LIS   R14,8              LOAD MEMORY CHECK COUNTER              MOS53520
1584  C840 3230      2354           LDAI  R4,C'20'                                                 MOS53530
1588  4040 0B56      2355           STH   R4,ERRNO           ERRNO = C'20'                         MOS53540
158C  2472           2356           LIS   R7,2                                                     MOS53550
                     2357  *                                                                       MOS53560
158E  4860 0C32      2358  T7S4     LH    R6,LOLIM+6                                               MOS53570
1592  C460 7FFE      2359           NAI   R6,X'7FFE'                                               MOS53580
1596  6110 0B56      2360           AHM   R1,ERRNO           INCREMENT ERRNO (21-28)               MOS53590
                     2361  *                                                                       MOS53600
159A  083A           2362  T7S5     LDAR  R3,R10             GET FIRST DATA PATTERN                MOS53610
159C  4846 8000      2363           LH    R4,X'8000'(R6)     LOAD DATA FROM LOC                    MOS53620
15A0  0543           2364           CLAR  R4,R3              DATA EQUAL ?                          MOS53630
15A2  2333           2365           BES   T7S6               YES, BRANCH                           MOS53640
15A4  41F0 1C74      2366           BAL   LINK,ERROR         NO, ERROR                             MOS53650
15A8  083B           2367  T7S6     LDAR  R3,R11             GET SECOND DATA PATTERN               MOS53660
15AA  2662           2368           AIS   R6,2               INCREMENT LOC COUNTER                 MOS53670
15AC  4846 8000      2369           LH    R4,X'8000'(R6)     LOAD DATA FROM LOC                    MOS53680
15B0  0543           2370           CLAR  R4,R3              DATA EQUAL ?                          MOS53690
15B2  2333           2371           BES   T7S7               YES, BRANCH                           MOS53700
15B4  41F0 1C74      2372           BAL   LINK,ERROR         NO, ERROR                             MOS53710
15B8  083C           2373  T7S7     LDAR  R3,R12             GET THIRD DATA PATTERN                MOS53720
15BA  2662           2374           AIS   R6,2               INCREMENT LOC COUNTER                 MOS53730
15BC  4846 8000      2375           LH    R4,X'8000'(R6)     LOAD DATA FROM LOC                    MOS53740
15C0  0543           2376           CLAR  R4,R3              DATA EQUAL ?                          MOS53750
15C2  2333           2377           BES   T7S8               YES, BRANCH                           MOS53760
15C4  41F0 1C74      2378           BAL   LINK,ERROR         NO, ERROR                             MOS53770
15C8  083D           2379  T7S8     LDAR  R3,R13             GET FOURTH DATA PATTERN               MOS53780
15CA  2662           2380           AIS   R6,2               INCREMENT LOC COUNTER                 MOS53790
15CC  4846 8000      2381           LH    R4,X'8000'(R6)     LOAD DATA FROM LOC                    MOS53800
15D0  0543           2382           CLAR  R4,R3              DATA EQUAL ?                          MOS53810
15D2  2333           2383           BES   T7S9               YES, BRANCH                           MOS53820
15D4  41F0 1C74      2384           BAL   LINK,ERROR         NO, ERROR                             MOS53830
15D8  C160 159A      2385  T7S9     BXLE  R6,T7S5            CHECK LOLIM TO HILIM                  MOS53840
```

TEST 7

```
15DC   C8F0 15F6          2386           LDAI   LINK,T7END                                                    MOS53850
15E0   40F0 0B0A          2387           STH    LINK,BRKVECT                                                  MOS53860
15E4   41F0 08D4          2388           BAL    LINK,TSTBRK          IF "BREAK" GO TO T7END ELSE RETURN       MOS53870
15E8   27E1               2389           SIS    R14,1                CHECKED MEMORY 8 TIMES ?                 MOS53880
15EA   4230 158E          2390           BNZ    T7S4                 NO, REPEATE                              MOS53890
15EE   41F0 15FE          2391           BAL    LINK,ENDCHK1         IF END, BRANCH *+4                       MOS53900
15F2   4300 1572          2392           B      T7MM4                ELSE BRANCH TO CONTINUE TEST             MOS53910
15F6   41F0 09D0          2393  T7END    BAL    LINK,LCORE           RE-ESTABLISH LOW CORE                    MOS53920
15FA   4300 04A8          2394           B      TSTEND               END OF TEST(RETURN TO EXEC)              MOS53930
                          2395  *                                                                            MOS53940
                          2396  * ************************************************************************   MOS53950
                          2397  *                                                                            MOS53960
15FE   9511               2398  ENDCHK1  EPSR   R1,R1                GRAB PRESENT PSW                         MOS53970
1600   4820 0C1A          2399           LH     R2,HIPHYS+6          GET HIGHEST PHYSICAL SEGMENT NUMBER      MOS53980
1604   C420 0007          2400           NAI    R2,7                 MASK IT                                  MOS53990
1608   0831               2401           LDAR   R3,R1                                                         MOS54000
160A   9034               2402           SRHLS  R3,4                 SHIFT SEGMENT NUMBER TO 3 LSB'S          MOS54010
160C   C430 0007          2403           NAI    R3,7                 MASK IT                                  MOS54020
1610   0532               2404           CLAR   R3,R2                DONE ?                                   MOS54030
1612   438F 0004          2405           BNL    4(LINK)              YES, BRANCH (*+4)                        MOS54040
1616   2631               2406           AIS    R3,1                 NO, INCREMENT SEGMENT NUMBER             MOS54050
1618   9134               2407           SLHLS  R3,4                 SHIFT INTO POSITION                      MOS54060
161A   C410 FF00          2408           NAI    R1,X'FF00'           MASK OFF CURRENT PSW                     MOS54070
161E   0613               2409           OAP    R1,R3                FORCE NEW PHYSICAL SEGMENT NUMBER        MOS54080
1620   9541               2410           EPSR   R4,R1                ESTABLISH NEW SEGMENT NUMBER             MOS54090
1622   030F               2411           BR     LINK                 RETURN                                   MOS54100
                          2412  *                                                                            MOS54110
                          2413  * ************************************************************************   MOS54120
                          2414  *        END    TEST 7                                                        MOS54130
```

TEST 8

```
                        2416  *       TEST 8 (OPTIONAL TEST)    LONG COUNT RELOCATABLE                MOS54150
                        2417  *                                 HAMMER DISTURB TEST                   MOS54160
                        2418  *                                                                       MOS54170
                        2419  *       PURPOSE:                                                        MOS54180
                        2420  *            THE TEST EXERCISES THE MOS MEMORY IN AN ENVIRONMENT       MOS54190
                        2421  *            SIMILAR TO THAT OF AN OPERATING SYSTEM.                   MOS54200
                        2422  *                                                                       MOS54210
                        2423  *       ASSUMPTIONS:                                                    MOS54220
                        2424  *            MINIMUM 64KB MOS MEMORY                                  MOS54230
                        2425  *                                                                       MOS54240
                        2426  *       DESIGN SPECIFICATIONS:                                          MOS54250
                        2427  *            THIS IS AN "OVERNIGHT" (VERY LONG) TEST DESIGNED TO      MOS54260
                        2428  *            POINT OUT POSSIBLE "SOFT" FAILURE LOCATIONS IN MOS       MOS54270
                        2429  *            MEMORY.      (SIMILAR TO TEST 5)                         MOS54280
                        2430  *                                                                       MOS54290
                        2431  *       OPTIONS:                                                        MOS54300
                        2432  *            LOPHYS - LOW PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST   MOS54310
                        2433  *            HIPHYS - HIGH PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST  MOS54320
                        2434  *                (FAILING PHYSICAL SEGMENT = MSB OF TASK PSW)          MOS54330
                        2435  *            DATA  - 16-BIT BACKGROUND DATA PATTERN                   MOS54340
                        2436  *            SCOPE - ERROR OPTION MODE                                MOS54350
                        2437  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST           MOS54360
                        2438  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST   MOS54370
                        2439  *                2 - PRINT ERROR DATA AND CONTINUE TEST               MOS54380
                        2440  *                3 - PRINT ERROR DATA AND HALT                        MOS54390
                        2441  *                4 - IGNORE ERROR                                     MOS54400
                        2442  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST       MOS54410
                        2443  *                                                                       MOS54420
                        2444  *       HOW TO RUN THE TEST:                                            MOS54430
                        2445  *            1. ENTER THE "SCOPE", "LOPHYS", "HIPHYS", & "DATA"       MOS54440
                        2446  *               OPTIONS VIA THE CONSOLE DEVICE.                       MOS54450
                        2447  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                 MOS54460

1624  41F0 0D0E         2449  TEST8   BAL   LINK,LOSET          ESTABLISH LOWEST PHYSICAL SEGMENT     MOS54480
                        2450  *                                                                       MOS54490
1628  4860 0C32         2451  TEST8A  LH    R6,LOLIM+6          INITIALIZE MEMORY LIMITS              MOS54500
162C  4880 0C3E         2452          LH    R8,HILIM+6                                                MOS54510
1630  C460 7FFE         2453          NAI   R6,X'7FFE'                                                MOS54520
1634  C480 7FFF         2454          NAI   R8,X'7FFF'                                                MOS54530
1638  08A6              2455          LDAR  R10,R6                                                    MOS54540
163A  08B8              2456          LDAR  R11,R8                                                    MOS54550
163C  0878              2457          LDAR  R7,R8                                                     MOS54560
163E  0B76              2458          SAR   R7,R6                                                     MOS54570
1640  C570 0070         2459          CLAI  R7,ENDMOV8-MOVPRG+4 IS HILIM - LOLIM LARGE ENOUGH ?       MOS54580
1644  4280 1756         2460          BL    T8LOPRT             IF NOT, BRANCH AND PRINT ERROR        MOS54590
1648  2411              2461          LIS   R1,1                LOAD DISPLAY ADDRESS                  MOS54600
164A  4850 0BF6         2462          LH    R5,DATA+6           LOAD BACKGROUND DATA PATTERN          MOS54610
164E  2472              2463          LIS   R7,2                                                      MOS54620
                        2464  *                                                                       MOS54630
1650  4056 8000         2465  T8SW    STH   R5,X'8000'(R6)      STORE BACKGROUND DATA PATTERN         MOS54640
1654  C160 1650         2466          BXLE  R6,T8SW             FROM LOLIM TO HILIM                   MOS54650
```

TEST 8

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1658  4860 0C32          2467          LH    R6,LOLIM+6                                          MOS54660
165C  C460 7FFE          2468          NAI   R6,X'7FFE'                                          MOS54670
                         2469  *                                                                 MOS54680
1660  D000 1EE0          2470          STM   R0,MOSSAVE+32       SAVE REGISTERS (0-F)            MOS54690
1664  0816               2471          LDAR  R1,R6                                               MOS54700
1666  D120 16EA          2472          LM    R2,MOVPRG           MOVE SUB INTO TEST AREA         MOS54710
166A  D021 7F92          2473          STM   R2,X'8000'+MOVPRG-ENDMOV8-2(R1)                     MOS54720
166E  D120 1706          2474          LM    R2,MOVPRG+28                                        MOS54730
1672  D021 7FAE          2475          STM   R2,X'8000'+MOVPRG-ENDMOV8+26(R1)                    MOS54740
1676  D120 1722          2476          LM    R2,MOVPRG+56                                        MOS54750
167A  D021 7FCA          2477          STM   R2,X'8000'+MOVPRG-ENDMOV8+54(R1)                    MOS54760
167E  D140 173E          2478          LM    R4,MOVPRG+84                                        MOS54770
1682  D041 7FE6          2479          STM   R4,X'8000'+MOVPRG-ENDMOV8+82(R1)                    MOS54780
1686  D100 1EE0          2480          LM    R0,MOSSAVE+32       RESTOTE REGISTERS (0-F)         MOS54790
168A  C840 0A3E          2481          LDAI  R4,MMO                                              MOS54800
168E  4040 003E          2482          STH   R4,X'3E'            SET NEW MM POINTER              MOS54810
                         2483  *                                                                 MOS54820
1692  41F0 08C2          2484  T8SX    BAL   LINK,TSTBRKX        IF "BREAK" GO TO "OPTIN" ELSE RETURN MOS54830
1696  C840 3044          2485          LDAI  R4,C'0D'                                            MOS54840
169A  4040 0B56          2486          STH   R4,ERRNO            ERRNO = C'0D'                   MOS54850
169E  41E6 7F94          2487          BAL   R14,X'8000'+MOVPRG-ENDMOV8(R6) * BRANCH TO "MOVPRG" MOS54860
                         2488  *                                                                 MOS54870
16A2  D000 1EE0          2489          STM   R0,MOSSAVE+32       SAVE REGISTERS (0-F)            MOS54880
16A6  0816               2490          LDAR  R1,R6                                               MOS54890
16A8  D121 7FE2          2491          LM    R2,X'8000'-30(R1)   RELOCATE SUB IN MEMORY          MOS54900
16AC  D021 7FE4          2492          STM   R2,X'8000'-28(R1)                                   MOS54910
16B0  D121 7FC6          2493          LM    R2,X'8000'-58(R1)                                   MOS54920
16B4  D021 7FC8          2494          STM   R2,X'8000'-56(R1)                                   MOS54930
16B8  D121 7FAA          2495          LM    R2,X'8000'-86(R1)                                   MOS54940
16BC  D021 7FAC          2496          STM   R2,X'8000'-84(R1)                                   MOS54950
16C0  D141 7F90          2497          LM    R4,X'8000'-112(R1)                                  MOS54960
16C4  D041 7F92          2498          STM   R4,X'8000'-110(R1)                                  MOS54970
16C8  9461               2499          EXBR  R6,R1                                               MOS54980
16CA  C660 0080          2500          OAI   R6,X'0080'                                          MOS54990
16CE  2441               2501          LIS   R4,1                                                MOS55000
16D0  9846               2502          WHR   R4,R6               DISPLAY ADDRESS UNDER TEST      MOS55010
16D2  D100 1EE0          2503          LM    R0,MOSSAVE+32       RESTORE REGISTERS (0-F)         MOS55020
                         2504  *                                                                 MOS55030
16D6  40E6 7F92          2505          STH   R5,X'8000'+MOVPRG-ENDMOV8-2(R6) * FIX LAST LOC BKGRD PAT MOS55040
16DA  088B               2506          LDAR  R8,R11                                              MOS55050
16DC  0568               2507          CLAR  R6,R8               DONE ?                          MOS55060
16DE  4280 1692          2508          BL    T8SX                NO, BRANCH                      MOS55070
16E2  41F0 0D36          2509          BAL   LINK,ENDCHK         IF END OF TEST, RETURN TO EXEC  MOS55080
16E6  4300 1628          2510          B     TEST8A              ELSE BRANCH TO CONTINUE TEST    MOS55090
                         2511  *                                                                 MOS55100
                         2512  * ***************************************************************** MOS55110
                         2513  *                                                                 MOS55120
16EA  2430               2514  MOVPRG  LIS   R3,0                INITIALIZE DATA PATTERN         MOS55130
16EC  9D14               2515          SSR   R1,R4               EXERCISE BIT NO.3 IN INSTR. STREAM MOS55140
                         2516  *                                                                 MOS55150
16EE  4036 8000          2517  MOVPRG1 STH   R3,X'8000'(R6)      STORE PATTERN AT TEST LOC       MOS55160
16F2  4846 8000          2518          LH    R4,X'8000'(R6)      LOAD FROM LOC                   MOS55170
16F6  0543               2519          CLAR  R4,R3               EQUAL ?                         MOS55180
```

TEST 8

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16F8  2134           2520          BNES  MOVPRG2F          NO, BRANCH                                    MOS55190
16FA  2731           2521  MOVPRG2 SIS   R3,1              DECREMENT DATA PATTERN                        MOS55200
16FC  2037           2522          BNZS  MOVPRG1           REPEATE TILL DONE                             MOS55210
16FE  2304           2523          BS    MOVPRG26          BRANCH                                        MOS55220
                     2524  *                                                                             MOS55230
1700  41F0 1C74      2525  MOVPRG2F BAL  LINK,ERROR        ERROR ROUTINE                                 MOS55240
1704  2205           2526          BS    MOVPRG2           RETURN                                        MOS55250
                     2527  *                                                                             MOS55260
1706  0886           2528  MOVPRG26 LDAR R8,R6                                                         MOS55270
1708  08C6           2529          LDAR  R12,R6            SAVE TEST LOCATION COUNTER                    MOS55280
170A  CB80 006E      2530          SAI   R8,ENDMOV8-MOVPRG+2                                           MOS55290
170E  0835           2531          LDAR  R3,R5             GET BACKGROUND DATA PATTERN                   MOS55300
1710  6110 0B56      2532          AHM   R1,ERRNO          ERRNO = C'0E'                                 MOS55310
1714  086A           2533          LDAR  R6,R10                                                        MOS55320
1716  0568           2534          CLAR  R6,R8             TST BG LOC = TEST LOCATION ?                  MOS55330
1718  238B           2535          BNLS  MOVPRG5           YES, BRANCH                                   MOS55340
171A  4846 8000      2536  MOVPRG3 LH    R4,X'8000'(R6)                                                MOS55350
171E  0543           2537          CLAR  R4,R3             IS LOW BACKGROUND PATTERN OK ?                MOS55360
1720  2134           2538          BNES  MOVPRG4F          NO, BRANCH                                    MOS55370
1722  C16C 7FC2      2539  MOVPRG4 BXLE  R6,X'8000'+MOVPRG3-ENDMOV8-2(R12) DO TIL DONE LOW BG TST      MOS55380
1726  2304           2540          BS    MOVPRG5           CONTINUE                                      MOS55390
                     2541  *                                                                             MOS55400
1728  41F0 1C74      2542  MOVPRG4F BAL  LINK,ERROR        ERROR ROUTINE                                 MOS55410
172C  2205           2543          BS    MOVPRG4           RETURN                                        MOS55420
                     2544  *                                                                             MOS55430
172E  C86C 0002      2545  MOVPRG5 LDAI  R6,2(R12)         INCREMENT LOC COUNTER                         MOS55440
1732  088B           2546          LDAR  R8,R11                                                        MOS55450
1734  0568           2547  MOVPRG6 CLAR  R6,R8             LOC > HILIM ?                                 MOS55460
1736  238A           2548          BNLS  MOVPRG8           YES, DONE                                     MOS55470
1738  4846 8000      2549          LH    R4,X'8000'(R6)                                                MOS55480
173C  0543           2550          CLAR  R4,R3             NO, IS HI BACKGROUND PATTERN OK ?             MOS55490
173E  2133           2551          BNES  MOVPRG7F          NO, BRANCH                                    MOS55500
1740  2662           2552  MOVPRG7 AIS   R6,2              INCREMENT HI LOC                              MOS55510
1742  2207           2553          BS    MOVPRG6           CONTINUE (BRANCH)                             MOS55520
                     2554  *                                                                             MOS55530
1744  41F0 1C74      2555  MOVPRG7F BAL  LINK,ERROR        ERROR ROUTINE                                 MOS55540
1748  2204           2556          BS    MOVPRG7           RETURN                                        MOS55550
                     2557  *                                                                             MOS55560
174A  C8EC 0002      2558  MOVPRG8 LDAI  R6,2(R12)         INDEX THE TEST LOCATION BY TWO                MOS55570
174E  0568           2559          CLAR  R6,R8             DONE ?                                        MOS55580
1750  028E           2560          BLR   R14                                                           MOS55590
1752  4300 04A8      2561          B     TSTEND            (RETURN TO EXEC)                              MOS55600
      0000 1756      2562  ENDMOV8 EQU   *                 (R6)                                          MOS55610
                     2563  *                                                                             MOS55620
                     2564  * ***************************************************************************** MOS55630
1756  C850 1E90      2565  T8LOPRT LDAI  R5,T8LOMSG        UNCONDITIONALLY PRINT ERROR MESSAGE           MOS55640
175A  4050 0B0C      2566          STH   R5,ISITERR                                                    MOS55650
175E  41F0 0756      2567          BAL   LINK,PRINT        "HILIM - LOLIM IS < REQUIRED"                 MOS55660
1762  4300 01BE      2568          B     OPTIN             ABORT TESTING SEQUENCE                        MOS55670
                     2569  * ***************************************************************************** MOS55680
                     2570  *       END   TEST 8                                                          MOS55690
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TEST 9 ECC DISTURB TEST

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                        2572  *       TEST 9-1                MARCHING PATTERN TEST                   MOS55710
                        2573  *                                                                       MOS55720
                        2574  *       PURPOSE:                                                        MOS55730
                        2575  *            THIS TEST CHECKS THAT THREE DIFFERENT BASE PATTERNS         MOS55740
                        2576  *            CAN BE WRITTEN, COMPLEMENTED, AND MARCHED THROUGH THE      MOS55750
                        2577  *            AVAILABLE MEMORY WITHOUT ERROR.                            MOS55760
                        2578  *                                                                       MOS55770
                        2579  *       ASSUMPTIONS:                                                    MOS55780
                        2580  *            MINIMUM 64KB MOS MEMORY                                    MOS55790
                        2581  *                                                                       MOS55800
                        2582  *       DESIGN SPECIFICATIONS:                                          MOS55810
                        2583  *            1. (IN ASCENDING ORDER) WRITE AND READ THE BASE PATTERN.    MOS55820
                        2584  *            2. (IN DESCENDING ORDER) WRITE AND READ THE                 MOS55830
                        2585  *               COMPLEMENT PATTERN.                                     MOS55840
                        2586  *                                                                       MOS55850
                        2587  *       OPTIONS:                                                        MOS55860
                        2588  *            LOPHYS - LOW PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST     MOS55870
                        2589  *            HIPHYS - HIGH PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST    MOS55880
                        2590  *                (FAILING PHYSICAL SEGMENT = MSB OF TASK PSW)           MOS55890
                        2591  *            SCOPE - ERROR OPTION MODE                                  MOS55900
                        2592  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST             MOS55910
                        2593  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST     MOS55920
                        2594  *                2 - PRINT ERROR DATA AND CONTINUE TEST                 MOS55930
                        2595  *                3 - PRINT ERROR DATA AND HALT                          MOS55940
                        2596  *                4 - IGNORE ERROR                                       MOS55950
                        2597  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST         MOS55960
                        2598  *                                                                       MOS55970
                        2599  *       HOW TO RUN THE TEST:                                            MOS55980
                        2600  *            1. ENTER THE "SCOPE", LOPHYS", & "HIPHYS" OPTIONS VIA      MOS55990
                        2601  *               THE CONSOLE DEVICE.                                     MOS56000
                        2602  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                   MOS56010

1766  41F0 0D0E         2604  TEST9   BAL   LINK,LOSET          ESTABLISH LOWEST PHYSICAL SEGMENT       MOS56030
                        2605  *                                                                       MOS56040
176A  2411              2606  TEST9A  LIS   R1,1                LOAD DISPLAY ADDRESS                    MOS56050
176C  C840 0A3E         2607          LDAI  R4,MM0                                                      MOS56060
1770  4040 003E         2608          STH   R4,X'3E'             SET NEW MM POINTER                     MOS56070
1774  24A0              2609          LIS   R10,0                                                       MOS56080
1776  C8B0 8001         2610          LDAI  R11,X'8001'                                                 MOS56090
177A  24D0              2611          LIS   R13,0                W/BACKGROUND = 0'S                     MOS56100
177C  41E0 17B0         2612          BAL   R14,KHKLOC           DO A SINGLE DISTURB TEST (MIN-MAX)     MOS56110
                        2613  *                                                                       MOS56120
1780  C8A0 8001         2614          LDAI  R10,X'8001'                                                 MOS56130
1784  24B0              2615          LIS   R11,0                W/BACKGROUND = F'S                     MOS56140
1786  41E0 17B0         2616          BAL   R14,KHKLOC           DO A SINGLE DISTURB TEST (MIN-MAX)     MOS56150
                        2617  *                                                                       MOS56160
178A  24D2              2618          LIS   R13,2                W/BACKGROUND = A'S                     MOS56170
178C  41E0 17B0         2619          BAL   R14,KHKLOC           DO A SINGLE DISTURB TEST (MIN-MAX)     MOS56180
                        2620  *                                                                       MOS56190
1790  24A0              2621          LIS   R10,0                                                       MOS56200
1792  C8B0 8001         2622          LDAI  R11,X'8001'          W/BACKGROUND = 5'S                     MOS56210
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TEST 9 ECC DISTURB TEST

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1796  41E0 17B0          2623          BAL   R14,KHKLOC          DO A SINGLE DISTURB TEST (MIN-MAX)     MOS56220
                         2624  *                                                                       MOS56230
179A  C8D0 0100          2625          LDAI  R13,X'100'          W/BACKGROUND =128-0'S,128-F'S,..       MOS56240
179E  41E0 17B0          2626          BAL   R14,KHKLOC          DO A SINGLE DISTURB TEST (MIN-MAX)     MOS56250
                         2627  *                                                                       MOS56260
17A2  C8A0 8001          2628          LDAI  R10,X'8001'                                               MOS56270
17A6  24E0               2629          LIS   R11,0               W/BACKGROUND =128-F'S,128-0'S,..      MOS56280
17A8  41E0 17B0          2630          BAL   R14,KHKLOC          DO A SINGLE DISTURB TEST (MIN-MAX)     MOS56290
                         2631  *                                                                       MOS56300
17AC  4300 1878          2632          B     TEST9B              END OF TEST (GOTO TEST 9B)             MOS56310
                         2633  *                                                                       MOS56320
                         2634  ************************************************************************ MOS56330
                         2635  *                                                                       MOS56340
17B0  4860 0C32          2636  KHKLOC  LH    R6,LOLIM+6          INITIALIZE MEMORY LIMITS               MOS56350
17B4  4880 0C3E          2637          LH    R8,HILIM+6                                                 MOS56360
17B8  C460 7FFE          2638          NAI   R6,X'7FFE'                                                 MOS56370
17BC  C480 7FFF          2639          NAI   R8,X'7FFF'                                                 MOS56380
17C0  2472               2640          LIS   R7,2                                                       MOS56390
                         2641  *                                                                       MOS56400
17C2  083A               2642  KHKLOC1 LDAR  R3,R10              STORE APPROPRIATE BACKGROUND PATTERN   MOS56410
17C4  C36D 0000          2643          TAI   R6,0(R13)                                                  MOS56420
17C8  2332               2644          BZS   KHKLOC2                                                    MOS56430
17CA  083B               2645          LDAR  R3,R11                                                     MOS56440
17CC  4036 8000          2646  KHKLOC2 STH   R3,X'8000'(R6)      IN MEMORY                              MOS56450
17D0  C160 17C2          2647          BXLE  R6,KHKLOC1          FROM LOLIM TO HILIM                    MOS56460
17D4  4860 0C32          2648          LH    R6,LOLIM+6                                                 MOS56470
17D8  C460 7FFE          2649          NAI   R6,X'7FFE'                                                 MOS56480
                         2650  *                                                                       MOS56490
17DC  C840 3033          2651  KHKLOC3 LDAI  R4,C'03'                                                   MOS56500
17E0  4040 0B56          2652          STH   R4,ERRNO            ERRNO = C'03'                          MOS56510
17E4  41F0 08C2          2653          BAL   LINK,TSTBRKX        IF "BREAK" GO TO TSTEND ELSE RETURN    MOS56520
17E8  083A               2654          LDAR  R3,R10              GET APPROPRIATE BACKGROUND PATTERN     MOS56530
17EA  C36D 0000          2655          TAI   R6,0(R13)                                                  MOS56540
17EE  2332               2656          BZS   KHKLOC4                                                    MOS56550
17F0  083B               2657          LDAR  R3,R11                                                     MOS56560
17F2  4846 8000          2658  KHKLOC4 LH    R4,X'8000'(R6)      GET DATA FROM LOC UNDER TEST           MOS56570
17F6  0543               2659          CLAR  R4,R3               EQUAL ?                                MOS56580
17F8  213E               2660          BNES  KHKLOC5F            NO, BRANCH                             MOS56590
17FA  C730 8001          2661  KHKLOC5 XAI   R3,X'8001'          COMPLEMENT DATA PATTERN                MOS56600
17FE  4036 8000          2662          STH   R3,X'8000'(R6)      STORE C.D.P. AT LOC                    MOS56610
1802  6110 0B56          2663          AHM   R1,ERRNO            ERRNO = C'04'                          MOS56620
1806  4846 8000          2664          LH    R4,X'8000'(R6)      GET DATA FROM LOC UNDER TEST           MOS56630
180A  0543               2665          CLAR  R4,R3               DATA = C.D.P. ?                        MOS56640
180C  2131               2666          BNES  KHKLOC6             NO, BRANCH                             MOS56650
180E  C160 17DC          2667  KHKLOC6 BXLE  R6,KHKLOC3          CONTINUE UNTIL DONE(INCREMENTING)      MOS56660
1812  2307               2668          BS    KHKLOC6A            BRANCH                                 MOS56670
                         2669  *---------------------------------                                       MOS56680
1814  41F0 1C74          2670  KHKLOC5F BAL  LINK,ERROR          ERROR  ROUTINE                         MOS56690
1818  220F               2671          BS    KHKLOC5             RETURN                                 MOS56700
                         2672  *                                                                       MOS56710
181A  41F0 1C74          2673  KHKLOC6F BAL  LINK,ERROR          ERROR  ROUTINE                         MOS56720
181E  2208               2674          BS    KHKLOC6             RETURN                                 MOS56730
                         2675  *---------------------------------                                       MOS56740
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TEST 9 ECC DISTURB TEST

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1820  4860 0C3E      2676 KHKLCC6A LH    R6,HILIM+6                                    MOS56750
1824  C460 7FFE      2677          NAI   R6,X'7FFE'                                    MOS56760
1828  4880 0C32      2678          LH    R8,LOLIM+6          ESTABLISH MEMORY LIMITS   MOS56770
182C  C480 7FFE      2679          NAI   R8,X'7FFE'                                    MOS56780
1830  2781           2680          SIS   R8,1                                          MOS56790
1832  2572           2681          LCS   R7,2                                          MOS56800
                     2682 *                                                            MOS56810
1834  083B           2683 KHKLOC7  LDAR  R3,R11               GET C.D.P. FOR LOC UNDER TEST MOS56820
1836  C36D 0000      2684          TAI   R6,0(R13)                                     MOS56830
183A  2332           2685          BZS   KHKLOC8                                       MOS56840
183C  083A           2686          LDAR  R3,R10                                        MOS56850
183E  C840 3035      2687 KHKLOC8  LDAI  R4,C'05'                                      MOS56860
1842  4040 0B56      2688          STH   R4,ERRNO            ERRNO = C'05'             MOS56870
1846  41F0 08C2      2689          BAL   LINK,TSTBRKX        IF "BREAK" GO TO TSTEND ELSE RETURN MOS56880
184A  4846 8000      2690          LH    R4,X'8000'(R6)      GET DATA FROM LOC UNDER TEST MOS56890
184E  0543           2691          CLAR  R4,R3               DATA = C.D.P. ?           MOS56900
1850  213E           2692          BNES  KHKLOC9F            NO, BRANCH                MOS56910
1852  C730 8001      2693 KHKLOC9  XAI   R3,X'8001'          COMPLEMENT C.D.P. (O.D.P.) MOS56920
1856  4036 8000      2694          STH   R3,X'8000'(R6)      STORE PATTERN AT LOC      MOS56930
185A  6110 0B56      2695          AHM   R1,ERRNO            ERRNO = C'06'             MOS56940
185E  4846 8000      2696          LH    R4,X'8000'(R6)      GET DATA FROM LOC UNDER TEST MOS56950
1862  0543           2697          CLAR  R4,R3               DATA = O.D.P. ?           MOS56960
1864  2137           2698          BNES  KHKLOC1F            NO, BRANCH                MOS56970
1866  C060 1834      2699 KHKLOC10 BXH   R6,KHKLOC7          CONTINUE UNTIL DONE(DECREMENTING) MOS56980
                     2700 *                                                            MOS56990
186A  030E           2701          BR    R14                 RETURN                    MOS57000
                     2702 *--------------------------------                           MOS57010
186C  41F0 1C74      2703 KHKLOC9F BAL   LINK,ERROR          ERROR ROUTINE             MOS57020
1870  220F           2704          BS    KHKLOC9             RETURN                    MOS57030
                     2705 *                                                            MOS57040
1872  41F0 1C74      2706 KHKLOC1F BAL   LINK,ERROR          ERROR ROUTINE             MOS57050
1876  2208           2707          BS    KHKLOC10            RETURN                    MOS57060
                     2708 *                                                            MOS57070
                     2709 * ************************************************************ MOS57080
                     2710 *        END   TEST 9-1                                      MOS57090
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                        2712  *       TEST 9-2                DOUBLE OPERATION COLUMN DISTURB TEST   MOS57110
                        2713  *                                                                      MOS57120
                        2714  *       PURPOSE:                                                       MOS57130
                        2715  *            THIS TEST CHECKS THAT A DOUBLE OPERATION ON AN ADJACENT    MOS57140
                        2716  *            COLUMN DOES NOT DISTURB THE TEST COLUMN.                  MOS57150
                        2717  *                                                                      MOS57160
                        2718  *       ASSUMPTIONS:                                                   MOS57170
                        2719  *            MINIMUM 64KB MOS MEMORY                                   MOS57180
                        2720  *                                                                      MOS57190
                        2721  *       DESIGN SPECIFICATIONS:                                         MOS57200
                        2722  *            1. WITH 6 DIFFERENT BACKROUND PATTERSN, A W-R-WC-          MOS57210
                        2723  *               RC-W-R-WC-RC SERIES IS EXECUTED AT EACH LOCATION.      MOS57220
                        2724  *            2. A COMPARE IS DONE UPON EACH READ OPERATION.             MOS57230
                        2725  *            3. A TEST (COMPARISON) OF THE REST OF MEMORY IS DONE       MOS57240
                        2726  *               AFTER EACH SERIES OF OPERATIONS.                       MOS57250
                        2727  *                                                                      MOS57260
                        2728  *       OPTIONS:                                                       MOS57270
                        2729  *            LOPHYS - LOW PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST    MOS57280
                        2730  *            HIPHYS - HIGH PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST   MOS57290
                        2731  *                (FAILING PHYSICAL SEGMENT = MSB OF TASK PSW)           MOS57300
                        2732  *            SCOPE - ERROR OPTION MODE                                 MOS57310
                        2733  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST            MOS57320
                        2734  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST    MOS57330
                        2735  *                2 - PRINT ERROR DATA AND CONTINUE TEST                MOS57340
                        2736  *                3 - PRINT ERROR DATA AND HALT                         MOS57350
                        2737  *                4 - IGNORE ERROR                                      MOS57360
                        2738  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST        MOS57370
                        2739  *                                                                      MOS57380
                        2740  *       HOW TO RUN THE TEST                                            MOS57390
                        2741  *            1. ENTER THE "SCOPE", "LOPHYS", & "HIPHYS" OPTIONS VIA    MOS57400
                        2742  *               THE CONSOLE DEVICE.                                    MOS57410
                        2743  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                 MOS57420

1878  2411          2745  TEST9B  LIS   R1,1              LOAD DISPLAY ADDRESS                   MOS57440
187A  24A0          2746          LIS   R10,0                                                    MOS57450
187C  C8B0 8001     2747          LDAI  R11,X'8001'                                              MOS57460
1880  24D0          2748          LIS   R13,0             W/BACKGROUND = 0'S                     MOS57470
1882  41E0 189C     2749          BAL   R14,KHKCOL        DO A DOUBLE OPERATION COLUMN           MOS57480
                    2750  *                               DISTURB AND COMPLEMENT TEST            MOS57490
1886  24D2          2751          LIS   R13,2             W/BACKGROUND = 5'S                     MOS57500
1888  41E0 189C     2752          BAL   R14,KHKCOL        DO A DOUBLE OPERATION COLUMN           MOS57510
                    2753  *                               DISTURB AND COMPLEMENT TEST            MOS57520
188C  C8D0 0100     2754          LDAI  R13,X'100'        W/BACKGROUND =128-0'S,128-F'S,..       MOS57530
1890  41E0 189C     2755          BAL   R14,KHKCOL        DO A DOUBLE OPERATION COLUMN           MOS57540
                    2756  *                               DISTURB AND COMPLEMENT TEST            MOS57550
1894  41F0 0D36     2757          BAL   LINK,ENDCHK       IF END OF TEST, RETURN TO EXEC         MOS57560
1898  43C0 176A     2758          B     TEST9A            ELSE BRANCH TO CONTINUE TEST           MOS57570
                    2759  * ********************************************************************** MOS57580
189C  4860 0C32     2760  KHKCOL  LH    R6,LOLIM+6        INITIALIZE MEMORY LIMITS               MOS57590
18A0  4880 0C3E     2761          LH    R8,HILIM+6                                               MOS57600
18A4  C460 7FFE     2762          NAI   R6,X'7FFE'                                               MOS57610
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TEST 9 ECC DISTURB TEST

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18A8  C480 7FFF          2763           NAI   R8,X'7FFF'                                          MOS57620
18AC  2472               2764           LIS   R7,2                                                MOS57630
                         2765  *                                                                   MOS57640
18AE  083A               2766  KHKCOL1  LDAR  R3,R10          GET PROPER BACKGROUND PATTERN       MOS57650
18B0  C36D 0000          2767           TAI   R6,0(R13)                                           MOS57660
18B4  2332               2768           BZS   KHKCOL2                                             MOS57670
18B6  083B               2769           LDAR  R3,R11                                              MOS57680
18B8  4036 8000          2770  KHKCOL2  STH   R3,X'8000'(R6)  STORE BACKGROUND PATTERN            MOS57690
18BC  C160 18AE          2771           BXLE  R6,KHKCOL1       TO ALL OF MEMORY UNDER TEST        MOS57700
18C0  4860 0C32          2772           LH    R6,LOLIM+6                                          MOS57710
18C4  C460 7FFE          2773           NAI   R6,X'7FFE'                                          MOS57720
                         2774  *                                                                   MOS57730
18C8  C840 3033          2775  KHKCOL3  LDAI  R4,C'03'                                           MOS57740
18CC  4040 0B56          2776           STH   R4,ERRNO          ERRNO = C'03'                     MOS57750
18D0  41F0 08C2          2777           BAL   LINK,TSTBRKX      IF "BREAK" GO TO TSTEND ELSE RETURN MOS57760
18D4  083A               2778           LDAR  R3,R10            GET ORIGINAL DATA PATTERN (O.D.P.) MOS57770
18D6  C36D 0000          2779           TAI   R6,0(R13)                                           MOS57780
18DA  2332               2780           BZS   KHKCOL4                                             MOS57790
18DC  083B               2781           LDAR  R3,R11                                              MOS57800
18DE  4846 8000          2782  KHKCOL4  LH    R4,X'8000'(R6)  GET DATA FROM LOC                  MOS57810
18E2  0543               2783           CLAR  R4,R3           DATA EQUAL ?                        MOS57820
18E4  4230 19BC          2784           BNE   KHKCOL5F          YES, BRANCH                       MOS57830
18E8  C730 8001          2785  KHKCOL5  XAI   R3,X'8001'       COMPLEMENT DATA PATTERN (C.D.P.)  MOS57840
18EC  4036 8000          2786           STH   R3,X'8000'(R6)  STORE C.D.P. AT LOC                MOS57850
18F0  6110 0B56          2787           AHM   R1,ERRNO          ERRNO = C'04'                     MOS57860
18F4  4846 8000          2788           LH    R4,X'8000'(R6)  GET DATA FROM LOC                  MOS57870
18F8  0543               2789           CLAR  R4,R3           DATA EQUAL ?                        MOS57880
18FA  4230 19C4          2790           BNE   KHKCOL6F          NO, BRANCH                        MOS57890
18FE  C730 8001          2791  KHKCOL6  XAI   R3,X'8001'       COMPLEMENT C.D.P. (O.D.P.)        MOS57900
1902  4036 8000          2792           STH   R3,X'8000'(R6)  STORE O.D.P. AT LOC                MOS57910
1906  C840 3039          2793           LDAI  R4,C'09'                                            MOS57920
190A  4040 0B56          2794           STH   R4,ERRNO          ERRNO = C'09'                     MOS57930
190E  4846 8000          2795           LH    R4,X'8000'(R6)  GET DATA FROM LOC                  MOS57940
1912  0543               2796           CLAR  R4,R3           DATA EQUAL ?                        MOS57950
1914  4230 19CC          2797           BNE   KHKCOL7F          NO, BRANCH                        MOS57960
1918  C730 8001          2798  KHKCOL7  XAI   R3,X'8001'       COMPLEMENT O.D.P.(C.D.P.)         MOS57970
191C  4036 8000          2799           STH   R3,X'8000'(R6)  STORE C.D.P. AT LOC                MOS57980
1920  C840 3041          2800           LDAI  R4,C'0A'                                            MOS57990
1924  4040 0B56          2801           STH   R4,ERRNO          ERRNO = C'0A'                     MOS58000
1928  4846 8000          2802           LH    R4,X'8000'(R6)  GET DATA FROM LOC                  MOS58010
192C  0543               2803           CLAR  R4,R3           DATA EQUAL ?                        MOS58020
192E  4230 19D4          2804           BNE   KHKCOL8F          NO, BRANCH                        MOS58030
1932  C160 18C8          2805  KHKCOL8  BXLE  R6,KHKCOL3       CONTINUE UNTIL DONE(INCREMENTING  MOS58040
1936  4860 0C3E          2806           LH    R6,HILIM+6        INITIALIZE MEMORY LIMITS          MOS58050
193A  C460 7FFE          2807           NAI   R6,X'7FFE'        (HILIM MUST BE EVEN)              MOS58060
193E  4880 0C32          2808           LH    R8,LOLIM+6                                          MOS58070
1942  C480 7FFE          2809           NAI   R8,X'7FFE'                                          MOS58080
1946  2572               2810           LCS   R7,2                                                MOS58090
                         2811  *                                                                   MOS58100
1948  083B               2812  KHKCOL9  LDAR  R3,R11          GET COMPLEMENT DATA PATTERN(C.D.P.) MOS58110
194A  C36D 0000          2813           TAI   R6,0(R13)                                           MOS58120
194E  2332               2814           BZS   KHKCOLA                                             MOS58130
1950  083A               2815           LDAR  R3,R10                                              MOS58140
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TEST 9 ECC DISTURB TEST

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1952 C840 3035          2816 KHKCOLA  LDAI  R4,C'05'                                          MOS58150
1956 4040 0B56          2817          STH   R4,ERRNO          ERRNO = C'05'                   MOS58160
195A 41E0 08C2          2818          BAL   LINK,TSTBRKX      IF "BREAK" GO TO TSTEND ELSE RETURN MOS58170
195E 4846 8000          2819          LH    R4,X'8000'(R6)    GET DATA FROM LOC               MOS58180
1962 0543               2820          CLAR  R4,R3             DATA EQUAL ?                    MOS58190
1964 4230 19DC          2821          BNE   KHKCOLBF          NO, BRANCH                      MOS58200
1968 C730 8001          2822 KHKCOLB  XAI   R3,X'8001'        COMPLEMENT C.D.P.(O.D.P.)       MOS58210
196C 4036 8000          2823          STH   R3,X'8000'(R6)    STORE O.D.P. AT LOC             MOS58220
1970 6110 0B56          2824          AHM   R1,ERRNO          ERRNO = C'06'                   MOS58230
1974 4846 8000          2825          LH    R4,X'8000'(R6)    GET DATA FROM LOC               MOS58240
1978 0543               2826          CLAR  R4,R3             DATA EQUAL ?                    MOS58250
197A 4230 19E4          2827          BNE   KHKCOLCF          NO, BRANCH                      MOS58260
197E C730 8001          2828 KHKCOLC  XAI   R3,X'8001'        COMPLEMENT O.D.P. (C.D.P.)      MOS58270
1982 4036 8000          2829          STH   R3,X'8000'(R6)    STORE C.D.P. AT LOC             MOS58280
1986 C840 3042          2830          LDAI  R4,C'0B'                                          MOS58290
198A 4040 0B56          2831          STH   R4,ERRNO          ERRNO = C'0B'                   MOS58300
198E 4846 8000          2832          IH    R4,X'8000'(R6)    GET DATA FROM LOC               MOS58310
1992 0543               2833          CLAR  R4,R3             DATA EQUAL ?                    MOS58320
1994 213E               2834          BNES  KHKCOLDF          NO, BRANCH                      MOS58330
1996 C730 8001          2835 KHKCOLD  XAI   R3,X'8001'        COMPLEMENT C.D.P.(O.D.P.)       MOS58340
199A 4036 8000          2836          STH   R3,X'8000'(R6)    STORE O.D.P. AT LOC             MOS58350
199E 6110 0B56          2837          AHM   R1,ERRNO          ERRNO = C'0C'                   MOS58360
19A2 4846 8000          2838          LH    R4,X'8000'(R6)    GET DATA FROM LOC               MOS58370
19A6 0543               2839          CLAR  R4,R3             DATA EQUAL ?                    MOS58380
19A8 2137               2840          BNES  KHKCOLEF          NO, BRANCH                      MOS58390
19AA C060 1948          2841 KHKCOLE  BXH   R6,KHKCOL9        CONTINUE UNTIL DONE(DECREMENTING) MOS58400
19AE 030E               2842          BR    R14               RETURN                          MOS58410
                        2843 *-----------------------------------                             MOS58420
19B0 41F0 1C74          2844 KHKCOLDF BAL   LINK,ERROR        ERROR ROUTINE                   MOS58430
19B4 220F               2845          BS    KHKCOLD           RETURN                          MOS58440
                        2846 *                                                                MOS58450
19B6 41F0 1C74          2847 KHKCOLEF BAL   LINK,ERROR        ERROR  ROUTINE                  MOS58460
19BA 2208               2848          BS    KHKCOLE           RETURN                          MOS58470
                        2849 *                                                                MOS58480
19BC 41F0 1C74          2850 KHKCOL5F BAL   LINK,ERROR        ERROR ROUTINE                   MOS58490
19C0 4300 18E8          2851          B     KHKCOL5           RETURN                          MOS58500
                        2852 *                                                                MOS58510
19C4 41F0 1C74          2853 KHKCOL6F BAL   LINK,ERROR        ERROR ROUTINE                   MOS58520
19C8 4300 18FE          2854          B     KHKCOL6           RETURN                          MOS58530
                        2855 *                                                                MOS58540
19CC 41F0 1C74          2856 KHKCOL7F BAL   LINK,ERROR        ERROR ROUTINE                   MOS58550
19D0 4300 1918          2857          B     KHKCOL7           RETURN                          MOS58560
                        2858 *                                                                MOS58570
19D4 41F0 1C74          2859 KHKCOL8F BAL   LINK,ERROR        ERROR ROUTINE                   MOS58580
19D8 4300 1932          2860          B     KHKCOL8           RETURN                          MOS58590
                        2861 *                                                                MOS58600
19DC 41F0 1C74          2862 KHKCOLBF BAL   LINK,ERROR        ERROR ROUTINE                   MOS58610
19E0 4300 1968          2863          B     KHKCOLB           RETURN                          MOS58620
                        2864 *                                                                MOS58630
19E4 41F0 1C74          2865 KHKCOLCF BAL   LINK,ERROR        ERROR ROUTINE                   MOS58640
19E8 4300 197E          2866          B     KHKCOLC           RETURN                          MOS58650
                        2867 * ************************************************************** MOS58660
                        2868 *        END   TEST 9-2                                          MOS58670
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TEST A PARITY DISTURB TEST

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                                2870  *       TEST A-1                MARCHING PATTERN TEST                   MOS58690
                                2871  *                                                                       MOS58700
                                2872  *       PURPOSE:                                                        MOS58710
                                2873  *            THIS TEST CHECKS THAT THREE DIFFERENT BASE PATTERNS         MOS58720
                                2874  *            CAN BE WRITTEN, COMPLEMENTED, AND MARCHED THROUGH THE      MOS58730
                                2875  *            AVAILABLE MEMORY WITHOUT ERROR.                            MOS58740
                                2876  *                                                                       MOS58750
                                2877  *       ASSUMPTIONS:                                                    MOS58760
                                2878  *            MINIMUM 64KB MOS MEMORY                                    MOS58770
                                2879  *                                                                       MOS58780
                                2880  *       DESIGN SPECIFICATIONS:                                          MOS58790
                                2881  *            1. (IN ASCENDING ORDER) WRITE AND READ THE BASE PATTERN.    MOS58800
                                2882  *            2. (IN DESCENDING ORDER) WRITE AND READ THE COMPLEMENT      MOS58810
                                2883  *               PATTERN.                                                MOS58820
                                2884  *                                                                       MOS58830
                                2885  *       OPTIONS:                                                        MOS58840
                                2886  *            LOPHYS - LOW PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST     MOS58850
                                2887  *            HIPHYS - HIGH PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST    MOS58860
                                2888  *               (FAILING PHYSICAL SEGMENT = MSB OF TASK PSW)             MOS58870
                                2889  *            SCOPE - ERROR OPTION MODE                                  MOS58880
                                2890  *               0 - PRINT ERROR DATA AND SKIP TO NEXT TEST              MOS58890
                                2891  *               1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST      MOS58900
                                2892  *               2 - PRINT ERROR DATA AND CONTINUE TEST                  MOS58910
                                2893  *               3 - PRINT ERROR DATA AND HALT                           MOS58920
                                2894  *               4 - IGNORE ERROR                                        MOS58930
                                2895  *               5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST          MOS58940
                                2896  *                                                                       MOS58950
                                2897  *       HOW TO RUN THE TEST:                                            MOS58960
                                2898  *            1. ENTER THE "SCOPE", "LOPHYS", & "HIPHYS" OPTIONS VIA     MOS58970
                                2899  *               THE CONSOLE DEVOCE.                                     MOS58980
                                2900  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                  MOS58990

19EC  41F0 0D0E                 2902  TESTA   BAL   LINK,LOSET          ESTABLISH LOWEST PHYSICAL SEGMENT       MOS59010
                                2903  *                                                                       MOS59020
19F0  2411                      2904  TESTAA  LIS   R1,1                LOAD DISPLAY ADDRESS                    MOS59030
19F2  C840 0A3E                 2905          LDAI  R4,MM0                                                      MOS59040
19F6  4040 003E                 2906          STH   R4,X'3E'            SET NEW MM POINTER                      MOS59050
19FA  24A0                      2907          LIS   R10,0                                                       MOS59060
19FC  24B1                      2908          LIS   R11,1                                                       MOS59070
19FE  24D0                      2909          LIS   R13,0               W/BACKGROUND = 0'S                      MOS59080
1A00  41E0 1A2E                 2910          BAL   R14,CLKLOC          DO A SINGLE DISTURB TEST (MIN-MAX)      MOS59090
                                2911  *                                                                       MOS59100
1A04  24A1                      2912          LIS   R10,1                                                       MOS59110
1A06  24E0                      2913          LIS   R11,0               W/BACKGROUND = F'S                      MOS59120
1A08  41E0 1A2E                 2914          BAL   R14,CLKLOC          DO A SINGLE DISTURB TEST (MIN-MAX)      MOS59130
                                2915  *                                                                       MOS59140
1A0C  24D2                      2916          LIS   R13,2               W/BACKGROUND = A'S                      MOS59150
1A0E  41E0 1A2E                 2917          BAL   R14,CLKLOC          DO A SINGLE DISTURB TEST (MIN-MAX)      MOS59160
                                2918  *                                                                       MOS59170
1A12  24A0                      2919          LIS   R10,0                                                       MOS59180
1A14  24B1                      2920          LIS   R11,1               W/BACKGROUND = 5'S                      MOS59190
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TEST A PARITY DISTURB TEST

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1A16  41E0 1A2E          2921           BAL   R14,CLKLOC          DO A SINGLE DISTURB TEST (MIN-MAX)     MOS59200
                         2922  *                                                                       MOS59210
1A1A  C8D0 0100          2923           LDAI  R13,X'100'          W/BACKGROUND =128-0'S,128-F'S,..       MOS59220
1A1E  41E0 1A2E          2924           BAL   R14,CLKLOC          DO A SINGLE DISTURB TEST (MIN-MAX)     MOS59230
                         2925  *                                                                       MOS59240
1A22  24A1               2926           LIS   R10,1                                                    MOS59250
1A24  24B0               2927           LIS   R11,0               W/BACKGROUND =128-F'S,128-0'S,..       MOS59260
1A26  41E0 1A2E          2928           BAL   R14,CLKLOC          DO A SINGLE DISTURB TEST (MIN-MAX)     MOS59270
                         2929  *                                                                       MOS59280
1A2A  4300 1AF4          2930           B     TESTAB              END OF TEST (GOTO TESTAB)              MOS59290
                         2931  *                                                                       MOS59300
                         2932  * ********************************************************************** MOS59310
                         2933  *                                                                       MOS59320
1A2E  4860 0C32          2934  CLKLOC   LH    R6,LOLIM+6          INITIALIZE MEMORY LIMITS               MOS59330
1A32  4880 0C3E          2935           LH    R8,HILIM+6                                                 MOS59340
1A36  C460 7FFE          2936           NAI   R6,X'7FFE'                                                 MOS59350
1A3A  C480 7FFF          2937           NAI   R8,X'7FFF'                                                 MOS59360
1A3E  2472               2938           LIS   R7,2                                                     MOS59370
                         2939  *                                                                       MOS59380
1A40  083A               2940  CLKLOC1  LDAR  R3,R10              STORE APPROPRIATE BACKGROUND PATTERN   MOS59390
1A42  C36D 0000          2941           TAI   R6,0(R13)                                                MOS59400
1A46  2332               2942           BZS   CLKLOC2                                                  MOS59410
1A48  083B               2943           LDAR  R3,R11                                                   MOS59420
1A4A  4036 8000          2944  CLKLOC2  STH   R3,X'8000'(R6)       IN MEMORY                          MOS59430
1A4E  C160 1A40          2945           BXLE  R6,CLKLOC1           FROM LOLIM TO HILIM                    MOS59440
1A52  4860 0C32          2946           LH    R6,LOLIM+6                                                 MOS59450
1A56  C460 7FFE          2947           NAI   R6,X'7FFE'                                                 MOS59460
                         2948  *                                                                       MOS59470
1A5A  C840 3033          2949  CLKLOC3  LDAI  R4,C'03'                                                 MOS59480
1A5E  4040 0B56          2950           STH   R4,ERRNO             ERRNO = C'03'                       MOS59490
1A62  41F0 08C2          2951           BAL   LINK,TSTBRKX         IF "BREAK" GO TO TSTEND ELSE RETURN    MOS59500
1A66  083A               2952           LDAR  R3,R10               GET APPROPRIATE BACKGROUND PATTERN      MOS59510
1A68  C36D 0000          2953           TAI   R6,0(R13)                                                MOS59520
1A6C  2332               2954           BZS   CLKLOC4                                                  MOS59530
1A6E  083B               2955           LDAR  R3,R11                                                   MOS59540
1A70  4846 8000          2956  CLKLOC4  LH    R4,X'8000'(R6)       GET DATA FROM LOC UNDER TEST           MOS59550
1A74  0543               2957           CLAR  R4,R3                EQUAL ?                             MOS59560
1A76  213E               2958           BNES  CLKLOC5F             NO, BRANCH                          MOS59570
1A78  C730 0001          2959  CLKLOC5  XAI   R3,1                 COMPLEMENT DATA PATTERN             MOS59580
1A7C  4036 8000          2960           STH   R3,X'8000'(R6)       STORE C.D.P. AT LOC                    MOS59590
1A80  6110 0B56          2961           AHM   R1,ERRNO             ERRNO = C'04'                       MOS59600
1A84  4846 8000          2962           LH    R4,X'8000'(R6)       GET DATA FROM LOC UNDER TEST           MOS59610
1A88  0543               2963           CLAR  R4,R3                DATA = C.D.P. ?                     MOS59620
1A8A  2131               2964           BNES  CLKLOC6              NO, BRANCH                          MOS59630
1A8C  C160 1A5A          2965  CLKLOC6  BXLE  R6,CLKLOC3           CONTINUE UNTIL DONE(INCREMENTING)      MOS59640
1A90  2307               2966           BS    CLKLOC6A             BRANCH                              MOS59650
                         2967  *---------------------------------                                       MOS59660
1A92  41F0 1C74          2968  CLKLOC5F BAL   LINK,ERROR           ERROR  ROUTINE                       MOS59670
1A96  220F               2969           BS    CLKLOC5              RETURN                              MOS59680
                         2970  *                                                                       MOS59690
1A98  41F0 1C74          2971  CLKLOC6F BAL   LINK,ERROR           ERROR  ROUTINE                       MOS59700
1A9C  2208               2972           BS    CLKLOC6              RETURN                              MOS59710
                         2973  *---------------------------------                                       MOS59720
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TEST A PARITY DISTURB TEST

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1A9E  4860 0C3E      2974  CLKLOC6A LH    R6,HILIM+6                                          MOS59730
1AA2  C460 7FFE      2975           NAI   R6,X'7FFE'                                         MOS59740
1AA6  4880 0C32      2976           LH    R8,LCLIM+6          ESTABLISH MEMORY LIMITS         MOS59750
1AAA  C480 7FFE      2977           NAI   R8,X'7FFE'                                         MOS59760
1AAE  2572           2978           LCS   R7,2                                               MOS59770
                     2979  *                                                                  MOS59780
1AB0  083B           2980  CLKLOC7  LDAR  R3,R11             GET C.D.P. FOR LOC UNDER TEST   MOS59790
1AB2  C36D 0000      2981           TAI   R6,0(R13)                                          MOS59800
1AB6  2332           2982           BZS   CLKLOC8                                            MOS59810
1AB8  083A           2983           LDAR  R3,R10                                             MOS59820
1ABA  C840 3035      2984  CLKLOC8  LDAI  R4,C'05'                                          MOS59830
1ABE  4040 0856      2985           STH   R4,ERRNO            ERRNO = C'05'                  MOS59840
1AC2  41F0 08C2      2986           BAL   LINK,TSTBRKX        IF "BREAK" GO TO TSTEND ELSE RETURN MOS59850
1AC6  4846 8000      2987           LH    R4,X'8000'(R6)      GET DATA FROM LOC UNDER TEST   MOS59860
1ACA  0543           2988           CLAR  R4,R3               DATA = C.D.P. ?                MOS59870
1ACC  213E           2989           BNES  CLKLOC9F            NO, BRANCH                     MOS59880
1ACE  C730 0001      2990  CLKLOC9  XAI   R3,1                COMPLEMENT C.D.P. (O.D.P.)     MOS59890
1AD2  4036 8000      2991           STH   R3,X'8000'(R6)      STORE PATTERN AT LOC           MOS59900
1AD6  6110 0856      2992           AHM   R1,ERRNO            ERRNO = C'06'                  MOS59910
1ADA  4846 8000      2993           LH    R4,X'8000'(R6)      GET DATA FROM LOC UNDER TEST   MOS59920
1ADE  0543           2994           CLAR  R4,R3               DATA = O.D.P. ?                MOS59930
1AE0  2137           2995           BNES  CLKLOC1F            NO, BRANCH                     MOS59940
1AE2  C060 1AB0      2996  CLKLOC10 BXH   R6,CLKLOC7          CONTINUE UNTIL DONE(DECREMENTING) MOS59950
                     2997  *                                                                  MOS59960
1AE6  03CE           2998           BR    R14                 RETURN                         MOS59970
                     2999  *-----------------------------------                              MOS59980
1AE8  41F0 1C74      3000  CLKLOC9F BAL   LINK,ERROR          ERROR ROUTINE                  MOS59990
1AEC  22CF           3001           BS    CLKLOC9             RETURN                         MOS60000
                     3002  *                                                                  MOS60010
1AEE  41F0 1C74      3003  CLKLOC1F BAL   LINK,ERROR          ERROR ROUTINE                  MOS60020
1AF2  2208           3004           BS    CLKLOC10            RETURN                         MOS60030
                     3005  *                                                                  MOS60040
                     3006  * ********************************************************************** MOS60050
                     3007  *        END   TEST A-1                                            MOS60060
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TEST A PARITY DISTURB TEST

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                        3009  *       TEST A-2                DOUBLE OPERATION COLUMN DISTURB TEST   MOS60080
                        3010  *                                                                      MOS60090
                        3011  *       PURPOSE:                                                       MOS60100
                        3012  *            THIS TEST CHECKS THAT A DOUBLE OPERATION ON AN ADJACENT    MOS60110
                        3013  *            COLUMN DOES NOT DISTURB THE TEST COLUMN.                  MOS60120
                        3014  *                                                                      MOS60130
                        3015  *       ASSUMPTIONS:                                                   MOS60140
                        3016  *            MINIMUM 64KB MOS MEMORY                                   MOS60150
                        3017  *                                                                      MOS60160
                        3018  *       DESIGN SPECIFICATIONS:                                         MOS60170
                        3019  *            1. WITH 6 DIFFERENT BACKROUND PATTERSN, A W-R-WC-          MOS60180
                        3020  *               RC-W-R-WC-RC SERIES IS EXECUTED AT EACH LOCATION.      MOS60190
                        3021  *            2. A COMPARE IS DONE UPON EACH READ OPERATION.             MOS60200
                        3022  *            3. A TEST (COMPARISON) OF THE REST OF MEMORY IS DONE       MOS60210
                        3023  *               AFTER EACH SERIES OF OPERATIONS.                       MOS60220
                        3024  *                                                                      MOS60230
                        3025  *       OPTIONS:                                                       MOS60240
                        3026  *            LOPHYS - LOW PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST    MOS60250
                        3027  *            HIPHYS - HIGH PHYSICAL SEGMENT NO. OF MEMORY UNDER TEST   MOS60260
                        3028  *                (FAILING PHYSICAL SEGMENT = MSB OF TASK PSW)           MOS60270
                        3029  *            SCOPE - ERROR OPTION MODE                                 MOS60280
                        3030  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST            MOS60290
                        3031  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST    MOS60300
                        3032  *                2 - PRINT ERROR DATA AND CONTINUE TEST                MOS60310
                        3033  *                3 - PRINT ERROR DATA AND HALT                         MOS60320
                        3034  *                4 - IGNORE ERROR                                      MOS60330
                        3035  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST        MOS60340
                        3036  *                                                                      MOS60350
                        3037  *       HOW TO RUN THE TEST                                            MOS60360
                        3038  *            1. ENTER THE "SCOPE", "LOPHYS", & "HIPHYS" OPTIONS VIA    MOS60370
                        3039  *               THE CONSOLE DEVICE.                                    MOS60380
                        3040  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                 MOS60390

1AF4  2411            3042  TESTAB  LIS   R1,1              LOAD DISPLAY ADDRESS                   MOS60410
1AF6  24A0            3043          LIS   R10,0                                                      MOS60420
1AF8  24B1            3044          LIS   R11,1                                                      MOS60430
1AFA  24D0            3045          LIS   R13,0             W/BACKGROUND = 0'S                     MOS60440
1AFC  41E0 1B16       3046          BAL   R14,CLKCOL        DO A DOUBLE OPERATION COLUMN           MOS60450
                      3047  *                               DISTURB AND COMPLEMENT TEST            MOS60460
1B00  24D2            3048          LIS   R13,2             W/BACKGROUND = 5'S                     MOS60470
1B02  41E0 1B16       3049          BAL   R14,CLKCOL        DO A DOUBLE OPERATION COLUMN           MOS60480
                      3050  *                               DISTURB AND COMPLEMENT TEST            MOS60490
1B06  C8D0 0100       3051          LDAI  R13,X'100'        W/BACKGROUND =128-0'S,128-F'S,..       MOS60500
1B0A  41E0 1B16       3052          BAL   R14,CLKCOL        DO A DOUBLE OPERATION COLUMN           MOS60510
                      3053  *                               DISTURB AND COMPLEMENT TEST            MOS60520
1B0E  41F0 0D36       3054          BAL   LINK,ENDCHK       IF END OF TEST, RETURN TO EXEC         MOS60530
1B12  43C0 19F0       3055          B     TESTAA            ELSE BRANCH TO CONTINUE TEST           MOS60540
                      3056  * ********************************************************************** MOS60550
1B16  4860 0C32       3057  CLKCOL  LH    R6,LOLIM+6        INITIALIZE MEMORY LIMITS               MOS60560
1B1A  4880 0C3E       3058          LH    R8,HILIM+6                                               MOS60570
1B1E  C460 7FFE       3059          NAI   R6,X'7FFE'                                               MOS60580
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TEST A PARITY DISTURB TEST

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1B22  C480 7FFF          3060           NAI   R8,X'7FFF'                                        MOS60590
1B26  2472               3061           LIS   R7,2                                              MOS60600
                         3062  *                                                                 MOS60610
1B28  083A               3063  CLKCOL1  LDAR  R3,R10          GET PROPER BACKGROUND PATTERN      MOS60620
1B2A  C36D 0000          3064           TAI   R6,0(R13)                                         MOS60630
1B2E  2332               3065           BZS   CLKCOL2                                           MOS60640
1B30  083B               3066           LDAR  R3,R11                                            MOS60650
1B32  4036 8000          3067  CLKCOL2  STH   R3,X'8000'(R6)  STORE BACKGROUND PATTERN          MOS60660
1B36  C160 1B28          3068           BXLE  R6,CLKCOL1       TO ALL OF MEMORY UNDER TEST      MOS60670
1B3A  4860 0C32          3069           LH    R6,LOLIM+6                                        MOS60680
1B3E  C460 7FFE          3070           NAI   R6,X'7FFE'                                        MOS60690
                         3071  *                                                                 MOS60700
1B42  C840 3033          3072  CLKCOL3  LDAI  R4,C'03'                                          MOS60710
1B46  4040 0B56          3073           STH   R4,ERRNO           ERRNO = C'03'                  MOS60720
1B4A  41F0 08C2          3074           BAL   LINK,TSTBRKX       IF "BREAK" GO TO TSTEND ELSE RETURN MOS60730
1B4E  083A               3075           LDAR  R3,R10             GET ORIGINAL DATA PATTERN (O.D.P.) MOS60740
1B50  C36D 0000          3076           TAI   R6,0(R13)                                         MOS60750
1B54  2332               3077           BZS   CLKCOL4                                           MOS60760
1B56  083B               3078           LDAR  R3,R11                                            MOS60770
1B58  4846 8000          3079  CLKCOL4  LH    R4,X'8000'(R6)  GET DATA FROM LOC                 MOS60780
1B5C  0543               3080           CLAR  R4,R3            DATA EQUAL ?                     MOS60790
1B5E  4230 1C36          3081           BNE   CLKCOL5F         YES, BRANCH                      MOS60800
1B62  C730 0001          3082  CLKCOL5  XAI   R3,1             COMPLEMENT DATA PATTERN (C.D.P.) MOS60810
1B66  4036 8000          3083           STH   R3,X'8000'(R6)   STORE C.D.P. AT LOC              MOS60820
1B6A  6110 0B56          3084           AHM   R1,ERRNO         ERRNO = C'04'                    MOS60830
1B6E  4846 8000          3085           LH    R4,X'8000'(R6)   GET DATA FROM LOC                MOS60840
1B72  0543               3086           CLAR  R4,R3            DATA EQUAL ?                     MOS60850
1B74  4230 1C3E          3087           BNE   CLKCOL6F         NO, BRANCH                       MOS60860
1B78  C730 0001          3088  CLKCOL6  XAI   R3,1             COMPLEMENT C.D.P. (O.D.P.)       MOS60870
1B7C  4036 8000          3089           STH   R3,X'8000'(R6)   STORE O.D.P. AT LOC              MOS60880
1B80  C840 3039          3090           LDAI  R4,C'09'                                          MOS60890
1B84  4040 0B56          3091           STH   R4,ERRNO         ERRNO = C'09'                    MOS60900
1B88  4846 8000          3092           LH    R4,X'8000'(R6)   GET DATA FROM LOC                MOS60910
1B8C  0543               3093           CLAR  R4,R3            DATA EQUAL ?                     MOS60920
1B8E  4230 1C46          3094           BNE   CLKCOL7F         NO, BRANCH                       MOS60930
1B92  C730 0001          3095  CLKCOL7  XAI   R3,1             COMPLEMENT O.D.P.(C.D.P.)        MOS60940
1B96  4036 8000          3096           STH   R3,X'8000'(R6)   STORE C.D.P. AT LOC              MOS60950
1B9A  C840 3041          3097           LDAI  R4,C'0A'                                          MOS60960
1B9E  4040 0B56          3098           STH   R4,ERRNO         ERRNO = C'0A'                    MOS60970
1BA2  4846 8000          3099           LH    R4,X'8000'(R6)   GET DATA FROM LOC                MOS60980
1BA6  0543               3100           CLAR  R4,R3            DATA EQUAL ?                     MOS60990
1BA8  4230 1C4E          3101           BNE   CLKCOL8F         NO, BRANCH                       MOS61000
1BAC  C160 1B42          3102  CLKCOL8  BXLE  R6,CLKCOL3       CONTINUE UNTIL DONE(INCREMENTING MOS61010
1BB0  4860 0C3E          3103           LH    R6,HILIM+6       INITIALIZE MEMORY LIMITS         MOS61020
1BB4  C460 7FFE          3104           NAI   R6,X'7FFE'       (HILIM MUST BE EVEN)             MOS61030
1BB8  4880 0C32          3105           LH    R8,LOLIM+6                                        MOS61040
1BBC  C480 7FFE          3106           NAI   R8,X'7FFE'                                        MOS61050
1BC0  2572               3107           LCS   R7,2                                              MOS61060
                         3108  *                                                                 MOS61070
1BC2  083B               3109  CLKCOL9  LDAR  R3,R11           GET COMPLEMENT DATA PATTERN(C.D.P.) MOS61080
1BC4  C36D 0000          3110           TAI   R6,0(R13)                                         MOS61090
1BC8  2332               3111           BZS   CLKCOLA                                           MOS61100
1BCA  083A               3112           LDAR  R3,R10                                            MOS61110
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TEST A PARITY DISTURB TEST

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1BCC  C840 3035          3113  CLKCOLA  LDAI  R4,C'05'                                                    MOS61120
1BD0  4040 0B56          3114           STH   R4,ERRNO          ERRNO = C'05'                             MOS61130
1BD4  41F0 08C2          3115           BAL   LINK,TSTBRKX      IF "BREAK" GO TO TSTEND ELSE RETURN       MOS61140
1BD8  4846 8000          3116           LH    R4,X'8000'(R6)    GET DATA FROM LOC                         MOS61150
1BDC  0543               3117           CLAR  R4,R3             DATA EQUAL ?                              MOS61160
1BDE  4230 1C56          3118           BNE   CLKCOLBF          NO, BRANCH                                MOS61170
1BE2  C730 0001          3119  CLKCOLB  XAI   R3,1              COMPLEMENT C.D.P.(O.D.P.)                 MOS61180
1BE6  4036 8000          3120           STH   R3,X'8000'(R6)    STORE O.D.P. AT LOC                       MOS61190
1BEA  6110 0B56          3121           AHM   R1,ERRNO          ERRNO = C'06'                             MOS61200
1BEE  4846 8000          3122           LH    R4,X'8000'(R6)    GET DATA FROM LOC                         MOS61210
1BF2  0543               3123           CLAR  R4,R3             DATA EQUAL ?                              MOS61220
1BF4  4230 1C5E          3124           BNE   CLKCOLCF          NO, BRANCH                                MOS61230
1BF8  C730 0001          3125  CLKCOLC  XAI   R3,1              COMPLEMENT O.D.P. (C.D.P.)                MOS61240
1BFC  4036 8000          3126           STH   R3,X'8000'(R6)    STORE C.D.P. AT LOC                       MOS61250
1C00  C840 3042          3127           LDAI  R4,C'0B'                                                    MOS61260
1C04  4040 0B56          3128           STH   R4,ERRNO          ERRNO = C'0B'                             MOS61270
1C08  4846 8000          3129           LH    R4,X'8000'(R6)    GET DATA FROM LOC                         MOS61280
1C0C  0543               3130           CLAR  R4,R3             DATA EQUAL ?                              MOS61290
1C0E  213E               3131           BNES  CLKCOLDF          NO, BRANCH                                MOS61300
1C10  C730 0001          3132  CLKCOLD  XAI   R3,1              COMPLEMENT C.D.P.(O.D.P.)                 MOS61310
1C14  4036 8000          3133           STH   R3,X'8000'(R6)    STORE O.D.P. AT LOC                       MOS61320
1C18  6110 0B56          3134           AHM   R1,ERRNO          ERRNO = C'0C'                             MOS61330
1C1C  4846 8000          3135           LH    R4,X'8000'(R6)    GET DATA FROM LOC                         MOS61340
1C20  0543               3136           CLAR  R4,R3             DATA EQUAL ?                              MOS61350
1C22  2137               3137           BNES  CLKCOLEF          NO, BRANCH                                MOS61360
1C24  C060 1BC2          3138  CLKCOLE  BXH   R6,CLKCOL9        CONTINUE UNTIL DONE(DECREMENTING)         MOS61370
1C28  03CE               3139           BR    R14               RETURN                                    MOS61380
                         3140  *-----------------------------------                                       MOS61390
1C2A  41F0 1C74          3141  CLKCOLDF BAL   LINK,ERROR        ERROR ROUTINE                             MOS61400
1C2E  22CF               3142           BS    CLKCOLD           RETURN                                    MOS61410
                         3143  *                                                                          MOS61420
1C30  41F0 1C74          3144  CLKCOLEF BAL   LINK,ERROR        ERROR  ROUTINE                            MOS61430
1C34  2208               3145           BS    CLKCOLE           RETURN                                    MOS61440
                         3146  *                                                                          MOS61450
1C36  41F0 1C74          3147  CLKCOL5F BAL   LINK,ERROR        ERROR ROUTINE                             MOS61460
1C3A  4300 1B62          3148           B     CLKCOL5           RETURN                                    MOS61470
                         3149  *                                                                          MOS61480
1C3E  41F0 1C74          3150  CLKCOL6F BAL   LINK,ERROR        ERROR ROUTINE                             MOS61490
1C42  4300 1B78          3151           B     CLKCOL6           RETURN                                    MOS61500
                         3152  *                                                                          MOS61510
1C46  41F0 1C74          3153  CLKCOL7F BAL   LINK,ERROR        ERROR ROUTINE                             MOS61520
1C4A  4300 1B92          3154           B     CLKCOL7           RETURN                                    MOS61530
                         3155  *                                                                          MOS61540
1C4E  41F0 1C74          3156  CLKCOL8F BAL   LINK,ERROR        ERROR ROUTINE                             MOS61550
1C52  4300 1BAC          3157           B     CLKCOL8           RETURN                                    MOS61560
                         3158  *                                                                          MOS61570
1C56  41F0 1C74          3159  CLKCOLBF BAL   LINK,ERROR        ERROR ROUTINE                             MOS61580
1C5A  4300 1BE2          3160           B     CLKCOLB           RETURN                                    MOS61590
                         3161  *                                                                          MOS61600
1C5E  41F0 1C74          3162  CLKCOLCF BAL   LINK,ERROR        ERROR ROUTINE                             MOS61610
1C62  4300 1BF8          3163           B     CLKCOLC           RETURN                                    MOS61620
                         3164  * ************************************************************************  MOS61630
                         3165  *        END   TEST A-2                                                    MOS61640
```

COMMON ERROR ROUTINE

```
1C66  D000 1EC0        3167  PARERR  STM   R0,MOSSAVE        SET UP TO PRINT PARITY ERROR          MOS61660
1C6A  C8F0 3132        3168          LDAI  R15,C'12'                                              MOS61670
1C6E  40F0 0B56        3169          STH   R15,ERRNO          SET ERRNO = C'12'                   MOS61680
1C72  2308             3170          BS    ERROR1             BRANCH                              MOS61690
                       3171  *                                                                    MOS61700
                       3172  *  COMMON ERROR ROUTINE          CALL:  BAL   LINK,ERROR             MOS61710
                       3173  *                                                                    MOS61720
                       3174  *   R6= LOCATION OF ERROR     R3= DATA EXPECTED     R4= DATA READ   MOS61730
                       3175  *                                                                    MOS61740
1C74  D000 1EC0        3176  ERROR   STM   R0,MOSSAVE        SAVE CALLING REGISTERS              MOS61750
1C78  95EE             3177          EPSR  R14,R14            GET THE CURRENT PSW                 MOS61760
1C7A  C4F0 FFF0        3178          NAI   R14,X'FFF0'        MASK OFF ALL BUT CC                 MOS61770
1C7E  C6E0 0004        3179          CAI   R14,4              ADD MEMORY FAULT CC                 MOS61780
                       3180  *                                                                    MOS61790
1C82  24F1             3181  ERROR1  LIS   LINK,1             LOAD DISPLAY PANEL ADDRESS          MOS61800
1C84  DEF0 010E        3182          OC    LINK,NORM          PUT PANEL IN NORMAL MODE            MOS61810
1C88  C660 8000        3183          OAI   R6,X'8000'         FORCE HIGH 32 KB RANGE              MOS61820
1C8C  9406             3184          EXBR  R0,R6              READY DISPLAY OUTPUT                MOS61830
1C8E  98F0             3185          WHR   LINK,R0            DISPLAY ERROR ADDRESS               MOS61840
                       3186  *                                                                    MOS61850
1C90  41F0 0602        3187          BAL   LINK,ERR           PRINT THE ERROR NUMBER              MOS61860
1C94  25F1             3188          LCS   LINK,1                                                 MOS61870
1C96  40F0 0B0E        3189          STH   LINK,NOERR         SET ERROR FLAG FOR EXEC.            MOS61880
1C9A  48F0 0BEA        3190          LH    LINK,SCOPE+6                                           MOS61890
1C9E  27F1             3191          SIS   LINK,1             IS SCOPE = 1 ?                      MOS61900
1CA0  4330 1D2E        3192          BZ    PARTNO             YES, PRINT PART NUMBER.             MOS61910
1CA4  27F3             3193          SIS   LINK,3             IS SCOPE = 4 ?                      MOS61920
1CA6  4330 1D1A        3194          BZ    ERORTN2            YES, RETURN                         MOS61930
1CAA  27F1             3195          SIS   LINK,1             IS SCOPE = 5 ?                      MOS61940
1CAC  4330 1D2E        3196          BZ    PARTNO             YES, PRINT PART NO. & CONTINUE      MOS61950
1CB0  24C4             3197  ERROR2  LIS   R0,4                                                   MOS61960
1CB2  0816             3198          LDAR  R1,R6                                                  MOS61970
1CB4  C820 1E11        3199          LDAI  R2,ADRMSG+1                                            MOS61980
1CB8  41F0 06F6        3200          BAL   LINK,HEXASC        STORE LOCATION UNDER TEST           MOS61990
1CBC  0813             3201          LDAR  R1,R3                                                  MOS62000
1CBE  C820 1E20        3202          LDAI  R2,DTAEXP                                              MOS62010
1CC2  41F0 06F6        3203          BAL   LINK,HEXASC        STORE DATA EXPECTED                 MOS62020
1CC6  0814             3204          LDAR  R1,R4                                                  MOS62030
1CC8  C820 1E30        3205          LDAI  R2,DTARED                                              MOS62040
1CCC  41F0 06F6        3206          BAL   LINK,HEXASC        STORE DATA READ                     MOS62050
1CD0  081E             3207          LDAR  R1,R14                                                 MOS62060
1CD2  C820 1E3C        3208          LDAI  R2,DTAPSW                                              MOS62070
1CD6  41F0 06F6        3209          BAL   LINK,HEXASC        STORE CONCURRENT PSW                MOS62080
1CDA  9014             3210          SRHLS R1,4                                                   MOS62090
1CDC  C410 0007        3211          NAI   R1,7                                                   MOS62100
1CE0  C820 1E10        3212          LDAI  R2,ADRMSG                                              MOS62110
1CE4  2401             3213          LIS   R0,1                                                   MOS62120
1CE6  41F0 06F6        3214          BAL   LINK,HEXASC                                            MOS62130
1CEA  9456             3215          EXBR  R5,R6                                                  MOS62140
1CEC  98C5             3216          WHR   R0,R5              WRITE TO DISPLAY THE ERROR LOC      MOS62150
1CEE  C850 1E0C        3217  ERROR3  LDAI  R5,ERRORMSG                                            MOS62160
1CF2  4050 0B0C        3218          STH   R5,ISITERR         SET ISITERR                         MOS62170
1CF6  41F0 0756        3219          BAL   LINK,PRINT         PRINT THE ERROR DATA                MOS62180
```

COMMON ERROR ROUTINE

```
1CFA  2450           3220           LIS   R5,0                                    MOS62190
1CFC  4050 0B0C      3221           STH   R5,ISITERR        RESET ISITERR          MOS62200
                     3222  *                                                       MOS62210
1D00  48F0 0BEA      3223  ERORTN   LH    LINK,SCOPE+6                           MOS62220
1D04  4330 04A8      3224           BZ    TSTEND            IF SCOPE = 0         MOS62230
1D08  27F1           3225           SIS   LINK,1            OR SCOPE = 1,        MOS62240
1D0A  4330 04A8      3226           BZ    TSTEND            GO TO NEXT TEST      MOS62250
1D0E  27F2           3227           SIS   LINK,2            IS SCOPE = 3 ?       MOS62260
1D10  4330 052A      3228           BZ    ABORT1            YES, ABORT TESTING SEQUENCE MOS62270
1D14  D100 1EC0      3229  ERORTN1  LM    R0,MOSSAVE        NO, RESTORE CALLING REGISTERS AND MOS62280
1D18  03CF           3230           BR    LINK              RETURN               MOS62290
                     3231  *                                                       MOS62300
1D1A  48F0 0B18      3232  ERORTN2  LH    LINK,TOTERR       IF SCOPE = 4         MOS62310
1D1E  26F1           3233           AIS   LINK,1            INDEX THE ERROR COUNTER MOS62320
1D20  40F0 0B18      3234           STH   LINK,TOTERR                              MOS62330
1D24  C5F0 7FFF      3235           CLAI  LINK,X'7FFF'      TOTERR = MAXIMUM ?   MOS62340
1D28  203A           3236           BNES  ERORTN1           NO, RETURN           MOS62350
1D2A  4300 0594      3237           B     HALT9             YES, WAIT FOR PRINTOUT MOS62360

                     3239  *-------------------------------------------------------------------- MOS62380

1D2E  C850 2041      3241  PARTNO   LDAI  R5,C' A'                                 MOS62400
1D32  081E           3242           LDAR  R1,R14            GET PSW              MOS62410
1D34  9014           3243           SRHLS R1,4                                     MOS62420
1D36  C410 0007      3244           NAI   R1,7              MASK OFF MEMORY SEGMENT MOS62430
1D3A  C510 0003      3245           CLAI  R1,3              IS ERROR IN "A" DRIVE AREA ? MOS62440
1D3E  2183           3246           BLS   CO1               YES, BRANCH          MOS62450
1D40  C850 2042      3247           LDAI  R5,C' B'          NO, LOAD "B" SYMBOL  MOS62460
1D44  D250 1E06      3248  CO1      STB   R5,CHIPNO         STORE FIRST CHIP LETTER MOS62470
1D48  C850 2030      3249           LDAI  R5,C' 0'                                 MOS62480
1D4C  2611           3250           AIS   R1,1              ALIGN PSW TO TRUE SEGMENT NUMBER MOS62490
1D4E  0A51           3251           AAR   R5,R1             PUT SEGMENT IN ERROR MESSAGE MOS62500
1D50  C510 0004      3252           CLAI  R1,4              IS SEGMENT NUMBER TRUE ? MOS62510
1D54  2182           3253           BLS   CO2               YES, BRANCH          MOS62520
1D56  2754           3254           SIS   R5,4              NO, RECTIFY SEGMENT NUMBER MOS62530
1D58  D250 1E07      3255  CO2      STB   R5,CHIPNO+1       STORE 32KB ROW NUMBER MOS62540
1D5C  0734           3256           XAR   R3,R4             DETERMINE BIT(S) THAT FAILED MOS62550
1D5E  2410           3257           LIS   R1,0              INITIALIZE CHIP NUMBER MOS62560
1D60  C530 FFFF      3258           CLAI  R3,-1             DID ALL BITS FAIL ?  MOS62570
1D64  2137           3259           BNES  CO3               NO, BRANCH           MOS62580
1D66  C840 4646      3260           LDAI  R4,C'FF'                                 MOS62590
1D6A  4040 1E08      3261           STH   R4,CHIPNO+2       YES, STORE 32KB ROW IDENTIFIER MOS62600
1D6E  2430           3262           LIS   R3,0                                     MOS62610
1D70  230C           3263           BS    CO5               CONTINUE             MOS62620
1D72  0A11           3264  CO3      AAR   R1,R1            DECIPHER FAILING BIT NUMBER(S) MOS62630
                     3265  *                               (00-09,10-16)    (SLHLS  R1,1)  **** MOS62640
1D74  2185           3266           BCS   CO4                                      MOS62650
1D76  2611           3267           AIS   R1,1                                    MOS62660
1D78  C510 0010      3268           CLAI  R1,16             CHIP NUMBER = 16 ?   MOS62670
1D7C  2085           3269           BLS   CO3               NO, BRANCH           MOS62680
1D7E  2402           3270  CO4      LIS   R0,2                                     MOS62690
```

COMMON ERROR ROUTINE

```
1D80  C820 1E08          3271           LDAI  R2,CHIPNO+2       CONVERT TO DECIMAL AND                MOS62700
1D84  41E0 071E          3272           BAL   LINK,DECASC       STORE IN ERROR MESSAGE                MOS62710
1D88  C850 1DEC          3273  C05      LDAI  R5,CHIPMSG                                              MOS62720
1D8C  4050 0B0C          3274           STH   R5,ISITERR        SET ISITERR                           MOS62730
1D90  41E0 0756          3275           BAL   LINK,PRINT        PRINT SUSPECTED CHIP NUMBER           MOS62740
1D94  2450               3276           LIS   R5,0                                                    MOS62750
1D96  4050 0B0C          3277           STH   R5,ISITERR        RESET ISITERR                         MOS62760
1D9A  0833               3278           LDAR  R3,R3             HAVE ALL SUSPECT CHIPS BEEN PRINTED?  MOS62770
1D9C  4230 1D72          3279           BNZ   C03               NO, BRANCH                            MOS62780
1DA0  D100 1EC0          3280           LM    R0,MOSSAVE        YES, RESTORE REGISTERS AND            MOS62790
1DA4  4300 1CB0          3281           B     ERROR2            GO PRINT ERROR DATA                   MOS62800
                         3282  *                                                                      MOS62810
                         3283  * ************************************************************************MOS62820
                         3284  *        END   COMMON ERROR ROUTINE                                     MOS62830
```

CHKSUM FILE

```
                                3286  *                                                                    MOS62850
                                3287  *        TEST MESSAGES                                               MOS62860
                                3288  *                                                                    MOS62870
1DA8   4153 5349 474E 4544      3289  ASMEMMSG DC    C'ASSIGNED MEMORY ',X'0D0A'                          MOS62880
1DB0   204D 454D 4F52 5920
1DB8   0D0A
1DBA   4C4F 4C49 4D20 3E20      3290  HILOMSG  DC    C'LOLIM > HILIM IS ILLEGAL',X'0D0A'                  MOS62890
1DC2   4849 4C49 4D20 4953
1DCA   2049 4C4C 4547 414C
1DD2   0D0A
1DD4   494C 4C45 4741 4C20      3291  TSTREJ   DC    C'ILLEGAL TEST SEQUENCE ',X'0D0A'                    MOS62900
1DDC   5445 5354 2053 4551
1DE4   5545 4E43 4520
1DEA   0D0A
1DEC   5355 5350 4543 5445      3292  CHIPMSG  DC    C'SUSPECTED BAD CHIP NUMBER '                        MOS62910
1DF4   4420 4241 4420 4348
1DFC   4950 204E 554D 4245
1E04   5220
1E06   2A2A 2A2A                3293  CHIPNO   DC    C'****',X'0D0A'                                      MOS62920
1E0A   0D0A
1E0C   4C4F 4320                3294  ERRORMSG DC    C'LOC '                                              MOS62930
                                3295  *                                                                    MOS62940
1E10   2A2A 2A2A 2A20 2044      3296  ADRMSG   DC    C'*****  DATA EXP '                                  MOS62950
1E18   4154 4120 4558 5020
1E20   2A2A 2A2A 2020 4441      3297  DTAEXP   DC    C'****  DATA READ '                                  MOS62960
1E28   5441 2052 4541 4420
1E30   2A2A 2A2A 2020 5053      3298  DTARED   DC    C'****  PSW = '                                      MOS62970
1E38   5720 3D20
1E3C   2A2A 2A2A                3299  DTAPSW   DC    C'****',X'0D0A'                                      MOS62980
1E40   0D0A
1E42   4D45 4D4F 5259 2055      3300  T6MSG    DC    C'MEMORY UNDER GALPAT TEST',X'0D0A'                  MOS62990
1E4A   4E44 4552 2047 414C
1E52   5041 5420 5445 5354
1E5A   0D0A
1E5C   3038 3030 302D 3646      3301  LOMSG    DC    C'08000-6FFFF ',X'0D0A'                              MOS63000
1E64   4646 4620
1E68   0D0A
       0000 1E62                3302  HIMSG    EQU   LOMSG+6                                              MOS63010
                                3303  *                                                                    MOS63020
1E6A   504F 5745 5220 444F      3304  T7MSG    DC    C'POWER DOWN PROCESSOR FOR 30 SECONDS ',X'0D0A'      MOS63030
1E72   574E 2050 524F 4345
1E7A   5353 4F52 2046 4F52
1E82   2033 3020 5345 434F
1E8A   4E44 5320
1E8E   0D0A
1E90   4849 4C49 4D20 2D20      3305  T8LOMSG  DC    C'HILIM - LOLIM IS < REQUIRED ',X'0D0A'              MOS63040
1E98   4C4F 4C49 4D20 4953
1EA0   203C 2052 4551 5549
1EA8   5245 4420
1EAC   0D0A
                                3306  * ********************************************************************** MOS63050
                                3307  *        END   TEST MESSAGE FILE                                     MOS63060
       0000 1EAD                3308  LNZB     EQU   *-1                                                   MOS63070
```

```
                                MOS63090
                                MOS63100
                                MOS63110
*********                       MOS63120
                                MOS63130
                                MOS63140
                                MOS63150
                                MOS63160
                                MOS63170
*********                       MOS63180
                                MOS63190
                                MOS63200
                                MOS63210
                                MOS63220
                                MOS63230
NES                             MOS63240
                                MOS63250
                                MOS63260
                                MOS63270
*********                       MOS63280
      ***                       MOS63290
```

CHKSUM FILE

```
                                3286  *                                                                    MOS62850
                                3287  *         TEST MESSAGES                                              MOS62860
                                3288  *                                                                    MOS62870
1DA8  4153 5349 474E 4544       3289  ASMEMMSG  DC    C'ASSIGNED MEMORY ',X'0D0A'                         MOS62880
1DB0  204D 454D 4F52 5920
1DB8  0DCA
1DBA  4C4F 4C49 4D20 3E20       3290  HILOMSG   DC    C'LOLIM > HILIM IS ILLEGAL',X'0D0A'                MOS62890
1DC2  4849 4C49 4D20 4953
1DCA  2049 4C4C 4547 414C
1DD2  0DCA
1DD4  494C 4C45 4741 4C20       3291  TSTREJ    DC    C'ILLEGAL TEST SEQUENCE ',X'0D0A'                  MOS62900
1DDC  5445 5354 2053 4551
1DE4  5545 4E43 4520
1DEA  0DCA
1DEC  5355 5350 4543 5445       3292  CHIPMSG   DC    C'SUSPECTED BAD CHIP NUMBER '                      MOS62910
1DF4  4420 4241 4420 4348
1DFC  4950 204E 554D 4245
1E04  5220
1E06  2A2A 2A2A                 3293  CHIPNO    DC    C'****',X'0D0A'                                    MOS62920
1E0A  0DCA
1E0C  4C4F 4320                 3294  ERRORMSG  DC    C'LOC '                                            MOS62930
                                3295  *                                                                  MOS62940
1E10  2A2A 2A2A 2A20 2044       3296  ADRMSG    DC    C'*****  DATA EXP '                                MOS62950
1E18  4154 4120 4558 5020
1E20  2A2A 2A2A 2020 4441       3297  DTAEXP    DC    C'****  DATA READ '                                MOS62960
1E28  5441 2052 4541 4420
1E30  2A2A 2A2A 2020 5053       3298  DTARED    DC    C'****  PSW = '                                    MOS62970
1E38  5720 3D20
1E3C  2A2A 2A2A                 3299  DTAPSW    DC    C'****',X'0D0A'                                    MOS62980
1E40  0D0A
1E42  4D45 4D4F 5259 2055       3300  T6MSG     DC    C'MEMORY UNDER GALPAT TEST',X'0D0A'                MOS62990
1E4A  4E44 4552 2047 414C
1E52  5041 5420 5445 5354
1E5A  0DCA
1E5C  3038 3030 302D 3646       3301  LOMSG     DC    C'08000-6FFFF ',X'0D0A'                            MOS63000
1E64  4646 4620
1E68  0D0A
      0000 1E62                 3302  HIMSG     EQU   LOMSG+6                                            MOS63010
                                3303  *                                                                  MOS63020
1E6A  504F 5745 5220 444F       3304  T7MSG     DC    C'POWER DOWN PROCESSOR FOR 30 SECONDS ',X'0D0A'    MOS63030
1E72  574E 2050 524F 4345
1E7A  5353 4F52 2046 4F52
1E82  2033 3020 5345 434F
1E8A  4E44 5320
1E8E  0D0A
1E90  4849 4C49 4D20 2D20       3305  T8LOMSG  DC    C'HILIM - LOLIM IS < REQUIRED ',X'0D0A'             MOS63040
1E98  4C4F 4C49 4D20 4953
1EA0  203C 2052 4551 5549
1EA8  5245 4420
1EAC  0DCA
                                3306  * ************************************************************************  MOS63050
                                3307  *         END   TEST MESSAGE FILE                                    MOS63060
      0000 1EAD                 3308  LNZB      EQU   *-1                                                  MOS63070
```

CHKSUM FILE

```
                        3310  *                                                                       MOS63090
                        3311  *        TEST PROGRAM STORAGE AREA                                      MOS63100
                        3312  *                                                                       MOS63110
                        3313  * ********************************************************************* MOS63120
                        3314  *                                                                       MOS63130
1EAE                    3315  OPTBUF   DS    6                 OPTION INPUT BUFFER                   MOS63140
1EB4                    3316  VLOLIM   DS    2                 VIRTUAL LOW LIMIT                     MOS63150
1EB6                    3317  VHILIM   DS    2                 VIRTUAL HIGH LIMIT                    MOS63160
                        3318  *                                                                       MOS63170
                        3319  * ********************************************************************* MOS63180
                        3320  *                                                                       MOS63190
1EB8                    3321          ALIGN 8                                                         MOS63200
                        3322  *                                                                       MOS63210
1EB8                    3323  PSWSAVE  DS    8                 PPF PSW SAVE AREA                     MOS63220
1EC0                    3324  MOSSAVE  DS    64                S16MMT REGISTER SAVE AREA             MOS63230
1F00                    3325  ERRSAVE  DS    32                REG STORAGE FOR ERROR ROUTINES        MOS63240
1F20                    3326  MMSAVE   DS    32                T7 MM REGISTER SAVE AREA              MOS63250
1F40                    3327  RSAVE    DS    160               REGISTER SAVE AREA                    MOS63260
1FE0                    3328           DB    *                                                       MOS63270
                        3329  * ********************************************************************* MOS63280
                        3330  *        END   TEST PROGRAM 06-214F01R00 PART 2 SECTION 1          ***  MOS63290
```

```
                        3383  * SCHKSUM/M17 PUNCHER (CONTINUED)                                  MOS63820
                        3384  *                                                                  MOS63830
                        3385  *                                                                  MOS63840
205A   C800 0100        3386  $TAPL    LDAI  R0,256          TO PUNCH BLANK LEADER              MOS63850
205E   2303             3387           BS    STAPLP                                             MOS63860
                        3388  *                                                                  MOS63870
2060   C800 0080        3389  $TAPL1   LDAI  R0,128          TO PUNCH 1-FOLD GAP                MOS63880
                        3390  *                                                                  MOS63890
2064   2701             3391  STAPLP   SIS   R0,1                                               MOS63900
2066   032F             3392           BNPR  R15              RETURN                             MOS63910
2068   2430             3393           LIS   R3,0                                               MOS63920
206A   9A63             3394           WDR   R6,R3            PUNCH BLANK FRAME                  MOS63930
206C   9D68             3395           SSR   R6,R8                                              MOS63940
206E   2081             3396           BTBS  8,1                                                MOS63950
2070   2206             3397           BS    STAPLP           CONTINUE                           MOS63960
                        3398  *                                                                  MOS63970
                        3399  * ************************************************************     MOS63980
2072                    3400           END                                                      MOS63990
```

CHKSUM/M17 PUNCHER

```
1FE0  2400           3332  SCHKSUM  LIS   R0,0            PUNCH M17 TAPE WITH CHECKSUM      MOS63310
1FE2  9510           3333           EPSR  R1,R0           SELECT REG. SET 0 & CLEAR PSW     MOS63320
                     3334  *                                                                MOS63330
1FE4  C810 0100      3335           LDAI  R1,ORIGIN1       LOAD START ADDRESS                MOS63340
1FE8  2421           3336           LIS   R2,1             LOAD INCREMENT VALUE              MOS63350
1FEA  C830 1EAD      3337           LDAI  R3,LNZB          LOAD FINAL ADDRESS                MOS63360
1FEE  2440           3338           LIS   R4,0             INITIALIZE CHKSUM BYTE            MOS63370
                     3339  *                                                                MOS63380
1FF0  D351 0000      3340  SGEN     LB    R5,0(R1)                                          MOS63390
1FF4  0745           3341           XAR   R4,R5            CALCULATE CHKSUM BYTE             MOS63400
1FF6  C110 1FF0      3342           BXLE  R1,SGEN                                            MOS63410
1FFA  D240 0099      3343           STB   R4,MN+3          CHECKSUM BYTE TO BOOT LOADER      MOS63420
                     3344  *                                                                MOS63430
1FFE  C810 0080      3345  STAPE    LDAI  R1,X'0080'                                         MOS63440
2002  9E21           3346           OCR   R2,R1            DISPLAY IN NORMAL MODE            MOS63450
2004  9444           3347           EXBR  R4,R4                                              MOS63460
2006  9824           3348           WHR   R2,R4            DISPLAY CHKSUM BYTE (TO D1)       MOS63470
2008  9411           3349           EXBR  R1,R1                                              MOS63480
200A  95C1           3350           EPSR  R0,R1            HALT PROCESSOR                    MOS63490
                     3351  *                                                                MOS63500
                     3352  * ****************************************************************MOS63510
                     3353  *                                                                MOS63520
200C  D360 007A      3354  SPUNCH   LB    R6,X'7A'        GET BOUTDV (PUNCH) ADDRESS        MOS63530
2010  DE60 007B      3355           OC    R6,X'7B'        START TAPE PUNCH                  MOS63540
2014  9D60           3356           SSR   R6,R0                                              MOS63550
2016  2081           3357           BTBS  8,1                                                MOS63560
2018  41F0 205A      3358           BAL   R15,STAPL        PUNCH LEADER (256 CHARACTERS)     MOS63570
201C  9411           3359           EXBR  R1,R1            (R1) = X'0080'                    MOS63580
201E  C830 00CF      3360           LDAI  R3,X'CF'                                           MOS63590
                     3361  *                                                                MOS63600
2022  DA61 0000      3362  SPNCH1   WD    R6,0(R1)        PUNCH BOOT LOADER                 MOS63610
2026  9D60           3363           SSR   R6,R0                                              MOS63620
2028  2081           3364           BTBS  8,1                                                MOS63630
202A  C110 2022      3365           BXLE  R1,SPNCH1                                          MOS63640
202E  41F0 2060      3366           BAL   R15,STAPL1       PUNCH ONE-FOLD GAP                MOS63650
                     3367  *                                                                MOS63660
2032  D340 0099      3368           LB    R4,MN+3          GET CHECKSUM BYTE                 MOS63670
2036  C810 0100      3369           LDAI  R1,ORIGIN1       (NORMALLY X'A00')                 MOS63680
203A  C830 1EAD      3370           LDAI  R3,LNZB                                            MOS63690
                     3371  *                                                                MOS63700
203E  D351 0000      3372  SPNCH2   LB    R5,0(R1)        PUNCH PROGRAM                     MOS63710
2042  0745           3373           XAR   R4,R5            (ORIGIN1 TO LNZB)                 MOS63720
2044  9A65           3374           WDR   R6,R5                                              MOS63730
2046  9401           3375           EXBR  R0,R1                                              MOS63740
2048  9820           3376           WHR   R2,R0            DISPLAY ADDRESS PUNCHED           MOS63750
204A  9D60           3377           SSR   R6,R0                                              MOS63760
204C  2081           3378           BTBS  8,1                                                MOS63770
204E  C110 203E      3379           BXLE  R1,SPNCH2                                          MOS63780
2052  41F0 205A      3380           BAL   R15,STAPL        PUNCH TRAILER                     MOS63790
2056  4300 1FFE      3381           B     STAPE            DISPLAY CHKSUM & HALT PROCESSOR   MOS63800
```

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

START OPTIONS: T=16,CROSS,ERLST,

NO CAL ERRORS
NO CAL WARNINGS
2 PASSES

```
SCHKSUM   0000 1FE0   3332*
SDEC1     0000 0728    727*   741
SDEC2     0000 072E    729*   734    736
SDEC3     0000 0740    730    737*
SGEN      0000 1FF0   3340*  3342
SPNCH1    0000 2022   3362*  3365
SPNCH2    0000 203E   3372*  3379
SPUNCH    0000 200C   3354*
STAPE     0000 1FFE   3345*  3381
STAPL     0000 205A   3358   3380   3386*
STAPL1    0000 2060   3366   3389*
STAPLP    0000 2064   3387   3391*  3397
STSTDU0   0000 0964    936    938*
STSTDU1   0000 0982    948*
STSTDU2   0000 0984    945    947    949*
ABORT     0000 04E8    503*
ABORT1    0000 052A    522*  3228
ABORT2    0000 0568    545*
ABORT3    0000 0532    515    525*
ABSTOP    0000 2072
ADC       0000 0002    726    740    884    891    928
ADRMSG    0000 1E10   3199   3212   3296*
AMSG      0000 0B98    217   1161*
ASCILOC   0000 0B82    645   1158*
ASCIPSW   0000 0B78    642   1156*
ASMEMMSG  0000 1DA8   1387   3289*
BGTST     0000 1250   1966*
BGTST1    0000 126C   1976*  1979
BGTST2    0000 1274   1979*  1983
BGTST2.5  0000 127A   1978   1982*
BGTST3    0000 1280   1975   1980   1985*
BGTST4    0000 128A   1990*  1993
BGTST5    0000 1292   1993*  1997
BGTST5.5  0000 1298   1992   1996*
BGTST6    0000 129E   1989   1994   1999*
BGTST7    0000 12A2   2000*  2027
BOOT      0000 0088     91     94*
BRK.SAV   0000 0B26    885    892    925    929   1138*
BRKMSG    0000 0B9A   1162*  1265
BRKVECT   0000 0B0A    887    923    927   1123*  2302   2387
BTESTNO   0000 0B1A    444    457    474    497    553   1131*
C300ADR   0000 0118    141*
CAR2ND    0000 0B00   1112*
CARRD     0000 0AF4   1103*
CARRQ2S   0000 0B08   1119*
CHIPMSG   0000 1DEC   3273   3292*
CHIPNO    0000 1E06   3248   3255   3261   3271   3293*
```

```
CHKCOL    0000 1082      1756   1759   1762   1767*
CHKCOL1   0000 1094      1772*  1777
CHKCOL2   0000 109E      1774   1776*
CHKCOL3   0000 10AE      1781*  1811
CHKCOL4   0000 10C4      1786   1788*
CHKCOL5   0000 10CE      1791*  1857
CHKCOL5F  0000 11A2      1790   1856*
CHKCOL6   0000 10E4      1797*  1860
CHKCOL6F  0000 11AA      1796   1859*
CHKCOL7   0000 10FE      1804*  1863
CHKCOL7F  0000 11B2      1803   1862*
CHKCOL8   0000 1118      1811*  1866
CHKCOL8F  0000 11BA      1810   1865*
CHKCOL9   0000 112E      1818*  1847
CHKCOLA   0000 1138      1820   1822*
CHKCOLB   0000 114E      1828*  1869
CHKCOLBF  0000 11C2      1827   1868*
CHKCOLC   0000 1164      1834*  1872
CHKCOLCF  0000 11CA      1833   1871*
CHKCOLD   0000 117C      1841*  1851
CHKCOLDF  0000 1196      1840   1850*
CHKCOLE   0000 1190      1847*  1854
CHKCOLEF  0000 119C      1846   1853*
CHKLOC    0000 0EE4      1518   1522   1525   1529   1532   1536   1543*
CHKLOC1   0000 0EF6      1549*  1554
CHKLOC10  0000 0F98      1605*  1612
CHKLOC1F  0000 0FA4      1604   1611*
CHKLOC2   0000 0F00      1551   1553*
CHKLOC3   0000 0F10      1558*  1574
CHKLOC4   0000 0F26      1563   1565*
CHKLOC5   0000 0F2E      1568*  1578
CHKLOC5F  0000 0F48      1567   1577*
CHKLOC6   0000 0F42      1573   1574*  1581
CHKLOC6A  0000 0F54      1575   1583*
CHKLOC6F  0000 0F4E      1580*
CHKLOC7   0000 0F66      1589*  1605
CHKLOC8   0000 0F70      1591   1593*
CHKLOC9   0000 0F84      1599*  1609
CHKLOC9F  0000 0F9E      1598   1608*
CKBG60    0000 1424      2193*
CKBG61    0000 1438      2200*  2207
CKBG62    0000 1442      2202   2204*
CKBG63    0000 144A      2207*  2213
CKBG64    0000 1450      2206   2210*
CKBG65    0000 145E      2208   2215*
CKBG66    0000 142E      2196*
CLIF2ND   0000 0AFC      1110*
CLIFADR   0000 0114       139*
CLIFRD    0000 0AF0      1101*
CLKCOL    0000 1B16      3046   3049   3052   3057*
CLKCOL1   0000 1B28      3063*  3068
CLKCOL2   0000 1B32      3065   3067*
CLKCOL3   0000 1B42      3072*  3102
CLKCOL4   0000 1B58      3077   3079*
CLKCOL5   0000 1B62      3082*  3148
```

```
CLKCOL5F  0000 1C36   3081   3147*
CLKCOL6   0000 1B78   3088*  3151
CLKCOL6F  0000 1C3E   3087   3150*
CLKCOL7   0000 1B92   3095*  3154
CLKCOL7F  0000 1C46   3094   3153*
CLKCOL8   0000 1BAC   3102*  3157
CLKCOL8F  0000 1C4E   3101   3156*
CLKCOL9   0000 1EC2   3109*  3138
CLKCOLA   0000 1BCC   3111   3113*
CLKCOLB   0000 1BE2   3119*  3160
CLKCOLBF  0000 1C56   3118   3159*
CLKCOLC   0000 1BF8   3125*  3163
CLKCOLCF  0000 1C5E   3124   3162*
CLKCOLD   0000 1C10   3132*  3142
CLKCOLDF  0000 1C2A   3131   3141*
CLKCOLE   0000 1C24   3138*  3145
CLKCOLEF  0000 1C30   3137   3144*
CLKLOC    0000 1A2E   2910   2914   2917   2921   2924   2928   2934*
CLKLOC1   0000 1A40   2940*  2945
CLKLOC10  0000 1AE2   2996*  3004
CLKLOC1F  0000 1AEE   2995   3003*
CLKLOC2   0000 1A4A   2942   2944*
CLKLOC3   0000 1A5A   2949*  2965
CLKLOC4   0000 1A70   2954   2956*
CLKLOC5   0000 1A78   2959*  2969
CLKLOC5F  0000 1A92   2958   2968*
CLKLOC6   0000 1A8C   2964   2965*  2972
CLKLOC6A  0000 1A9E   2966   2974*
CLKLOC6F  0000 1A98   2971*
CLKLOC7   0000 1AB0   2980*  2996
CLKLOC8   0000 1ABA   2982   2984*
CLKLOC9   0000 1ACE   2990*  3001
CLKLOC9F  0000 1AE8   2989   3000*
CO1       0000 1D44   3246   3248*
CO2       0000 1D58   3253   3255*
CO3       0000 1D72   3259   3264*  3269   3279
CO4       0000 1D7E   3266   3270*
CO5       0000 1D88   3263   3273*
COMM      0000 0A04   1005*  1022
COMM1     0000 0A0C   1007*  1080
COMRET    0000 0B22    612    619   1136*
CON       0000 0C5E   1179   1195*
CON2ND    0000 0AF8    178    187    188   1062   1106*  1107   1108   2328
CONADR    0000 0AEA    184    864    893    963   1096*
CONENRD   0000 0AF9   1108*
CONRD     0000 0AEC    185    186    198    861    964   1063   1097*  1098   2329
CONRQ2S   0000 0B04    172    190    191    969   1115*
CONSOLE   0000 0C20   1179*
CONTIN    0000 0BCC    514    921   1172*
CONWRT    0000 0AED    978   1098*  1099
COUNT     0000 0B1C    471    486    488   1132*
CRLF      0000 07DE    205    213    289    331    357    410    427    567    799*   873
CRT2ND    0000 0AFA   1109*
CRTRD     0000 0AEE   1100*
CRTRQ2S   0000 0B05   1116*
```

KHKCOL5	0000	18E8	2785*	2851										
KHKCOL5F	0000	19BC	2784	2850*										
KHKCOL6	0000	18FE	2791*	2854										
KHKCOL6F	0000	19C4	2790	2853*										
KHKCOL7	0000	1918	2798*	2857										
KHKCOL7F	0000	19CC	2797	2856*										
KHKCOL8	0000	1932	2805*	2860										
KHKCOL8F	0000	19D4	2804	2859*										
KHKCOL9	0000	1948	2812*	2841										
KHKCOLA	0000	1952	2814	2816*										
KHKCOLB	0000	1968	2822*	2863										
KHKCOLBF	0000	19DC	2821	2862*										
KHKCOLC	0000	197E	2828*	2866										
KHKCOLCF	0000	19E4	2827	2865*										
KHKCOLD	0000	1996	2835*	2845										
KHKCOLDF	0000	19B0	2834	2844*										
KHKCOLE	0000	19AA	2841*	2848										
KHKCOLEF	0000	19B6	2840	2847*										
KHKLOC	0000	17B0	2612	2616	2619	2623	2626	2630	2636*					
KHKLOC1	0000	17C2	2642*	2647										
KHKLOC10	0000	1866	2699*	2707										
KHKLOC1F	0000	1872	2698	2706*										
KHKLOC2	0000	17CC	2644	2646*										
KHKLOC3	0000	17DC	2651*	2667										
KHKLOC4	0000	17F2	2656	2658*										
KHKLOC5	0000	17FA	2661*	2671										
KHKLOC5F	0000	1814	2660	2670*										
KHKLOC6	0000	180E	2666	2667*	2674									
KHKLOC6A	0000	1820	2668	2676*										
KHKLOC6F	0000	181A	2673*											
KHKLOC7	0000	1834	2683*	2699										
KHKLOC8	0000	183E	2685	2687*										
KHKLOC9	0000	1852	2693*	2704										
KHKLOC9F	0000	186C	2692	2703*										
LADC	0000	0001	475	725										
LCORE	0000	09D0	201	439	984*	2393								
LDWT	0000	00C8	117*	120										
LEADER	0000	00A2	101*	105										
LEVELIN	0000	03AE	383*	1171	1172	1173	1174	1177	1178					
LINK	0000	000F	73*	180	201	205	211	212	213	216	218	220	282	289	292
			297	309	310	314	317	331	336	341	344	352	357	358	410
			427	428	439	463	466	468	482	483	489	496	503	504	507
			509	513	522	523	527	530	534	536	537	548	563	567	570
			573	576	581	587	591	596	608	615	634	643	646	648	701
			718	743	748	767	777	786	790	791	793	801	810	825	829
			839	848	849	869	873	874	876	885	886	887	892	921	929
			930	951	959	1001	1009	1010	1033	1251	1257	1283	1305	1362	1363
			1369	1375	1380	1385	1389	1391	1428	1445	1455	1464	1469	1472	1510
			1538	1560	1577	1580	1595	1608	1611	1651	1670	1687	1697	1709	1712
			1751	1764	1783	1824	1850	1853	1856	1859	1862	1865	1868	1871	1917
			1944	1950	1982	1996	2026	2070	2077	2079	2107	2168	2173	2191	2211
			2261	2280	2293	2301	2302	2303	2348	2366	2372	2378	2384	2386	2387
			2388	2391	2393	2405	2411	2449	2484	2509	2525	2542	2555	2567	2604
			2653	2670	2673	2689	2703	2706	2757	2777	2818	2844	2847	2850	2853
			2856	2859	2862	2865	2902	2951	2968	2971	2986	3000	3003	3054	3074

```
MTESTNO   0000 0B4A    436    462    464   1149*
NEXTST    0000 0B1E    445    449    460   1133*
NOERMSG   0000 0B6A    495   1154*
NOERR     0000 0B0E    470    493    618   1125*  3189
NOMSG     0000 0BD8    534    771   1173*
NORM      0000 010E    133*   595   1250   1277   1300   3182
OLOC      0000 0AE2    644   1006   1045   1087*
OPSW      0000 0AE0    641   1005   1044   1086*
OPT       0000 0BB4    255    291    333   1169*
OPTBUF    0000 1EAE    223    224    225    241    249    260   3315*
OPTCMD    0000 02AA    290*
OPTCMD1   0000 02AC    291*   295
OPTCMD10  0000 0334    335*   339
OPTCMD11  0000 0366    352*   356
OPTCMD12  0000 0374    347    350    357*
OPTCMD2   0000 02CE    301*   327
OPTCMD3   0000 02D4    303*   322
OPTCMD4   0000 02DA    305*
OPTCMD5   0000 02EC    307    310*
OPTCMD6   0000 02FC    312    315*
OPTCMD7   0000 0308    304    318*
OPTCMD71  0000 031A    323*
OPTCMD8   0000 0328    288    331*
OPTCMD9   0000 0332    334*   361
OPTEND    0000 0C2C   1181*
OPTEND2   0000 0C2C    360   1180*  1181
OPTEXX    0000 0298    277    280    284*
OPTIN     0000 01BE    211*   233    354    379    394    407    539    582   1196   1258   2568
OPTIN1    0000 01CA    214*   362    879   1012
OPTIN2    0000 0D08    922    924   1265*
OPTION    0000 0C44    271    284   1190*
OPTRTN    0000 029E    287*
OPTVAL    0000 0682    278    371    399    653*
OPTVAL0   0000 0688    655*   673
OPTVAL1   0000 068A    656*   659
OPTVAL2   0000 0696    657    661*
OPTVAL3   0000 069A    663*   669
OPTVAL4   0000 06AE    667    670*
OPTVAL5   0000 06AA    665    668*
ORIGIN1   0000 0100     94    123*  3335   3369
OTC.0     0000 07FE    810*   815    824    826
OTC.1     0000 0814    813    817*
OTC.3     0000 0826    820    823*
OTC.4     0000 0844    832*   837
OTC.5     0000 085A    839*   845
OUT.SAV   0000 0B24    805    848   1137*
OUT0      0000 0870    811    830    833    835    840    847*
OUT1      0000 0874    846    848*
OUTCHR    0000 07EC    218    220    282    292    297    309    314    317    336    341    576    697    767
                       777    786    790    801    805*
OUTCHR2   0000 0834    808    816    822    828*
P1        0000 076C    749    753*
P2        0000 0792    767*   769
P3        0000 079E    754    771*
P4        0000 0778    756*   760
```

			2992	3042	3084	3121	3134	3198	3201	3204	3207	3210	3211	3242	3243
			3244	3245	3250	3251	3252	3257	3264	3264	3267	3268	3333	3335	3340
			3342	3345	3346	3349	3349	3350	3359	3359	3362	3365	3369	3372	3375
			3379												
R10	0000 000A		66*	1029	1030	1031	1036	1036	1037	1043	1515	1520	1527	1534	1549
			1561	1592	1753	1772	1784	1821	1927	2005	2006	2018	2084	2089	2096
			2103	2116	2122	2139	2150	2179	2200	2270	2275	2362	2455	2533	2609
			2614	2621	2628	2642	2654	2686	2746	2766	2778	2815	2907	2912	2919
			2926	2940	2952	2983	3043	3063	3075	3112					
R11	0000 000B		67*	1516	1521	1528	1535	1552	1564	1589	1754	1775	1787	1818	1928
			2008	2009	2021	2085	2090	2097	2104	2119	2125	2136	2153	2182	2203
			2271	2276	2367	2456	2506	2546	2610	2615	2622	2629	2645	2657	2683
			2747	2769	2781	2812	2908	2913	2920	2927	2943	2955	2980	3044	3066
			3078	3109											
R12	0000 000C		68*	221	239	248	259	370	373	384	401	420	660	1671	1673
			1678	1949	1970	1985	2011	2083	2164	2188	2272	2277	2373	2529	2539
			2545	2558											
R13	0000 000D		69*	1517	1524	1531	1550	1562	1590	1669	1679	1696	1705	1755	1758
			1761	1773	1785	1819	1962	2013	2086	2093	2100	2117	2123	2137	2151
			2180	2201	2273	2278	2379	2611	2618	2625	2643	2655	2684	2748	2751
			2754	2767	2779	2813	2909	2916	2923	2941	2953	2981	3045	3048	3051
			3064	3076	3110										
R14	0000 000E		70*	278	288	324	371	374	376	399	402	671	674	680	1005
			1020	1026	1026	1029	1040	1042	1043	1044	1200	1201	1202	1204	1205
			1206	1207	1208	1210	1211	1212	1214	1215	1218	1222	1222	1223	1224
			1225	1227	1228	1231	1233	1235	1237	1241	1242	1243	1244	1246	1249
			1250	1363	1518	1522	1525	1529	1532	1536	1606	1756	1759	1762	1848
			1934	1942	2002	2087	2091	2094	2098	2101	2105	2224	2296	2304	2310
			2311	2312	2312	2313	2314	2315	2320	2321	2323	2325	2326	2326	2327
			2328	2332	2333	2335	2337	2339	2341	2341	2342	2343	2344	2346	2347
			2353	2389	2487	2560	2612	2616	2619	2623	2626	2630	2701	2749	2752
			2755	2842	2910	2914	2917	2921	2924	2928	2998	3046	3049	3052	3139
			3177	3177	3178	3179	3207	3242							
R15	0000 000F		72*	199	207	228	376	385	411	412	413	531	532	654	655
			656	658	662	663	697	805	923	925	1006	1021	1041	1045	1955
			1956	2315	3168	3169	3358	3366	3380	3392					
R2	0000 0002		58*	90	110	116	155	157	162	167	169	171	172	176	176
			177	178	185	186	187	188	196	196	197	214	215	284	285
			290	291	293	294	300	303	303	325	333	335	337	342	359
			360	449	452	455	457	458	459	460	462	464	465	474	475
			476	559	601	605	606	612	617	618	619	620	642	645	689
			690	692	694	698	713	714	738	739	753	900	901	903	908
			912	915	915	985	1008	1016	1017	1018	1019	1027	1028	1038	1039
			1050	1054	1055	1057	1061	1062	1063	1064	1072	1073	1076	1077	1078
			1279	1279	1280	1281	1282	1286	1287	1291	1368	1374	1379	1384	1929
			1931	1937	1939	1953	1954	1969	2000	2081	2163	2187	2297	2299	2399
			2400	2404	2472	2473	2474	2475	2476	2477	2491	2492	2493	2494	2495
			2496	3199	3202	3205	3208	3212	3271	3336	3346	3348	3376		
R3	0000 0003		59*	95	96	97	163	164	167	183	184	193	193	197	198
			199	256	260	264	266	287	300	325	334	338	403	574	577
			678	681	681	706	707	708	710	715	724	725	726	728	740
			766	768	986	992	993	1274	1275	1282	1288	1289	1290	1291	1293
			1296	1301	1303	1436	1438	1447	1452	1458	1549	1552	1553	1561	1564
			1566	1568	1569	1572	1589	1592	1597	1599	1600	1603	1661	1663	1672
			1673	1674	1676	1684	1690	1698	1700	1702	1704	1772	1775	1776	1784

		1787	1789	1791	1792	1795	1797	1798	1802	1804	1805	1809	1818	1821
		1826	1828	1829	1832	1834	1835	1839	1841	1842	1845	1969	1977	1991
		2018	2021	2116	2119	2120	2122	2125	2126	2136	2139	2140	2144	2146
		2150	2153	2155	2157	2179	2182	2183	2200	2203	2205	2362	2364	2367
		2370	2373	2376	2379	2382	2401	2402	2403	2404	2406	2407	2409	2514
		2517	2519	2521	2531	2537	2550	2642	2645	2646	2654	2657	2659	2661
		2662	2665	2683	2686	2691	2693	2694	2697	2766	2769	2770	2778	2781
		2783	2785	2786	2789	2791	2792	2796	2798	2799	2803	2812	2815	2820
		2822	2823	2826	2828	2829	2833	2835	2836	2839	2940	2943	2944	2952
		2955	2957	2959	2960	2963	2980	2983	2988	2990	2991	2994	3063	3066
		3067	3075	3078	3080	3082	3083	3086	3088	3089	3093	3095	3096	3100
		3109	3112	3117	3119	3120	3123	3125	3126	3130	3132	3133	3136	3201
		3256	3258	3262	3278	3278	3337	3360	3370	3393	3394			
R4	0000 0004	60*	99	100	101	103	111	113	190	191	192	194	194	217
		219	229	231	232	234	236	243	245	249	276	281	291	296
		301	302	305	308	313	315	316	316	318	319	320	321	335
		340	353	355	369	372	390	404	575	656	664	666	670	672
		693	694	695	696	696	709	710	711	712	712	713	727	732
		733	735	737	737	738	762	763	764	765	776	778	782	787
		789	800	838	853	855	857	867	868	970	988	991	994	995
		996	1000	1271	1272	1275	1276	1277	1294	1295	1298	1299	1300	1304
		1440	1441	1446	1447	1465	1513	1514	1558	1559	1565	1566	1571	1572
		1593	1594	1596	1597	1602	1603	1659	1660	1666	1667	1675	1676	1701
		1702	1781	1782	1788	1789	1794	1795	1799	1800	1801	1802	1806	1807
		1808	1809	1822	1823	1825	1826	1831	1832	1836	1837	1838	1839	1844
		1845	1957	1960	1967	1968	1976	1977	1990	1991	2023	2024	2025	2141
		2142	2143	2144	2154	2155	2197	2198	2204	2205	2327	2328	2329	2330
		2338	2339	2342	2343	2344	2349	2350	2351	2352	2354	2355	2363	2364
		2369	2370	2375	2376	2381	2382	2410	2478	2479	2481	2482	2485	2486
		2497	2498	2501	2502	2515	2518	2519	2536	2537	2549	2550	2607	2608
		2651	2652	2658	2659	2664	2665	2687	2688	2690	2691	2696	2697	2775
		2776	2782	2783	2788	2789	2793	2794	2795	2796	2800	2801	2802	2803
		2816	2817	2819	2820	2825	2826	2830	2831	2832	2833	2838	2839	2905
		2906	2949	2950	2956	2957	2962	2963	2984	2985	2987	2988	2993	2994
		3072	3073	3079	3080	3085	3086	3090	3091	3092	3093	3097	3098	3099
		3100	3113	3114	3116	3117	3122	3123	3127	3128	3129	3130	3135	3136
		3204	3256	3260	3261	3338	3341	3343	3347	3347	3348	3368	3373	
R5	0000 0005	61*	101	103	104	104	106	107	108	111	113	119	206	258
		260	298	299	311	311	323	323	326	342	396	400	467	495
		528	529	568	569	572	580	633	647	693	728	729	731	776
		780	875	1254	1256	1260	1265	1273	1276	1296	1299	1387	1390	1923
		1933	1936	1941	1973	2076	2078	2127	2134	2147	2177	2194	2282	2283
		2284	2285	2286	2286	2287	2288	2291	2292	2294	2295	2462	2465	2505
		2531	2565	2566	3215	3216	3217	3218	3220	3221	3241	3247	3248	3249
		3251	3254	3255	3273	3274	3276	3277	3340	3341	3372	3373	3374	
R5HEX	0000 06CC	344	573	581	688*									
R5X	0000 06DA	693*	699											
R5XA	0000 06E8	697*												
R5XB	0000 06F0	691	700*											
R6	0000 0006	62*	98	108	115	172	173	174	174	257	258	265	279	283
		332	348	349	351	378	383	400	653	661	662	668	679	682
		1297	1298	1364	1365	1367	1430	1432	1438	1439	1442	1443	1446	1449
		1450	1451	1458	1459	1461	1462	1465	1467	1543	1545	1550	1553	1554
		1555	1556	1562	1565	1569	1571	1574	1583	1584	1590	1596	1600	1602
		1605	1654	1656	1663	1664	1665	1674	1675	1681	1682	1683	1690	1691

START2	0000	011E	123	154*						
STLOOP	0000	12AC	1953	1954	1955	1956	1962	1972	2000	2005* 2012
STORE10	0000	0E6E	1453	1458*	1459					
STORE11	0000	0E34	1438*	1439						
STORE30	0000	1018	1685	1690*	1691					
STORE31	0000	0FCC	1663*	1664						
T3S1	0000	0FE0	1669*	1681						
T3S2	0000	0FEC	1672*	1680						
T3S3	0000	0FFC	1678*	1688						
T3S3F	0000	1012	1677	1687*						
T3S4	0000	102C	1696*	1707						
T3S5	0000	1038	1700*	1706						
T3S6	0000	1044	1704*	1713						
T3S6F	0000	1056	1703	1712*						
T5S1	0000	11F8	1931*	1932						
T5S2	0000	120A	1939*	1940						
T6ER10	0000	13E0	2145	2167*						
T6ER11	0000	13F0	2156	2172*						
T6MSG	0000	1E42	2076	3300*						
T6S1	0000	1356	2116*	2121						
T6S10	0000	13CA	2157*	2175						
T6S2	0000	1360	2118	2120*						
T6S2.5	0000	1372	2124	2126*						
T6S3	0000	137A	2129*							
T6S4	0000	137C	2130*	2222						
T6S5	0000	137E	2131*	2189						
T6S6	0000	1380	2132*	2165						
T6S7	0000	1394	2138	2140*						
T6S8	0000	13AA	2146*	2170						
T6S9	0000	13C0	2152	2154*						
T6SX	0000	12F2	2075*							
T7END	0000	15F6	2301	2386	2393*					
T7MM1	0000	1506	2282	2310*	2316					
T7MM2	0000	151C	2310	2320*						
T7MM2A	0000	152A	2322	2325*						
T7MM3	0000	1540	2324	2332*						
T7MM3A	0000	154E	2334	2337*						
T7MM4	0000	1572	2349*	2392						
T7MMCOM	0000	1568	2336	2340	2346*					
T7MSG	0000	1E6A	2291	3304*						
T7OUTMSG	0000	14D6	2291*	2306						
T7S1	0000	14A0	2275*	2279						
T7S2	0000	14EA	2297*	2305						
T7S3	0000	14EE	2299*	2300						
T7S4	0000	158E	2358*	2390						
T7S5	0000	159A	2362*	2385						
T7S6	0000	15A8	2365	2367*						
T7S7	0000	15B8	2371	2373*						
T7S8	0000	15C8	2377	2379*						
T7S9	0000	15D8	2383	2385*						
T8LOMSG	0000	1E90	2565	3305*						
T8LOPRT	0000	1756	2460	2565*						
T8SW	0000	1650	2465*	2466						
T8SX	0000	1692	2484*	2508						
TEMP	0000	010C	132*	302	305	315	318	320		

TEST	0000 0BB4	287	364	393	406	415	453	1170*	1241	1243					
TEST0	0000 0DBA	1321	1362*												
TEST1	0000 0E1A	1322	1428*												
TEST1A	0000 0E1E	1430*	1470												
TEST2	0000 0E9E	1323	1510*												
TEST2A	0000 0EA2	1512*	1539												
TEST3	0000 0FAA	1324	1651*												
TEST3A	0000 0FAE	1653*	1710												
TEST4	0000 105C	1325	1751*												
TEST4A	0000 1060	1752*	1765												
TEST5	0000 11D2	1326	1917*												
TEST5A	0000 11D6	1919*	1945												
TEST6	0000 12E4	1328	2070*												
TEST6A	0000 12E8	2072*	2108												
TEST6ALL	0000 134C	2087	2091	2094	2098	2101	2105	2112*							
TEST7	0000 147A	1329	2261*												
TEST7A	0000 147E	2263*	2281												
TEST8	0000 1624	1330	2449*												
TEST8A	0000 1628	2451*	2510												
TEST9	0000 1766	1332	2604*												
TEST9A	0000 176A	2606*	2758												
TEST9B	0000 1878	2632	2745*												
TESTA	0000 19EC	1333	2902*												
TESTAA	0000 19F0	2904*	3055												
TESTAB	0000 1AF4	2930	3042*												
TESTOP	0000 03B6	365	390*												
TESTS	0000 0DA4	476	1321*												
TITLE	0000 0D6E	206	1307*												
TOTAL	0000 0B16	432	508	516	519	545	547	549	550	572	1129*				
TOTERR	0000 0B18	433	508	549	580	622	624	1130*	3232	3234					
TOTMSG	0000 0B5A	568	1153*												
TSTBRK	0000 08D4	358	466	489	513	791	891*	2303	2388						
TSTBRK1	0000 092C	909	918*	920											
TSTBRK2	0000 0934	907	917	921*											
TSTBRK3	0000 0948	895	897	899	911	916	926*								
TSTBRK4	0000 0910	902	908*												
TSTBRK5	0000 0900	903*	906												
TSTBRK6	0000 08DC	888	893*												
TSTBRKX	0000 08C2	884*	1445	1464	1560	1595	1670	1697	1783	1824	1950	2191	2484	2653	
		2689	2777	2818	2951	2986	3074	3115							
TSTDU	0000 0958	509	563	615	748	810	829	839	934*						
TSTEND	0000 04A8	482*	886	1292	2394	2561	3224	3226							
TSTMSG	0000 0B44	467	1148*	1149											
TSTOP1	0000 03C6	391	396*												
TSTOP2	0000 03CE	399*	405												
TSTOP4	0000 03DC	404*													
TSTREJ	0000 1DD4	1260	3291*												
TTYGET	0000 09B0	968*													
UNARY	0000 06BE	402	678*												
UNARY1	0000 06C0	679*	683												
VHILIM	0000 1EB6	2075	2113	3317*											
VLOLIM	0000 1EB4	2073	2112	2127	3316*										
WASDU	0000 0B12	203	412	434	543	566	750	753	763	847	1127*				
WASDU1	0000 0B14	204	413	511	751	765	1128*								
ZERO1	0000 09DE	989*	990												

PROG= MOSQ22 ASSEMBLED BY CAL 03-066R05-01 (32-BIT)

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                        CROSS                                                   MOS40010
                        TARGT 16                                                MOS40020
                        WIDTH 120                                               MOS40030
MOSQ22                  PROG  S16 19-221 MOS MEMORY TEST PART 2 06-214F02M96R00A13  MOS40040
                        SQCHK                                                   MOS40050
*  ************************************************************************     MOS40060
*                       SERIES-16 19-221 MOS MEMORY TEST PART 2 - SECTION 2 (F02)  MOS40070
*                       COPYRIGHT        PERKIN-ELMER CORP.        OCTOBER, 1978  MOS40080
*                                                                               MOS40090
*                       THIS PROGRAM TESTS THE LOWER 32KB OF A 64KB OR LARGER MOS  MOS40100
*                       MEMORY IN AN INTERDATA SERIES 16 EXTENDED MEMORY PROCESSOR  MOS40110
*                       WITH AN OPTIONAL BATTERY BACK-UP POWER SUPPLY.          MOS40120
*                                                                               MOS40130
*                       TEST 0                    MEMORY SEARCH TEST            MOS40140
*                                                                               MOS40150
*                       TEST 1                    BIT SET-RESET TEST            MOS40160
*                                                                               MOS40170
*                       TEST 2                    MARCHING PATTERN TEST         MOS40180
*                                                                               MOS40190
*                       TEST 3                    0 AND 1 WALK TEST             MOS40200
*                                                                               MOS40210
*                       TEST 4                    DOUBLE OPERATION COLUMN DISTURB TEST  MOS40220
*                                                                               MOS40230
*                       TEST 5 (OPTIONAL)         SHORT COUNT RELOCATABLE       MOS40240
*                                                 HAMMER DISTURB TEST           MOS40250
*                                                                               MOS40260
*                       TEST 6 (OPTIONAL)         DIAGONAL GALPAT TEST          MOS40270
*                                                                               MOS40280
*                       TEST 7 (OPTIONAL)         MEMORY HOLD TEST              MOS40290
*                       (REQUIRES MANUAL INTERVENTION & BATTERY BACK-UP POWER SUPPLY)  MOS40300
*                                                                               MOS40310
*                       TEST 8 (OPTIONAL)         LONG COUNT RELOCATABLE        MOS40320
*                                                 HAMMER DISTURB TEST           MOS40330
*                                                                               MOS40340
*                       TEST 9 (OPTIONAL)         ECC DISTURB TEST (IN 2 PARTS)  MOS40350
*                                                                               MOS40360
*                       TEST A (OPTIONAL)         PARITY  DISTURB TEST (IN 2 PARTS)  MOS40370
*                                                                               MOS40380
*                       THE DEFAULT TESTS ARE 0, 1, 2, 3, 4, 5, & 6.            MOS40390
*                                                                               MOS40400
*                       TEST 0 IS EXECUTED WHENEVER "RUN" IS ENTERED.           MOS40410
*                          TEST 0 FORCES "LOIM" AND "HILIM" TO THE BOUNDRIES PRINTED  MOS40420
*                       ON THE LIST DEVICE.                                     MOS40430
*                                                                               MOS40440
*                       TEST 7 REQUIRES MANUAL INTERVENTION AND CANNOT BE LOOPED ON  MOS40450
*                       WHILE THE PROCESSOR IS UNATTENDED.                      MOS40460
*                                                                               MOS40470
*                       TEST 8 IS AN OPTIONAL, LONG TERM (I.E.,OVERNIGHT) TEST.  MOS40480
*                                                                               MOS40490
*                       TEST 9 IS AN OPTIONAL TEST TO BE USED WITH ECC TURNED ON.  MOS40500
*                                                                               MOS40510
*                       TEST A IS AN OPTIONAL TEST TO BE USED W/PARITY MEMORIES ONLY.  MOS40520
*  ************************************************************************     MOS40530
```

```
0000 0000              56  R0      EQU   0                                  MOS40560
0000 0001              57  R1      EQU   1                                  MOS40570
0000 0002              58  R2      EQU   2                                  MOS40580
0000 0003              59  R3      EQU   3                                  MOS40590
0000 0004              60  R4      EQU   4                                  MOS40600
0000 0005              61  R5      EQU   5                                  MOS40610
0000 0006              62  R6      EQU   6                                  MOS40620
0000 0007              63  R7      EQU   7                                  MOS40630
0000 0008              64  R8      EQU   8                                  MOS40640
0000 0009              65  R9      EQU   9                                  MOS40650
0000 000A              66  R10     EQU   10                                 MOS40660
0000 000B              67  R11     EQU   11                                 MOS40670
0000 000C              68  R12     EQU   12                                 MOS40680
0000 000D              69  R13     EQU   13                                 MOS40690
0000 000E              70  R14     EQU   14                                 MOS40700
0000 000E              71  RET     EQU   14                                 MOS40710
0000 000F              72  R15     EQU   15                                 MOS40720
0000 000F              73  LINK    EQU   15                                 MOS40730


                       75  *       LISTING NOTES:                           MOS40750
                       76  *                                                MOS40760
                       77  *       1)   TRIPLE ASTERISKS IN COLUMNS 69-71 INDICATE A   MOS40770
                       78  *          DELETION OR MINOR MODIFICATION TO THE EXECUTIVES. MOS40780
                       79  *                                                MOS40790
                       80  *       2)   QUAD ASTERISKS IN COLUMNS 68-71 INDICATE MAJOR MOS40800
                       81  *          CHANGES TO THE EXEC WHICH MUST BE NOTED. THESE    MOS40810
                       82  *          CHANGES MAY YIELD INCOMPATIBILITIES BETWEEN THIS  MOS40820
                       83  *          (MODIFIED) AND OTHER (UNMODIFIED) EXTENDED TEST   MOS40830
                       84  *          PROGRAM EXECUTIVES.                       MOS40840
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BOOTSTRAP LOADER

```
                                86  *                                                                    MOS40860
                                87  *  BOOTLOADER WITH CHKSUM                                           MOS40870
                                88  *                                                                    MOS40880
0000R                           89          ORG   X'80'                                                  MOS40890
0080   2421                     90          LIS   R2,1                                                   MOS40900
0082   2303                     91          BS    BOOT                                                   MOS40910
0084   9DC8                     92          DC    Z(PSWSAVE)       CURRENT PSW SAVE POINTER(32-BIT M/C)  MOS40920
0086   9E50                     93          DC    Z(RSAVE)         REGISTER SAVE POINTER(32-BIT M/C)     MOS40930
0088   C810 8000                94  BOOT    LHI   R1,ORIGIN1      R1 = ADR( FIRST BYTE OF TEST PROG )   MOS40940
008C   C830 9DBC                95          LHI   R3,LNZB+1       R3 = ADR( LAST NON-ZERO BYTE )        MOS40950
0090   4030 003E                96          STH   R3,X'3E'        REGISTER SAVE POINTER(16-BIT M/C)     MOS40960
0094   2731                     97          SIS   R3,1                                                   MOS40970
0096   C860 0000                98  MN      LHI   R6,0            R6 = CHKSUM BYTE = X'MN'              MOS40980
009A   D340 0078                99          LB    R4,X'78'        INPUT DEV ADR                         MOS40990
009E   DE40 0079               100          OC    R4,X'79'                                              MOS41000
00A2   9D45                    101  LEADER  SSR   R4,R5                                                  MOS41010
00A4   2091                    102          BTBS  9,1             DU,BSY                                 MOS41020
00A6   9B45                    103          RDR   R4,R5                                                  MOS41030
00A8   0855                    104          LDAR  R5,R5                                                  MOS41040
00AA   2234                    105          BZS   LEADER          IGNORE LEADER                          MOS41050
00AC   D251 0000               106  LOAD    STB   R5,0(R1)        STORE 1ST NON-ZERO & SUBSEQUENT BYTE  MOS41060
00B0   D351 0000               107          LB    R5,0(R1)        RELOAD DATA BYTE TO                   MOS41070
00B4   0765                    108          XAR   R6,R5           GENERATE CHKSUM                        MOS41080
00B6   9481                    109          EXBR  R8,R1                                                  MOS41090
00B8   9828                    110          WHR   R2,R8           DISPLAY MEMORY ADDRESS                 MOS41100
00BA   9D45                    111          SSR   R4,R5                                                  MOS41110
00BC   2091                    112          BTBS  9,1             DU,BSY                                 MOS41120
00BE   9B45                    113          RDR   R4,R5                                                  MOS41130
00C0   C110 00AC               114          BXLE  R1,LOAD         LOAD TILL LAST BYTE                    MOS41140
00C4   9486                    115          EXBR  R8,R6                                                  MOS41150
00C6   9828                    116          WHR   R2,R8           FINAL CHKSUM                           MOS41160
00C8   2478                    117  LDWT    LIS   R7,8                                                   MOS41170
00CA   917C                    118          SLLS  R7,12           R7 = X'8000'                           MOS41180
00CC   9557                    119          EPSR  R5,R7           HALT PROCESSOR.                        MOS41190
00CE   2203                    120          BS    LDWT                                                   MOS41200
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EXEC - ETPE R03-05 (16 BIT/STRIPPED & MODIFIED)

```
00D0                        122          ORG   X'8000'          *                                   **** MOS41220
8000   4300 801E            123  ORIGIN1 B     START2           START HERE FOR 16-BIT PROCESSOR          MOS41230
                            124  *                                                                     MOS41240
                            125  *                                                                     MOS41250
8004   0000                 126  FIRST   DCX   0                *                                   ***  MOS41260
8006   3000                 127  PSW     DC    X'3000'          PSW USED IN TEST (BASIC)                MOS41270
8008   3000                 128  PSW2    DC    X'3000'          PSW USED IN EXEC                        MOS41280
800A   0000                 129  IOSAVE  DCX   0                                                        MOS41290
800C   0000                 130  TEMP    DCX   0                                                        MOS41300
800E   80                   131  NORM    DB    X'80'            DISPLAY NORMAL MODE COMMAND             MOS41310
800F   40                   132  INCR    DB    X'40'            DISPLAY INCREMENTAL MODE COMMAND        MOS41320
                            133  *                                                                   *** MOS41330
                            134  *-----------------------------------                                  MOS41340
                            135  *   TEST CONSTANTS                          *                        MOS41350
                            136  *                                                                     MOS41360
8010   0505                 137  IO      DC    X'0505'          I/O DEVICE(S) IDENTIFIER                MOS41370
8012   1011                 138  PASLADR DC    X'1011'          PASLA/PALM READ/WRITE ADDRESSES         MOS41380
8014   0202                 139  CLIFADR DC    X'0202'          CURRENT LOOP INTERFACE R/W ADDRESSES    MOS41390
8016   6262                 140  LPADR   DC    X'6262'          LINE PRINTER ADDRESS                    MOS41400
8018   1011                 141  C300ADR DC    X'1011'          CAROUSEL 300/PASLA ADDRESSES            MOS41410
801A   C0C0                 142  MICROBUS DC   X'C0C0'          MICROBUS ADDRESS                        MOS41420
801C   0000                 143          DCX   0                PROVISION FOR SPECIAL DEVICE            MOS41430
                            144  *                                                                     MOS41440
                            145  * IO =   0101  FOR CRT ON PASLA                                       MOS41450
                            146  *        0202  FOR TELETYPE, CAROUSEL 15/30                           MOS41460
                            147  *        XX03  FOR LINE PRINTER                                       MOS41470
                            148  *        0404  FOR CAROUSEL 300                                       MOS41480
                            149  *        0505  FOR MICROBUS                                           MOS41490
                            150  *                                                                     MOS41500
                            151  *-----------------------------------                                  MOS41510
                            152  *                                                                     MOS41520
801E   4810 8008            153  START2  LH    R1,PSW2          *                                   ***  MOS41530
8022   C820 8032            154  ST      LDAI  R2,START         *                                   ***  MOS41540
8026   4010 0034            155          STH   R1,X'34'                                                 MOS41550
802A   4020 0036            156          STH   R2,X'36'         II INT NEW PSW LOC                      MOS41560
802E   0000                 157          DCX   0                TAKE AN ILLEGAL INSTRUCTION INT         MOS41570
8030   2200                 158          BS    *                HALT IF II INTERRUPT NOT TAKEN          MOS41580
                            159  *                                                                     MOS41590
8032   D310 8010            160  START   LB    R1,IO            GET I/O IDENTIFIERS                     MOS41600
8036   D320 8011            161          LB    R2,IO+1                                                  MOS41610
803A   2436                 162          LIS   R3,6             IDENTIFIER CAN BE 1,2,3,4,5             MOS41620
803C   0513                 163          CLAR  R1,R3                                                    MOS41630
803E   2182                 164          BLS   IO.OK1           BRANCH IF KB IDENTIFIER OK              MOS41640
8040   2412                 165          LIS   R1,2             OTHERWISE FORCE IT TO BE TTY            MOS41650
8042   0523                 166  IO.OK1  CLAR  R2,R3                                                    MOS41660
8044   2182                 167          BLS   IO.OK2           SAME TEST FOR LIST DEVICE               MOS41670
8046   2422                 168          LIS   R2,2                                                     MOS41680
8048   D210 8010            169  IO.OK2  STB   R1,IO            REESTABLISH VALUES                      MOS41690
804C   D220 8011            170          STB   R2,IO+1                                                  MOS41700
8050   D362 8A04            171          LB    R6,CONRQ2S(R2)                                           MOS41710
8054   4060 89E8            172          STH   R6,PASFLG2       SET PASLA FLAG (LIST DEVICE)            MOS41720
8058   0866                 173          LDAR  R6,R6                                                    MOS41730
805A   2336                 174          BZS   IO.OK3           SKIP IF NOT PASLA                       MOS41740
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805C  0A22           175          AAR   R2,R2          (SLHLS  R2,1)                ****  MOS41750
805E  D302 8011      176          LB    R0,IO+1(R2)                                      MOS41760
8062  DE02 89F8      177          OC    R0,CON2ND(R2)  ISSUE 2ND COMMAND (LIST DEVICE) ***  MOS41770
                     178  *                                                               MOS41780
8066  41F0 888E      179  IO.OK3  BAL   LINK,SETKB     ESTABLISH KEYBOARD DEVICE        MOS41790
806A  9310           180          LBR   R1,R0          (R1) = 1,2,4,5                   MOS41800
806C  0A11           181          AAR   R1,R1          (R1) = 2,4,6,A   (SLHLS  R1,1) ****  MOS41810
806E  4831 8010      182          LH    R3,IO(R1)                                        MOS41820
8072  4030 895A      183          STH   R3,CONADR      SET UP CONSOLE DEVICE ADDRESS    MOS41830
8076  4821 89EC      184          LH    R2,CONRD(R1)                                     MOS41840
807A  4020 89EC      185          STH   R2,CONRD       SET UP R/W COMMANDS              MOS41850
807E  4821 89F8      186          LH    R2,CON2ND(R1)                                    MOS41860
8082  4020 89F8      187          STH   R2,CON2ND      2ND CMD; ENABLE READ CMD         MOS41870
8086  9011           188          SRHLS R1,1                                             MOS41880
8088  D341 8A04      189          LB    R4,CONRQ2S(R1)                                   MOS41890
808C  D240 8A04      190          STB   R4,CONRQ2S     CONSOLE REQUEST TO SEND          MOS41900
8090  4040 89E6      191          STH   R4,PASFLG      SET PASLA FLAG (CONSOLE)         MOS41910
8094  9333           192          LBR   R3,R3          MASK CONSOLE DEVICE TO 8 BITS    ***  MOS41920
8096  0844           193          LDAR  R4,R4                                            MOS41930
8098  2333           194          BZS   IO.OK4         SKIP 2ND OC IF NOT PASLA         MOS41940
809A  9422           195          EXBR  R2,R2                                            MOS41950
809C  9E32           196          OCR   R3,R2          ISSUE 2ND COMMAND (CONSOLE)      MOS41960
809E  DE30 89EC      197  IO.OK4  OC    R3,CONRD       PUT CONSOLE IN READ MODE         MOS41970
80A2  9B3F           198          RDB   R3,R15         READ A DUMMY CHARACTER (SET BUSY) MOS41980
                     199  *                                                               MOS41990
80A4  41F0 88D0      200          BAL   LINK,LCORE     SET UP LOW CORE                  MOS42000
80A8  2400           201          LIS   R0,0                                             MOS42010
80AA  4000 8A12      202          STH   R0,WASDU       RESET 'DEVICE UNAVAILABLE' FLAGS MOS42020
80AE  4000 8A14      203          STH   R0,WASDU1                                        MOS42030
80B2  41F0 86DE      204          BAL   LINK,CRLF                                        MOS42040
80B6  C850 8BFC      205          LDAI  R5,TITLE                                         MOS42050
80BA  41F0 8656      206          BAL   R15,PRINT      PRINT TEST PROGRAM TITLE         MOS42060
                     207  *---------------------------------                            MOS42070
                     208  *  KEYBOARD INPUT ROUTINE                                      MOS42080
                     209  *                                                               MOS42090
80BE  C8F0 895A      210  OPTIN   LDAI  LINK,MM        *                          ***  MOS42100
80C2  40F0 003E      211          STH   LINK,X'3E'     RESTORE ETPE MM POINTER    ***  MOS42110
80C6  41F0 86DE      212          BAL   LINK,CRLF      CR,LF TO LIST DEVICE             MOS42120
80CA  4820 8008      213  OPTIN1  LH    R2,PSW2                                          MOS42130
80CE  9512           214          EPSR  R1,R2          NO INT. REG SET 15               MOS42140
80D0  41F0 888E      215          BAL   LINK,SETKB     ESTABLISH CONSOLE                MOS42150
80D4  D340 8A98      216          LB    R4,AMSG        OUTPUT AN * TO INDICATE          MOS42160
80D8  41F0 86EC      217          BAL   LINK,OUTCHR    COMMAND MODE ESTABLISHED         MOS42170
80DC  2541           218          LCS   R4,1           X'FF'                            MOS42180
80DE  41F0 86EC      219          BAL   LINK,OUTCHR                                      MOS42190
80E2  C8C0 87A8      220          LDAI  R12,QUESTN     SET UP R12 FOR ERR ROUTINE       MOS42200
80E6  C800 2020      221          LDAI  R0,X'2020'     BLANK OUT COMMAND BUFFER         MOS42210
80EA  40C0 9DBC      222          STH   R0,OPTBUF      WHICH WILL CONTAIN OPTION        MOS42220
80EE  4000 9DBE      223          STH   R0,OPTBUF+2    NAME                             MOS42230
80F2  40C0 9DC0      224          STH   R0,OPTBUF+4                                      MOS42240
80F6  2410           225          LIS   R1,0           CLEAR OPTBUF INDEX               MOS42250
80F8  4010 8A0C      226          STH   R1,ISITERR     RESET FORCED PRINTING FLAG  ****  MOS42260
80FC  41F0 877A      227  RDCHR   BAL   R15,GETCHR     GET A CHAR IN R4                 MOS42270
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8100  C540 0060          228          CLAI  R4,X'60'          UPPER CASE ALPHA ?                    MOS42280
8104  2183               229          BLS   RDCHAR0          BRANCH IF NO.                         MOS42290
8106  C840 0020          230          SAI   R4,X'20'          CONVERT TO LOWER CASE                 MOS42300
810A  C540 0023          231 RDCHAR0  CLAI  R4,X'23'          IS IT A HASH MARK ?                   MOS42310
810E  4330 80BE          232          BE    OPTIN                                                   MOS42320
8112  C540 005F          233          CLAI  R4,X'5F'          LEFT ARROW, UNDERLINE OR DELETE ?     MOS42330
8116  2334               234          BES   RDCHAR1          YES, BRANCH                           MOS42340
8118  C540 0008          235          CLAI  R4,X'08'          BACK SPACE ?                          MOS42350
811C  2139               236          BNES  RDCHR1           NO, BRANCH                            MOS42360
811E  2711               237 RDCHAR1  SIS   R1,1              YES, DECREMENT INDEX                  MOS42370
8120  021C               238          BNR   R12              BUFFER UNDERFLOW; PRINT '?'           MOS42380
8122  C800 0020          239          LDAI  R0,X'20'                                                MOS42390
8126  D201 9DBC          240          STB   R0,OPTBUF(R1)                                           MOS42400
812A  4300 80FC          241          B     RDCHR                                                   MOS42410
812E  C540 000D          242 RDCHR1   CLAI  R4,X'0D'          IS IT CR ?                            MOS42420
8132  233C               243          BES   LOOKUP           YES, TRY MATCH                        MOS42430
8134  C540 0020          244          CLAI  R4,X'20'          IS IT A BLANK?                        MOS42440
8138  2339               245          BES   LOOKUP           YES, TRY MATCH                        MOS42450
813A  C510 0006          246          CLAI  R1,6              7 CHARACTERS INPUT ?                  MOS42460
813E  038C               247          BNLR  R12              IF YES, ERROR                         MOS42470
8140  D241 9DBC          248          STB   R4,OPTBUF(R1)     STORE CURRENT BYTE                    MOS42480
8144  2611               249          AIS   R1,1              BUMP BUFFER INDEX                     MOS42490
8146  4300 80FC          250          B     RDCHR             READ NEXT CHARACTER                   MOS42500
                         251 *--------------------------------                                      MOS42510
                         252 *  OPTION MATCH ROUTINE                                               MOS42520
                         253 *                                                                      MOS42530
814A  C810 8AB4          254 LOOKUP   LDAI  R1,OPT            LOAD ADDRESS OF OPTION TABLE          MOS42540
814E  2430               255 LOOK1    LIS   R3,0              CLEAR BUFFER INDEX                    MOS42550
8150  0861               256          LDAR  R6,R1             SET OPTION WORD INDEX                 MOS42560
8152  4856 0000          257 LOOK2    LH    R5,0(R6)                                                MOS42570
8156  021C               258          BNR   R12              IF MINUS, THEN NO MATCH = ERROR       MOS42580
8158  4553 9DBC          259          CLH   R5,OPTBUF(R3)     COMPARE TO OPTBUF HW                  MOS42590
815C  2333               260          BES   LOOK3                                                   MOS42600
815E  261C               261          AIS   R1,12                                                   MOS42610
8160  2209               262          BS    LOOK1                                                   MOS42620
8162  2632               263 LOOK3    AIS   R3,2              TRY NEXT HW                           MOS42630
8164  2662               264          AIS   R6,2                                                    MOS42640
8166  C530 0006          265          CLAI  R3,6              3 MATCHING HW FOUND ?                 MOS42650
816A  208C               266          BLS   LOOK2                                                   MOS42660
                         267 *                                                                      MOS42670
816C  C510 8B38          268          CLAI  R1,RUN            RUN COMMAND ?                         MOS42680
8170  4330 82EA          269          BE    RUNIT                                                   MOS42690
8174  C510 8B2C          270          CLAI  R1,OPTION         OPTION CMD ?                          MOS42700
8178  4230 828A          271          BNE   LOOK4             NO, LOOK FURTHER                      MOS42710
                         272 *--------------------------------                                      MOS42720
                         273 *  TO PROCESS INPUT COMMAND 'OPTION'                                   MOS42730
817C  C540 000D          274          CLAI  R4,X'0D'          CR ?                                  MOS42740
8180  233C               275          BES   OPTEXX            YES, BRANCH                           MOS42750
8182  41E0 8582          276          BAL   R14,OPTVAL        NO, GET OPTION DEV PRINTOUT NO.       MOS42760
8186  C560 0006          277          CLAI  R6,5              IS DEVICE NUMBER VALID ?              MOS42770
818A  2387               278          BNLS  OPTEXX            NO, BRANCH                            MOS42780
818C  C840 000A          279          LDAI  R4,X'0A'          YES, LOAD A LF CHARACTER              MOS42790
8190  41F0 86EC          280          BAL   LINK,OUTCHR       WRITE IT TO THE CONSOLE               MOS42800
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8194   D260 800B          281           STB   R6,IOSAVE+1       CHANGE THE LIST DEVICE NUMBER          MOS42810
8198   4820 8B34          282  OPTEXX   LH    R2,OPTION+8       CHECK FOR SPECIAL ROUTINE              MOS42820
819C   0232               283           BNZR  R2                LINK TO ROUTINE                        MOS42830
                          284  *                                                                        MOS42840
819E   C830 8AB4          285  OPTRTN   LDAI  R3,TEST           RETURN HERE                            MOS42850
81A2   C8E0 8228          286           LDAI  R14,OPTCMD8                                               MOS42860
81A6   41F0 86DE          287           BAL   LINK,CRLF                                                 MOS42870
81AA   2420               288  OPTCMD   LIS   R2,0              RESET COUNTER                          MOS42880
81AC   D342 8AB4          289  OPTCMD1  LB    R4,OPT(R2)        TO PRINT TEST                          MOS42890
81B0   41F0 86EC          290           BAL   LINK,OUTCHR                                               MOS42900
81B4   2621               291           AIS   R2,1                                                      MOS42910
81B6   C520 0006          292           CLAI  R2,6                                                      MOS42920
81BA   2087               293           BLS   OPTCMD1                                                   MOS42930
81BC   C840 0020          294           LDAI  R4,C' '                                                   MOS42940
81C0   41F0 86EC          295           BAL   LINK,OUTCHR         OUTPUT 1 SPACE                        MOS42950
81C4   2450               296           LIS   R5,0                TO PRINT SELECTED TEST NUMBERS        MOS42960
81C6   4050 8004          297           STH   R5,FIRST                                                  MOS42970
81CA   4823 0006          298           LH    R2,6(R3)            FIRST TEST WORD                       MOS42980
81CE   2440               299  OPTCMD2  LIS   R4,0                START WITH TEST 0                     MOS42990
81D0   4040 800C          300           STH   R4,TEMP                                                   MOS43000
81D4   0A22               301  OPTCMD3  AAR   R2,R2              (SLHLS  R2,1)                  ****    MOS43010
81D6   4380 8208          302           BNC   OPTCMD7                                                   MOS43020
81DA   4040 800C          303  OPTCMD4  STH   R4,TEMP            OPTION VALUE FOUND.                   MOS43030
81DE   4800 8004          304           LH    R0,FIRST            IS IT FIRST ?                         MOS43040
81E2   2335               305           BZS   OPTCMD5                                                   MOS43050
81E4   C840 002C          306           LDAI  R4,C','             NO, OUTPUT COMMA                      MOS43060
81E8   41F0 86EC          307           BAL   LINK,OUTCHR                                               MOS43070
81EC   40F0 8004          308  OPTCMD5  STH   LINK,FIRST                                                MOS43080
81F0   0855               309           LDAR  R5,R5               TEST VALUE FROM SECOND HW             MOS43090
81F2   2335               310           BZS   OPTCMD6             NO                                    MOS43100
81F4   C840 0031          311           LDAI  R4,C'1'             YES,OUTPUT '1'                        MOS43110
81F8   41F0 86EC          312           BAL   LINK,OUTCHR                                               MOS43120
81FC   4840 800C          313  OPTCMD6  LH    R4,TEMP             RESTORE R4                            MOS43130
8200   D344 8A34          314           LB    R4,HEXTAB(R4)       CONVERT                               MOS43140
8204   41F0 86EC          315           BAL   LINK,OUTCHR         OUTPUT 0-F                            MOS43150
8208   4840 800C          316  OPTCMD7  LH    R4,TEMP             RESTORE                               MOS43160
820C   2641               317           AIS   R4,1                INCREMENT TEST NUMBER                 MOS43170
820E   4040 800C          318           STH   R4,TEMP                                                   MOS43180
8212   C540 0010          319           CLAI  R4,16                                                     MOS43190
8216   4280 81D4          320           BL    OPTCMD3                                                   MOS43200
821A   0855               321  OPTCMD71 LDAR  R5,R5               DONE ?                                MOS43210
821C   023E               322           BNZR  R14                                                       MOS43220
821E   4823 0008          323           LH    R2,8(R3)            SECOND TEST WORD                      MOS43230
8222   2451               324           LIS   R5,1                R5 = 1 FOR SECOND TEST HW             MOS43240
8224   43C0 81CE          325           B     OPTCMD2                                                   MOS43250
                          326  *---------------------------------                                       MOS43260
                          327  *  TO OUTPUT OTHER OPTION NAMES & VALUES                                 MOS43270
                          328  *                                                                        MOS43280
8228   41F0 86DE          329  OPTCMD8  BAL   LINK,CRLF                                                 MOS43290
822C   2461               330           LIS   R6,1                SET LINE COUNTER                      MOS43300
822E   C820 8AC0          331           LDAI  R2,OPT+12           R2 POINTS TO THE NAME                 MOS43310
8232   2436               332  OPTCMD9  LIS   R3,6                                                      MOS43320
8234   D342 0000          333  OPTCMD10 LB    R4,0(R2)                                                  MOS43330
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8238  41F0 86EC      334           BAL   LINK,OUTCHR        OUTPUT OPTION NAME CHAR                    MOS43340
823C  2621           335           AIS   R2,1                                                          MOS43350
823E  2731           336           SIS   R3,1               6 CHARACTERS OUTPUT ?                      MOS43360
8240  2026           337           BPS   OPTCMD10           NO,LOOP                                    MOS43370
8242  C840 0020      338           LDAI  R4,C' '                                                       MOS43380
8246  41F0 86EC      339           BAL   LINK,OUTCHR        OUTPUT ONE SPACE                           MOS43390
824A  4852 0000      340           LH    R5,0(R2)           R5 = OPTION VALUE                          MOS43400
824E  2404           341           LIS   R0,4                                                          MOS43410
8250  41F0 85CC      342           BAL   LINK,R5HEX         WRITE OPTION VALUE IN HEX (4 DIGITS)       MOS43420
8254  D300 8010      343           LB    R0,IO                                                         MOS43430
8258  2701           344           SIS   R0,1               CONSOLE = CRT ?                            MOS43440
825A  213D           345           BNZS  OPTCMD12           BRANCH: NO.                                MOS43450
825C  2661           346           AIS   R6,1               INCREMENT LINE COUNTER.                    MOS43460
825E  C560 0014      347           CLAI  R6,20              PAGE FULL ?                                MOS43470
8262  2189           348           BLS   OPTCMD12           NO, BRANCH                                 MOS43480
8264  2460           349           LIS   R6,0               YES, INITIALIZE LINE COUNT                 MOS43490
8266  41F0 877A      350  OPTCMD11 BAL   LINK,GETCHR                                                   MOS43500
826A  274D           351           SIS   R4,13              CR ?                                       MOS43510
826C  4330 80BE      352           BZ    OPTIN              NO, ACCEPT NEXT COMMAND                    MOS43520
8270  2643           353           AIS   R4,3               LF ?                                       MOS43530
8272  2036           354           BNZS  OPTCMD11           YES, GO PRINT NEXT PAGE                    MOS43540
8274  41F0 86DE      355  OPTCMD12 BAL   LINK,CRLF          NO, CRLF                                   MOS43550
8278  41F0 87D4      356           BAL   LINK,TSTBRK        EXIT IF 'BREAK' PRESSED.                   MOS43560
827C  2626           357           AIS   R2,6                                                          MOS43570
827E  C520 8B14      358           CLAI  R2,OPTEND2         ALL PRINTING OPTIONS DONE ?                MOS43580
8282  4280 8232      359           BL    OPTCMD9            NO,LOOP FOR NEXT ONE                       MOS43590
8286  43C0 80CA      360           B     OPTIN1             TO ACCEPT NEXT COMMAND                     MOS43600
                     361  *-----------------------------------                                         MOS43610
828A  C510 8AB4      362  LOOK4    CLAI  R1,TEST            'TEST' OPTION ?                            MOS43620
828E  4330 82B6      363           BE    TESTOP                                                        MOS43630
                     364  *                                                                            MOS43640
                     365  *  TO PROCESS COMMANDS OTHER THAN 'TEST', 'OPTION'.                          MOS43650
                     366  *                                                                            MOS43660
8292  274D           367           SIS   R4,13              OPT FOLLOWED BY CR ?                       MOS43670
8294  033C           368           BZR   R12                YES, ERROR                                 MOS43680
8296  41E0 8582      369           BAL   R14,OPTVAL         GET OPTION VALUE IN R6                     MOS43690
829A  274D           370           SIS   R4,13              TERMINATED BY CR ?                         MOS43700
829C  023C           371           BNZR  R12                IF NO, BRANCH                              MOS43710
829E  48F1 0008      372           LH    R14,8(R1)          GET OPTION CHECK ROUTINE ADDRESS           MOS43720
82A2  2332           373           BZS   LOOK5                                                         MOS43730
82A4  01FE           374           BALR  R15,R14            LINK TO OPTION CHECK ROUTINE               MOS43740
                     375  *                                 *  RETURN HERE IF OK  *                    MOS43750
82A6  4061 0006      376  LOOK5    STH   R6,6(R1)           STORE OPTION VALUE                         MOS43760
82AA  4300 80BE      377           B     OPTIN              TO ACCEPT NEXT COMMAND                     MOS43770
                     378  *                                                                            MOS43780
                     379  *-----------------------------------                                  ***    MOS43790
                     380  *                                                                            MOS43800
82AE  4561 000A      381  LEVELIN  CLH   R6,10(R1)          IS R6 > MAX VALUE ?                ***    MOS43810
82B2  022C           382           BPR   R12                YES, ERROR RETURN                  ***    MOS43820
82B4  030F           383           BR    R15                NO, RETURN TO LOOK5                ***    MOS43830
                     384  *                                                                            MOS43840
                     385  *-----------------------------------                                         MOS43850
                     386  *  TEST OPTION PROCESS ROUTINE                                               MOS43860
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                        387  *                                                                  MOS43870
82B6  274D              388  TESTOP   SIS   R4,13            'TEST' FOLLOWED BY (CR) ?        MOS43880
82B8  2137              389           BNZS  TSTOP1                                             MOS43890
82BA  4800 8C2C         390           LH    R0,DEFTESTS      YES, SET TEST OPTION TO          MOS43900
82BE  4000 8ABA         391           STH   R0,TEST+6        FIRST TEST WORD                  MOS43910
82C2  4300 80BE         392           B     OPTIN            TO ACCEPT NEXT COMMAND           MOS43920
                        393  *                                                                  MOS43930
82C6  4850 8C2E         394  TSTOP1   LH    R5,MAXTST                                         MOS43940
82CA  2470              395           LIS   R7,0             RESET TEST BIT ACCUMULATORS      MOS43950
82CC  2480              396           LIS   R8,0                                               MOS43960
82CE  41E0 8582         397  TSTOP2   BAL   R14,OPTVAL        GET OPTION VALUE IN R6           MOS43970
82D2  0556              398           CLAR  R5,R6                                              MOS43980
82D4  02EC              399           BLR   R12              ERROR: INVALID TEST NUMBER       MOS43990
82D6  41E0 85BE         400           BAL   R14,UNARY        GET UNARY OPERAND IN R3          MOS44000
82DA  0673              401           OAR   R7,R3            SET CURRENT BIT                  MOS44010
82DC  274D              402  TSTOP4   SIS   R4,13            TERMINATED BY CR ?               MOS44020
82DE  4230 82CE         403           BNZ   TSTOP2                                             MOS44030
82E2  4070 8ABA         404           STH   R7,TEST+6        STORE VALID SELECTED TESTS       MOS44040
82E6  4300 80BE         405           B     OPTIN            TO ACCEPT NEXT COMMAND           MOS44050
                        406  *----------------------------------                              MOS44060
                        407  *                                                                  MOS44070
82EA  41F0 86DE         408  RUNIT    BAL   LINK,CRLF                                         MOS44080
82EE  24F0              409           LIS   R15,0                                             MOS44090
82F0  40F0 8A12         410           STH   R15,WASDU        RESET DU FLAGS                   MOS44100
82F4  40F0 8A14         411           STH   R15,WASDU1                                        MOS44110
82F8  24CF              412           LIS   R0,15            TO FIND HIGHEST SELECTED TEST  NO. MOS44120
82FA  4810 8ABA         413           LH    R1,TEST+6        CHECK FIRST TEST HW              MOS44130
82FE  9011              414  KEEP2    SRLS  R1,1                                             MOS44140
8300  2184              415           BCS   FOUND2           R0 = F-0 = TEST NUMBER           MOS44150
8302  27C1              416           SIS   R0,1                                             MOS44160
8304  2213              417           BNMS  KEEP2            LOOP                             MOS44170
8306  030C              418           BR    R12              TEST NOT SELECTED                MOS44180
8308  40C0 8A10         419  FOUND2   STH   R0,SELTST        HIGHEST SELECTED TEST NUMBER  ***  MOS44190
                        420  *                                                                  MOS44200
                        421  *  RESET TEST PARAMETERS                                         MOS44210
                        422  *                                                                  MOS44220
830C  4800 8010         423           LH    R0,IO                                            MOS44230
8310  40C0 800A         424           STH   R0,IOSAVE        RESTORE USER'S I/O CHOICE        MOS44240
8314  41F0 86DE         425           BAL   LINK,CRLF                                         MOS44250
8318  41F0 8B4C         426           BAL   LINK,INIT        LINK USER INITIALIZATION ROUTINE MOS44260
                        427  *                                                                  MOS44270
831C  2400              428  INITRET  LIS   R0,0             RETURN HERE FROM INIT            MOS44280
831E  4000 8A0C         429           STH   R0,ISITERR       RESET ERROR FLAG                 MOS44290
8322  40C0 8A16         430           STH   R0,TOTAL         RESET TOTAL                      MOS44300
8326  4000 8A18         431           STH   R0,TOTERR        RESET TOTERR                     MOS44310
832A  4000 8A12         432           STH   R0,WASDU         RESET WASDU FLAG                 MOS44320
832E  C810 3030         433           LDAI  R1,C'00'                                          MOS44330
8332  4010 8A4A         434           STH   R1,MTESTNO       RESET THESE FLAGS TO C'00'       MOS44340
8336  4010 8A54         435           STH   R1,ETESTNO                                        MOS44350
833A  4010 8A56         436           STH   R1,ERRNO                                          MOS44360
833E  41F0 88D0         437           BAL   LINK,LCORE       SET UP LOW CORE                  MOS44370
                        438  *                                                                  MOS44380
                        439  *  START SELECTION FROM TEST 0                                    MOS44390
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                        440  *                                                                    MOS44400
8342  2400              441  KEEP3    LIS   R0,0                                                  MOS44410
8344  4000 8A1A         442           STH   R0,BTESTNO        RESET BINARY TEST NUMBER              MOS44420
8348  4000 8A1E         443           STH   R0,NEXTST         RESET NEXT TEST NUMBER                MOS44430
                        444  *                                                                    MOS44440
                        445  *  TO FIND THE NEXT SELECTED TEST.                                   MOS44450
                        446  *                                                                    MOS44460
834C  4820 8A1E         447  KEEP4    LH    R2,NEXTST         GET NEXT TEST NUMBER                  MOS44470
8350  2408              448  KEEP41   LIS   R0,8                                                  MOS44480
8352  910C              449           SLHLS R0,12             R0 = X'8000'                          MOS44490
8354  CCC2 0000         450           SRHL  R0,0(R2)          R0 = NEXT TEST BIT                    MOS44500
8358  44C0 8A3A         451  KEEP42   NH    R0,TEST+6         LOOK AT TEST HW 1                ***  MOS44510
835C  2133              452           BNZS  KEEP5                                                 MOS44520
835E  2621              453  KEEP43   AIS   R2,1                                                  MOS44530
8360  2208              454           BS    KEEP41            LOOP FOR NEXT TEST NUMBER             MOS44540
8362  4020 8A1A         455  KEEP5    STH   R2,BTESTNO        CURRENT TEST NUMBER                   MOS44550
8366  0812              456           LDAR  R1,R2             R1 = TEST NO. IN BINARY               MOS44560
8368  2621              457           AIS   R2,1                                                    MOS44570
836A  4020 8A1E         458           STH   R2,NEXTST                                             MOS44580
836E  2402              459           LIS   R0,2              SET DIGITS TO PRINT = 2               MOS44590
8370  C820 8A4A         460           LDAI  R2,MTESTNO        R2 = A(MTESTNO)                       MOS44600
8374  41F0 85F6         461           BAL   LINK,HEXASC       STORE TEST NO. IN ASCII @ MTESTNO     MOS44610
8378  4820 8A4A         462           LH    R2,MTESTNO                                            MOS44620
837C  4020 8A54         463           STH   R2,ETESTNO        STORE TEST NO. IN ASCII @ ETESTNO     MOS44630
8380  41F0 87D4         464           BAL   LINK,TSTBRK       TEST BREAK                            MOS44640
8384  C850 8A44         465           LDAI  R5,TSTMSG                                             MOS44650
8388  41F0 8656         466           BAL   LINK,PRINT        PRINT 'TEST NN'                       MOS44660
838C  2400              467           LIS   R0,0                                                  MOS44670
838E  4000 8A0E         468           STH   R0,NOERR          RESET ERROR FLAG                      MOS44680
8392  4000 8A1C         469           STH   R0,COUNT          RESET COUNT                           MOS44690
8396  4810 8006         470  KEEP6    LH    R1,PSW            ENABLE INTERRUPTS                     MOS44700
839A  9501              471           EPSR  R0,R1                                                 MOS44710
839C  4820 8A1A         472           LH    R2,BTESTNO        R2 = TEST NUMBER                      MOS44720
83A0  9121              473           SLLS  R2,LADC                                               MOS44730
83A2  4812 8C30         474           LDA   R1,TESTS(R2)                                          MOS44740
83A6  0301              475           BR    R1                GO TO TEST MODULE                     MOS44750
                        476  *---------------------------------                                   MOS44760
                        477  *                                                                    MOS44770
                        478  *  TEST MODULE END ROUTINE                                           MOS44780
                        479  *                                                                    MOS44790
83A8  C8F0 895A         480  TSTEND   LDAI  LINK,MM           *                                 ***  MOS44800
83AC  40F0 003E         481           STH   LINK,X'3E'        RESTORE ETPE MM POINTER           ***  MOS44810
83B0  4810 8008         482           LH    R1,PSW2                                               MOS44820
83B4  9501              483           EPSR  R0,R1             DISABLE INT @ PROCESSOR LEVEL         MOS44830
83B6  48C0 8A1C         484           LH    R0,COUNT                                              MOS44840
83BA  2601              485           AIS   R0,1              INCREMENT COUNT                       MOS44850
83BC  4000 8A1C         486           STH   R0,COUNT                                              MOS44860
83C0  41F0 87D4         487           BAL   LINK,TSTBRK       IF BREAK GO TO OPTIN              ***  MOS44870
83C4  4500 8AC6         488           CLH   R0,LOOP+6         IF COUNT > LOOP,                      MOS44880
83C8  2383              489           BNLS  KEEP7             GO TO NEXT TEST MODULE                MOS44890
83CA  4300 8396         490           B     KEEP6             OTHERWISE, REPEAT SAME TEST           MOS44900
83CE  4800 8A0E         491  KEEP7    LH    R0,NOERR          LOOK @ ERROR FLAG                     MOS44910
83D2  2135              492           BNZS  KEEP71                                                MOS44920
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83D4  C850 8A6A          493          LDAI  R5,NOERMSG                                          MOS44930
83D8  41F0 8656          494          BAL   LINK,PRINT          PRINT "NO ERROR"                MOS44940
83DC  4810 8A1A          495  KEEP71  LH    R1,BTESTNO          GET TEST NUMBER                 MOS44950
83E0  4510 8A10          496          CLH   R1,SELTST           IS THE LAST SELECTED TEST DONE ?MOS44960
83E4  4280 834C          497          BL    KEEP4               NO, GO SELECT NEXT TEST         MOS44970
                         498  *                                                                 MOS44980
                         499  *  ALL THE SELECTED TESTS ARE NOW RUN                             MOS44990
                         500  *                                                                 MOS45000
83E8  C8F0 895A          501  ABORT   LDAI  LINK,MM             COME HERE TO ABORT TEST SEQUENCE ***  MOS45010
83EC  40F0 003E          502          STH   LINK,X'3E'          RESTORE ETPE MM POINTER         ***  MOS45020
83F0  4810 8008          503          LH    R1,PSW2                                             MOS45030
83F4  95C1               504          EPSR  R0,R1               PSW = 30F0                      MOS45040
83F6  41F0 84DC          505          BAL   LINK,DISPLAY        DISPLAY TOTAL & TOTERR          MOS45050
83FA  8A16               506          DC    Z(TOTAL),Z(TOTERR)                                  MOS45060
83FC  8A18
83FE  41F0 8858          507          BAL   LINK,TSTDU          RETURN WITH R1 = DU BIT         MOS45070
8402  4230 8464          508          BNZ   KEEP9               IF DU, DISPLAY TOTAL            MOS45080
8406  4810 8A14          509          LH    R1,WASDU1           WAS IT EVER ?                   MOS45090
840A  4230 849A          510          BNZ   KEEP92              YES, PRINT TOTAL, TOTERR        MOS45100
840E  41F0 87D4          511          BAL   LINK,TSTBRK                                          MOS45110
8412  4810 8AD2          512          LH    R1,CONTIN+6         IF CONTIN = 0,                  MOS45120
8416  233E               513          BZS   ABORT3              GO TO ABORT TEST          ***   MOS45130
8418  6110 8A16          514          AHM   R1,TOTAL            INCREMENT TOTAL COUNTER   ***   MOS45140
841C  4230 8342          515          BNZ   KEEP3               IF TOTAL < MAX, BRANCH    ***   MOS45150
8420  2511               516          LCS   R1,1                OTHERWISE                 ***   MOS45160
8422  6110 8A16          517          AHM   R1,TOTAL            SET "TOTAL" TO MAX &      ***   MOS45170
8426  4300 8494          518          B     HALT9               HALT PROCESSOR            ***   MOS45180
                         519  *                                                                 MOS45190
842A  C8F0 895A          520  ABORT1  LDAI  LINK,MM             *                         ***   MOS45200
842E  40F0 003E          521          STH   LINK,X'3E'          RESTORE ETPE MM POINTER   ***   MOS45210
                         522  *                                                           ***   MOS45220
8432  4810 8008          523  ABORT3  LH    R1,PSW2             *                         ***   MOS45230
8436  9501               524          EPSR  R0,R1               SET PSW = X'30F0'         ***   MOS45240
8438  41F0 888E          525          BAL   LINK,SETKB          KB DEVICE = LIST DEVICE         MOS45250
843C  C850 8A88          526          LDAI  R5,EOTMSG                                         MOS45260
8440  4050 8A0C          527          STH   R5,ISITERR          *                         ***   MOS45270
8444  41F0 8656          528          BAL   LINK,PRINT          'END OF TEST'                   MOS45280
8448  24F0               529          LIS   R15,0               *                         ***   MOS45290
844A  40F0 8A0C          530          STH   R15,ISITERR         *                         ***   MOS45300
                         531  *                                                                 MOS45310
844E  48F0 8ADE          532          LH    LINK,NOMSG+6        IF "NOMSG" = 1,                 MOS45320
8452  4230 849A          533          BNZ   KEEP92              PRINT "TOTAL" & "TOTERR"        MOS45330
8456  48F0 8AEA          534          LH    LINK,SCOPE+6        *                         ***   MOS45340
845A  27F4               535          SIS   LINK,4              IF "SCOPE" = 4,           ***   MOS45350
845C  4330 849A          536          BZ    KEEP92              PRINT "TOTAL" & "TOTERR"  ***   MOS45360
8460  4300 80BE          537          B     OPTIN                                           MOS45370
                         538  *--------------------------------                            MOS45380
                         539  *  ROUTINE INCREMENTS, DISPLAYS & CHECKS 'TOTAL'                  MOS45390
                         540  *                                                                 MOS45400
8464  4010 8A12          541  KEEP9   STH   R1,WASDU            SET 'WASDU' FLAG                MOS45410
                         542  *                                                                 MOS45420
8468  4810 8A16          543  ABORT2  LH    R1,TOTAL            INCREMENT TOTAL                 MOS45430
846C  2611               544          AIS   R1,1                                              MOS45440
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846E  4010 8A16          545          STH   R1,TOTAL                                          MOS45450
8472  41F0 84DC          546  KEEP91  BAL   LINK,DISPLAY      DISPLAY TOTAL & TOTERR          MOS45460
8476  8A16               547          DC    Z(TOTAL),Z(TOTERR)                              MOS45470
8478  8A18
847A  4810 8A16          548          LH    R1,TOTAL                                        MOS45480
847E  C510 7FFF          549          CLAI  R1,X'7FFF'      TOTAL < MAX RETAINABLE ?        MOS45490
8482  2389               550          BNLS  HALT9           NO, BRANCH                      MOS45500
8484  48C0 8A1A          551          LH    R0,BTESTNO      R0 = CURRENT TEST NUMBER        MOS45510
8488  45C0 8A10          552          CLH   R0,SELTST       IS IT LAST TEST ?               MOS45520
848C  4280 834C          553          BL    KEEP4           NO, GO TO NEXT TEST             MOS45530
8490  4300 8342          554          B     KEEP3           YES, GO TO TEST 0               MOS45540
                         555  *                                                              MOS45550
8494  C810 30F0          556  HALT9   LDAI  R1,X'80F0'      (R1) = X'80F0'          ***     MOS45560
8498  9521               557          EPSR  R2,R1           HALT PROCESSOR                  MOS45570
                         558  *                                                              MOS45580
                         559  *  WHEN EXE/RUN IS PRESSED, PRINT TOTAL & TOTERR               MOS45590
                         560  *                                                              MOS45600
849A  41F0 8858          561  KEEP92  BAL   LINK,TSTDU      SEE IF LIST DEV IS ON           MOS45610
849E  2035               562          BNZS  HALT9           NO, HALT                        MOS45620
84A0  24C0               563  KEEP10  LIS   R0,0                                            MOS45630
84A2  40C0 8A12          564          STH   R0,WASDU        RESET FLAG                      MOS45640
84A6  41F0 86DE          565          BAL   LINK,CRLF                                       MOS45650
84AA  C850 8A5A          566          LDAI  R5,TOTMSG                                       MOS45660
84AE  4050 8A0C          567          STH   R5,ISITERR                                      MOS45670
84B2  41F0 8656          568          BAL   LINK,PRINT      PRINT 'TOTAL   TOTERR'          MOS45680
84B6  2404               569          LIS   R0,4            TO PRINT 4 HEX DIGITS           MOS45690
84B8  4850 8A16          570          LH    R5,TOTAL                                        MOS45700
84BC  41F0 85CC          571          BAL   LINK,R5HEX      PRINT TOTAL IN HEX              MOS45710
84C0  2434               572          LIS   R3,4                                            MOS45720
84C2  C840 0020          573          LDAI  R4,C' '         SPACE                           MOS45730
84C6  41F0 86EC          574  KEEP101 BAL   LINK,OUTCHR     OUTPUT IT                       MOS45740
84CA  2731               575          SIS   R3,1                                            MOS45750
84CC  2023               576          BPS   KEEP101         4 TIMES                         MOS45760
84CE  2404               577          LIS   R0,4            TO PRINT 4 HEX DIGITS           MOS45770
84D0  4850 8A18          578          LH    R5,TOTERR                                       MOS45780
84D4  41F0 85CC          579          BAL   LINK,R5HEX      PRINT TOTERR IN HEX             MOS45790
84D8  43C0 80BE          580          B     OPTIN           GO TO BEGINNING                 MOS45800
                         581  *----------------------------------                          MOS45810
                         582  *   DISPLAY DATA ROUTINE                                     MOS45820
84DC  2401               583  DISPLAY LIS   R0,1            GET DISPLAY PANEL ADDRESS       MOS45830
84DE  DE00 800F          584          OC    R0,INCR         PUT PANEL IN INCREMENTAL MODE   MOS45840
84E2  481F 0002          585          LH    R1,2(LINK)      GET 2ND PARAMETER               MOS45850
84E6  4811 0000          586          LH    R1,0(R1)        GET DATA                        MOS45860
84EA  9411               587          EXBR  R1,R1                                           MOS45870
84EC  9801               588          WHR   R0,R1           WRITE DATA                      MOS45880
84EE  481F 0000          589          LH    R1,0(LINK)      GET 1ST PARAMETER               MOS45890
84F2  4811 0000          590          LH    R1,0(R1)        GET DATA                        MOS45900
84F6  9411               591          EXBR  R1,R1                                           MOS45910
84F8  9801               592          WHR   R0,R1           WRITE DATA                      MOS45920
84FA  DE00 800E          593          OC    R0,NORM         PUT PANEL IN NORMAL MODE        MOS45930
84FE  43CF 0004          594          B     4(LINK)         RETURN                          MOS45940
                         595  *----------------------------------                      ***  MOS45950
                         596  *  ERROR ROUTINES               (OVERRIDE NOMSG OPTION)      MOS45960
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                                597  *                                                                    MOS45970
8502   D000 9E10                598  ERR       STM   R0,ERRSAVE        STORE REGISTERS                   MOS45980
8506   4120 8520                599            BAL   R2,ERRCOM         RETURN IF LIST DEVICE IS ON       MOS45990
850A   41E0 8554                600            BAL   RET,ERR1          PRINT 'ERROR TTNN'                MOS46000
850E   24C0                     601  ERRCOM2   LIS   R0,0               *                           ***  MOS46010
8510   4000 8A0C                602            STH   R0,ISITERR        RESET ERROR FLAG                  MOS46020
8514   4820 8006                603            LH    R2,PSW                                              MOS46030
8518   95C2                     604            EPSR  R0,R2                                               MOS46040
851A   D100 9E10                605            LM    R0,ERRSAVE        RESTORE REGISTERS                 MOS46050
851E   030F                     606            BR    LINK              RETURN TO TEST                    MOS46060
                                607  *                                                                    MOS46070
                                608  *  ETPE COMMON ERROR ROUTINE                                      ***  MOS46080
                                609  *                                                                    MOS46090
8520   4020 9A22                610  ERRCOM    STH   R2,COMRET                                            MOS46100
8524   4810 8008                611            LH    R1,PSW2                                             MOS46110
8528   95C1                     612            EPSR  R0,R1               DISABLE INT. @ PROCESSOR LEVEL    MOS46120
852A   41F0 8858                613            BAL   LINK,TSTDU          GET LIST DEVICE DU BIT IN R1      MOS46130
852E   2138                     614            BNZS  ERRCOM1             BRANCH IF OFF-LINE                MOS46140
8530   4020 8A0C                615            STH   R2,ISITERR          SET ERROR FLAG                    MOS46150
8534   4020 8A0E                616            STH   R2,NCERR                                              MOS46160
8538   4820 8A22                617            LH    R2,COMRET                                           MOS46170
853C   03C2                     618            BR    R2                  GO, PRINT ERROR MESSAGE           MOS46180
                                619  *                                                                    MOS46190
853E   4810 8A18                620  ERRCOM1   LH    R1,TOTERR           LIST DEVICE IS OFF                MOS46200
8542   2611                     621            AIS   R1,1                                                  MOS46210
8544   4010 8A18                622            STH   R1,TOTERR           INCREMENT TOTERR                  MOS46220
8548   C510 7FFF                623            CLAI  R1,X'7FFF'          TOTERR < MAX RETAINABLE ?         MOS46230
854C   4280 8472                624            BL    KEEP91              NO, ABORT CURRENT TEST & GOTO NEXT MOS46240
8550   43C0 8494                625            B     HALT9               YES, HALT PROCESSOR               MOS46250
                                626  *---------------------------------                                  MOS46260
                                627  * MESSAGE PRINT ROUTINES           (DO NOT OVERRIDE NOMSG OPTION)    MOS46270
                                628  *                                                                    MOS46280
                                629  *  TO PRINT 'ERROR TTNN'                                            MOS46290
                                630  *                                                                    MOS46300
8554   C850 8A4E                631  ERR1      LDAI  R5,ERRMSG                                            MOS46310
8558   41F0 8656                632            BAL   LINK,PRINT          PRINT 'ERROR TTNN'                MOS46320
                                633  *                                   TT = TEST NO., NN = ERROR NO.     MOS46330
855C   030E                     634            BR    RET                 RETURN                            MOS46340
                                635  *                                                                 ***  MOS46350
                                636  *  TO PRINT 'PSW PPPP  LOC LLLL'                                    MOS46360
                                637  *                                                                    MOS46370
855E   2404                     638  ERRPL1    LIS   R0,4                SET UP DIGITS = 4                 MOS46380
8560   4810 89E0                639            LH    R1,OPSW             R1 = OLD PSW                      MOS46390
8564   C820 8A78                640            LDAI  R2,ASCIPSW                                            MOS46400
8568   41F0 85F6                641            BAL   LINK,HEXASC         CONVERT IT TO ASCII               MOS46410
856C   4810 89E2                642            LH    R1,OLOC             R1= OLD LOC                       MOS46420
8570   C820 8A82                643            LDAI  R2,ASCILOC                                            MOS46430
8574   41F0 85F6                644            BAL   LINK,HEXASC         CONVERT IT TO ASCII               MOS46440
8578   C850 8A74                645            LDAI  R5,PSWMSG                                             MOS46450
857C   41F0 8656                646            BAL   LINK,PRINT          PRINT 'PSW PPPP  LOC LLLL'        MOS46460
8580   030E                     647            BR    RET                 RETURN                            MOS46470
                                648  * ********************************                                   MOS46480
                                649  *  TO OBTAIN OPTION VALUE IN R6    (16 BITS, TARGT 16)               MOS46490
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                        650  *                                                                    MOS46500
8582  2460              651  OPTVAL   LIS   R6,0              INITIALIZE ACCUMULATOR            MOS46510
8584  41F0 877A         652           BAL   R15,GETCHR        GET A CHAR IN R4                  MOS46520
8588  24FF              653  CPTVAL0  LIS   R15,15                                              MOS46530
858A  D44F 8A34         654  OPTVAL1  CLB   R4,HEXTAB(R15)    SCAN TABLE                        MOS46540
858E  2334              655           BES   OPTVAL2           MATCH                             MOS46550
8590  27F1              656           SIS   R15,1                                               MOS46560
8592  2214              657           BNMS  OPTVAL1                                             MOS46570
8594  03CC              658           BR    R12               ERROR; VALUE NOT IN TABLE.        MOS46580
8596  91E4              659  OPTVAL2  SLLS  R6,4              SHIFT LEFT 4                      MOS46590
8598  066F              660           CAR   R6,R15            OR IN CURRENT DIGIT               MOS46600
859A  41F0 877A         661  OPTVAL3  BAL   R15,GETCHR        GET NEXT CHAR                     MOS46610
859E  C540 005F         662           CLAI  R4,X'5F'          IS IT LEFT ARROW ?                MOS46620
85A2  2334              663           BES   OPTVAL5           YES, BRANCH                       MOS46630
85A4  C540 0008         664           CLAI  R4,X'08'          BACK SPACE ?                      MOS46640
85A8  2133              665           BNES  OPTVAL4           NO, BRANCH                        MOS46650
85AA  90E4              666  OPTVAL5  SRLS  R6,4              YES, THROW AWAY LAST HEX ENTRY     MOS46660
85AC  2209              667           BS    OPTVAL3                                             MOS46670
85AE  C540 000D         668  OPTVAL4  CLAI  R4,13             EXIT IF CR                        MOS46680
85B2  033E              669           BER   R14                                                 MOS46690
85B4  C540 002C         670           CLAI  R4,X'2C'          OR COMMA                          MOS46700
85B8  4230 8588         671           BNE   OPTVAL0           LOOP TO PROCESS                   MOS46710
85BC  03CE              672           BR    R14               RETURN                            MOS46720
                        673  *--------------------------------                                   MOS46730
                        674  * TO CONVERT (R6) FROM BINARY TO UNARY PATTERN, IN R3               MOS46740
                        675  *                                                                    MOS46750
85BE  2431              676  UNARY    LIS   R3,1              INITIALIZE                        MOS46760
85C0  C560 000F         677  UNARY1   CLAI  R6,15             DONE ?                            MOS46770
85C4  033E              678           BER   R14               RETURN                            MOS46780
85C6  0A33              679           AAR   R3,R3             NO. SHIFT R3.  (SLHLS  R3,1)  **** MOS46790
85C8  2661              680           AIS   R6,1              INCREMENT COUNTER                 MOS46800
85CA  2205              681           BS    UNARY1                                              MOS46810
                        682  *--------------------------------                              ***  MOS46820
                        683  *  R5HEX PRINTS CONTENTS OF R5 IN HEX                              MOS46830
                        684  *        PRINTS UPTO 4 DIGITS     (8 DIGITS, TARGT 32)              MOS46840
                        685  *                                                                    MOS46850
85CC  D000 9E50         686  R5HEX    STM   R0,RSAVE          STORE REGISTERS                   MOS46860
85D0  0820              687           LDAR  R2,R0             R2 = NO. OF DIGITS TO BE PRINTED  MOS46870
85D2  2721              688           SIS   R2,1                                                MOS46880
85D4  4210 85F0         689           BM    R5XB                                                MOS46890
85D8  9122              690           SLLS  R2,2              R2 = 4(DIGITS-1)                  MOS46900
85DA  0845              691  R5X      LDAR  R4,R5                                               MOS46910
85DC  CC42 0000         692           SRAL  R4,0(R2)                                            MOS46920
85E0  C440 000F         693           NAI   R4,15             R4 = HEX DIGIT                    MOS46930
85E4  D344 8A34         694           LB    R4,HEXTAB(R4)                                       MOS46940
85E8  41F0 86EC         695  R5XA     BAL   R15,OUTCHR                                          MOS46950
85EC  2724              696           SIS   R2,4                                                MOS46960
85EE  221A              697           BNMS  R5X               LOOP TILL ALL DIGITS              MOS46970
85F0  D1C0 9E50         698  R5XB     LM    R0,RSAVE          RESTORE REGISTERS                 MOS46980
85F4  03CF              699           BR    LINK              RETURN                            MOS46990
                        700  *--------------------------------                              ***  MOS47000
                        701  *  TO CONVERT HEXADECIMAL DATA IN R1 TO ASCII CHAR & STORE @ 0(R2)  MOS47010
                        702  *                                                                    MOS47020
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EXEC - ETPE R03-05 (16 BIT/STRIPPED & MODIFIED)

```
85F6  D000 9E50          703  HEXASC   STM   R0,RSAVE          STORE REGISTERS                    MOS47030
85FA  0830               704           LDAR  R3,R0             R3 = DIGITS                        MOS47040
85FC  9132               705           SLLS  R3,2                                                 MOS47050
85FE  2734               706           SIS   R3,4              R3 = 4(DIGITS)-4                   MOS47060
8600  0841               707  HEXASC1  LDAR  R4,R1             R4 = HEX DATA                      MOS47070
8602  CC43 0000          708           SRAL  R4,0(R3)                                             MOS47080
8606  C440 000F          709           NAI   R4,15             R4 = HEX DIGIT TO BE CONVERTED     MOS47090
860A  D344 8A34          710           LB    R4,HEXTAB(R4)                                        MOS47100
860E  D242 0000          711           STB   R4,0(R2)          STORE ASCII CHAR                   MOS47110
8612  2621               712           AIS   R2,1                                                 MOS47120
8614  2734               713           SIS   R3,4                                                 MOS47130
8616  221B               714           BNMS  HEXASC1           LOOP TILL ALL DIGITS               MOS47140
8618  D100 9E50          715           LM    R0,RSAVE          RESTORE REGISTERS                  MOS47150
861C  030F               716           BR    LINK              RETURN                             MOS47160
                         717  *-------------------------------                                    MOS47170
                         718  *  TO CONVERT BINARY DATA IN R1 INTO DECIMAL DIGITS                 MOS47180
                         719  *     AND STORE THEM IN ASCII @ 0(R2)                               MOS47190
                         720  *                                                                    MOS47200
861E  D000 9E50          721  DECASC   STM   R0,RSAVE                                            MOS47210
8622  0830               722           LDAR  R3,R0             COPY DIGIT COUNT                   MOS47220
8624  9131               723           SLLS  R3,LADC           & ESTABLISH DECTAB INDEX.          MOS47230
8626  2732               724           SIS   R3,ADC                                               MOS47240
8628  2440               725  $DEC1    LIS   R4,0              CLEAR MODULUS COUNTER              MOS47250
862A  4853 8A2A          726           LDA   R5,DECTAB(R3)     LOAD LARGEST REQ. POWER OF 10.     MOS47260
862E  0515               727  $DEC2    CLAR  R1,R5             EXCEEDS TEST VALUE ?               MOS47270
8630  2188               728           BLS   $DEC3             BRANCH IF YES.                     MOS47280
8632  0B15               729           SAR   R1,R5             DECREMENT TEST VALUE               MOS47290
8634  2641               730           AIS   R4,1              INCREMENT MODULUS COUNTER          MOS47300
8636  C540 000A          731           CLAI  R4,10             VALID DECIMAL DIGIT ?              MOS47310
863A  2086               732           BLS   $DEC2             BRANCH IF YES; ELSE                MOS47320
863C  274A               733           SIS   R4,10             FORCE VALID DIGIT,                 MOS47330
863E  2208               734           BS    $DEC2             REPEAT DECREMENT.                  MOS47340
8640  D344 8A34          735  $DEC3    LB    R4,HEXTAB(R4)     CONVERT MODULUS COUNT TO ASCII     MOS47350
8644  D242 0000          736           STB   R4,0(R2)          AND STORE AT DESTINATION MSB.      MOS47360
8648  2621               737           AIS   R2,1              INCREMENT DESTINATION POINTER      MOS47370
864A  2732               738           SIS   R3,ADC            DECREMENT DECTAB POINTER           MOS47380
864C  4310 8628          739           BNM   $DEC1             FALL THROUGH ON DECTAB UNDERFLOW.  MOS47390
8650  D100 9E50          740           LM    R0,RSAVE          RESTORE USER'S REGISTERS           MOS47400
8654  030F               741           BR    LINK              RETURN.                            MOS47410
                         742  *-------------------------------                                    MOS47420
                         743  *  TO PRINT THE ASCII MESSAGE                                      MOS47430
                         744  *                                                                    MOS47440
8656  D000 9E50          745  PRINT    STM   R0,RSAVE          STORE REGISTERS                    MOS47450
865A  41F0 8858          746           BAL   LINK,TSTDU                                           MOS47460
865E  2337               747           BZS   P1                                                   MOS47470
8660  4010 8A12          748           STH   R1,WASDU          SET DU FLAGS                       MOS47480
8664  4010 8A14          749           STH   R1,WASDU1                                            MOS47490
8668  4300 86D4          750           B     PRINT5            EXIT                               MOS47500
866C  4820 8A12          751  P1       LH    R2,WASDU                                           MOS47510
8670  4330 869E          752           BZ    P3                                                 MOS47520
8674  C810 0140          753           LDAI  R1,X'140'         DELAY CONSTANT                     MOS47530
8678  C800 1000          754  P4       LDAI  R0,X'1000'                                         MOS47540
867C  2701               755  P5       SIS   R0,1                                               MOS47550
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867E  2031           756          BNZS  P5                                    MOS47560
8680  2711           757          SIS   R1,1                                  MOS47570
8682  2035           758          BNZS  P4              LOOP TILL TIMEOUT       MOS47580
                     759  *                             (20 SEC FOR CRT WARM-UP) MOS47590
8684  2440           760          LIS   R4,0                                   MOS47600
8686  4040 8A12      761          STH   R4,WASDU                               MOS47610
868A  2541           762          LCS   R4,1             CHARACTER = X'FF'     MOS47620
868C  4040 8A14      763          STH   R4,WASDU1                              MOS47630
8690  2434           764          LIS   R3,4                                   MOS47640
8692  41F0 86EC      765  P2      BAL   LINK,OUTCHR                            MOS47650
8696  2731           766          SIS   R3,1                                   MOS47660
8698  2023           767          BPS   P2                                    MOS47670
869A  4300 84A0      768          B     KEEP10           PRINT TOTAL, TOTERR   MOS47680
869E  4800 8ADE      769  P3      LH    R0,NOMSG+6                             MOS47690
86A2  2335           770          BZS   PRINT2           NO, PRINT ALL MESSAGES MOS47700
86A4  4800 8A0C      771          LH    R0,ISITERR                             MOS47710
86A8  4330 86D4      772          BZ    PRINT5           NOT AN ERROR MSG. EXIT MOS47720
                     773  *                                                    MOS47730
86AC  D345 0000      774  PRINT2  LB    R4,0(R5)         GET A MESSAGE BYTE    MOS47740
86B0  41F0 86EC      775          BAL   LINK,OUTCHR      OUTPUT IT             MOS47750
86B4  274D           776          SIS   R4,13            CR ?                  MOS47760
86B6  2333           777          BZS   PRINT3           MSG OVER              MOS47770
86B8  2651           778          AIS   R5,1                                   MOS47780
86BA  2207           779          BS    PRINT2           LOOP FOR NEXT CHAR    MOS47790
86BC  244A           780  PRINT3  LIS   R4,10            LF                    MOS47800
86BE  D310 800B      781          LB    R1,IOSAVE+1      GET LIST DEV IDENTIFIER MOS47810
86C2  2713           782          SIS   R1,3             LINE PRINTER ?        MOS47820
86C4  2335           783          BZS   PRINT3A          BRANCH IF YES.        MOS47830
86C6  41F0 86EC      784          BAL   LINK,OUTCHR      LF                    MOS47840
86CA  2541           785          LCS   R4,1             DEL                   MOS47850
86CC  2302           786          BS    PRINT3B                                MOS47860
86CE  2441           787  PRINT3A LIS   R4,1             YES, OUTPUT X'01'     MOS47870
86D0  41F0 86EC      788  PRINT3B BAL   LINK,OUTCHR      TERMINAL CHARACTER    MOS47880
86D4  41F0 87D4      789  PRINT5  BAL   LINK,TSTBRK                            MOS47890
86D8  D100 9E50      790          LM    R0,RSAVE         RESTORE REGISTERS     MOS47900
86DC  03CF           791          BR    LINK             RETURN                MOS47910
                     792  *---------------------------------                   MOS47920
                     793  *  SMALL SUPPORT ROUTINES                            MOS47930
                     794  *                                                    MOS47940
                     795  *  TO OUTPUT CR,LF TO LIST DEVICE                    MOS47950
                     796  *                                                    MOS47960
86DE  D000 9E50      797  CRLF    STM   R0,RSAVE         STORE REGISTERS       MOS47970
86E2  244D           798          LIS   R4,13                                  MOS47980
86E4  41F0 86EC      799          BAL   LINK,OUTCHR      OUTPUT CR             MOS47990
86E8  4300 86BC      800          B     PRINT3           LINE FEED, RESTORE, RETURN MOS48000
                     801  *---------------------------------                   MOS48010
                     802  *  TO OUTPUT A CHARACTER TO THE LIST DEVICE           MOS48020
86EC  40F0 8A24      803  OUTCHR  STH   R15,OUT.SAV      SAVE RETURN ADDRESS   MOS48030
86F0  D300 800B      804          LB    R0,ICSAVE+1                            MOS48040
86F4  2704           805          SIS   R0,4                                   MOS48050
86F6  4230 8734      806          BNZ   OUTCHR2          BRANCH IF NOT CAROUSEL MOS48060
86FA  4000 8A20      807          STH   R0,PAUSE                               MOS48070
86FE  41F0 8858      808  OTC.0   BAL   LINK,TSTDU       ON LINE ?             MOS48080
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8702  4230 8770          809           BNZ   OUTO              NO, BRANCH                                  MOS48090
8706  9D01               810           SSR   R0,R1             GET CAROUSEL STATUS                         MOS48100
8708  2386               811           BNCS  OTC.1             BRANCH IF CHAR. IS TO BE READ               MOS48110
870A  4810 8A20          812           LH    R1,PAUSE          PAUSED NOW ?                                MOS48120
870E  2038               813           BNZS  OTC.0             YES, LOOP                                   MOS48130
8710  4300 8734          814           B     OUTCHR2           NO, GO OUTPUT CHARACTER                     MOS48140
8714  9BC1               815  OTC.1    RDR   R0,R1             GET CAROUSEL CHARACTER                      MOS48150
8716  C410 007F          816           NAI   R1,X'7F'                                                      MOS48160
871A  CB10 0012          817           SAI   R1,X'12'          DC2 ?                                       MOS48170
871E  2134               818           BNZS  OTC.3             NO, BRANCH                                  MOS48180
8720  4010 8A20          819           STH   R1,PAUSE          SET PAUSE FLAG                              MOS48190
8724  2308               820           BS    OUTCHR2           BRANCH                                      MOS48200
8726  2712               821  OTC.3    SIS   R1,2              DC4 ?                                       MOS48210
8728  4230 86FE          822           BNZ   OTC.0             NO, GO WAIT FOR DC2                         MOS48220
872C  40F0 8A20          823           STH   LINK,PAUSE        RESET PAUSE FLAG                            MOS48230
8730  4300 86FE          824           B     OTC.0             GO WAIT FOR DC2                             MOS48240
                         825  *                                                                            MOS48250
8734  4010 8A20          826  OUTCHR2  STH   R1,PAUSE          RESET FLAG                                  MOS48260
8738  41F0 8858          827           BAL   LINK,TSTDU        OFF-LINE ?                                  MOS48270
873C  4230 8770          828           BNZ   OUTO              BRANCH IF OFF-LINE                          MOS48280
8740  4110 88B8          829           BAL   R1,SETUP          SET UP FOR OUTPUT                           MOS48290
8744  9D01               830  OTC.4    SSR   R0,R1             WAIT FOR NOT BUSY                           MOS48300
8746  4230 8770          831           BTC   3,OUTO            BRANCH IF OFF-LINE                          MOS48310
874A  C510 000C          832           CLAI  R1,12             PASLA OFFLINE ?                             MOS48320
874E  4330 8770          833           BE    OUTO              BRANCH: YES.                                MOS48330
8752  C310 0008          834           TAI   R1,8              BUSY ?                                      MOS48340
8756  2039               835           BNZS  OTC.4             WAIT FOR NOT BUSY.                          MOS48350
8758  9A04               836           WDR   R0,R4             OUTPUT DATA BYTE                            MOS48360
875A  41F0 8858          837  OTC.5    BAL   LINK,TSTDU        DEVICE DU ?                                 MOS48370
875E  2139               838           BNZS  OUTO              YES, BRANCH                                 MOS48380
8760  D310 800B          839           LB    R1,IOSAVE+1                                                   MOS48390
8764  0A11               840           AAR   R1,R1             (SLHLS  R1,1)                         ****  MOS48400
8766  D301 8011          841           LB    R0,IO+1(R1)       GET CONSOLE WRITE ADDRESS                   MOS48410
876A  9D01               842           SSR   R0,R1                                                         MOS48420
876C  2089               843           BTBS  8,OTC.5           WAIT FOR NOT BUSY.                          MOS48430
876E  2303               844           BS    OUT1                                                          MOS48440
8770  4010 8A12          845  OUTO     STH   R1,WASDU          SET WASDU FLAG                              MOS48450
8774  48F0 8A24          846  OUT1     LH    LINK,OUT.SAV                                                  MOS48460
8778  030F               847           BR    LINK              RETURN AS SET UP ABOVE                      MOS48470
                         848  *---------------------------------                                           MOS48480
                         849  *  TO GET A CHAR FROM KEYBOARD (IN REG R4)                                   MOS48490
                         850  *                                                                            MOS48500
877A  4140 889C          851  GETCHR   BAL   R4,KBREAD         PUT KB DEVICE IN READ MODE                  MOS48510
877E  0890               852           LDAR  R9,R0             SAVE CONSOLE ADDRESS                        MOS48520
8780  9D04               853           SSR   R0,R4                                                         MOS48530
8782  2081               854           BTBS  8,1               IF BUSY, LOOP (POSSIBLE HANG)         ***   MOS48540
8784  9B04               855           RDR   R0,R4             READ A CHARACTER IN R4                      MOS48550
                         856  *  TO ECHO RECEIVED CHARACTERS TO CONSOLE DEVICE IN FDX MODE                 MOS48560
8786  D400 801A          857  ECHO     CLB   R0,MICROBUS       IS IT MICROBUS ?                            MOS48570
878A  233B               858           BES   ECHO1             YES, BRANCH                                 MOS48580
878C  D390 89EC          859           LB    R9,CONRD                                                      MOS48590
8790  C590 00A9          860           CLAI  R9,X'A9'          CAROUSEL ?                                  MOS48600
8794  2137               861           BNES  ECHRTN            YES, DO NOT ECHO                            MOS48610
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8796  D390 89EB        862           LB    R9,CONADR+1                                    MOS48620
879A  DD90 89E4        863           SS    R9,SINK                                        MOS48630
879E  2082             864           BTBS  8,2                 WAIT FOR NOT BUSY        MOS48640
87A0  9A94             865 ECHO1     WDR   R9,R4               ECHO RECEIVED BYTE       MOS48650
87A2  C440 007F        866 ECHRTN    NAI   R4,X'7F'            REMOVE PARITY BIT        MOS48660
87A6  03CF             867           BR    LINK                RETURN                   MOS48670
                       868 *---------------------------------                             MOS48680
                       869 *  TO OUTPUT '?' TO CONSOLE                                    MOS48690
                       870 *                                                              MOS48700
87A8  41F0 86DE        871 QUESTN    BAL   LINK,CRLF                                     MOS48710
87AC  40F0 8A0C        872           STH   LINK,ISITERR        SET FLAG                 MOS48720
87B0  C850 8A96        873           LDAI  R5,QMSG                                      MOS48730
87B4  41F0 8656        874           BAL   LINK,PRINT          PRINT '?'                MOS48740
87B8  2400             875           LIS   R0,0                                         MOS48750
87BA  4000 8A0C        876           STH   R0,ISITERR                                   MOS48760
87BE  4300 80CA        877           B     OPTIN1              TO ACCEPT COMMAND INPUT  MOS48770
                       878 *---------------------------------                             MOS48780
                       879 * IF BREAK KEY DEPRESSED, GO TO 'OPTIN' OR (BRKVECT); ELSE RETURN.  MOS48790
                       880 *   BUT IF "BREAK" & CONTIN = 1, GO TO ABORT1.                  MOS48800
                       881 *                                                              MOS48810
87C2  D000 9E70        882 TSTBRKX   STM   R0,16*ADC+RSAVE     STORE REGISTERS          ****  MOS48820
87C6  40F0 8A26        883           STH   LINK,BRK.SAV        SAVE RETURN ADDRESS      ****  MOS48830
87CA  C8F0 83A8        884           LDAI  LINK,TSTEND         *                        ****  MOS48840
87CE  40F0 8A0A        885           STH   LINK,BRKVECT        ESTABLISH "TSTEND" VECTOR ****  MOS48850
87D2  2305             886           BS    TSTBRK6             BRANCH                   ****  MOS48860
                       887 *                                                              MOS48870
                       888 *                                                              MOS48880
87D4  D000 9E70        889 TSTBRK    STM   R0,16*ADC+RSAVE     STORE REGISTERS          MOS48890
87D8  40F0 8A26        890           STH   LINK,BRK.SAV        SAVE RETURN ADDRESS      MOS48900
87DC  D300 89EA        891 TSTBRK6   LB    R0,CONADR           GET KEYBOARD DEVICE ADR  MOS48910
87E0  9D01             892           SSR   R0,R1                                        MOS48920
87E2  4210 8848        893           BTC   1,TSTBRK3           IF CLI OR MICROBUS DU, BRANCH  MOS48930
87E6  C510 000C        894           CLAI  R1,X'0C'                                     MOS48940
87EA  4330 8848        895           BE    TSTBRK3             IF PASLA DU, BRANCH      MOS48950
87EE  C310 0020        896           TAI   R1,X'20'            'BREAK' KEY PRESSED ?    MOS48960
87F2  4330 8848        897           BZ    TSTBRK3             NO, EXIT                 MOS48970
87F6  D320 8010        898           LB    R2,IO                                        MOS48980
87FA  C520 0005        899           CLAI  R2,5                IS IT MICROBUS ?         MOS48990
87FE  2139             900           BNES  TSTBRK4             NO, BRANCH               MOS49000
8800  9B02             901 TSTBRK5   RDR   R0,R2                                        MOS49010
8802  9D01             902           SSR   R0,R1                                        MOS49020
8804  C310 0020        903           TAI   R1,X'20'                                     MOS49030
8808  4230 8800        904           BNZ   TSTBRK5                                      MOS49040
880C  4300 8834        905           B     TSTBRK2                                      MOS49050
8810  4820 89E6        906 TSTBRK4   LH    R2,PASFLG           PASLA ?                  MOS49060
8814  233C             907           BZS   TSTBRK1             BRANCH IF NO             MOS49070
8816  C310 0008        908           TAI   R1,8                ALREADY ACKNOWLEDGED ?   MOS49080
881A  4230 8848        909           BNZ   TSTBRK3             BRANCH IF YES            MOS49090
881E  9B02             910           RDR   R0,R2                                        MOS49100
8820  9D01             911           SSR   R0,R1                                        MOS49110
8822  2281             912           BFBS  8,1                                          MOS49120
8824  0822             913           LDAR  R2,R2               ZERO CHARACTER ?         MOS49130
8826  4230 8848        914           BNZ   TSTBRK3             BRANCH: JUST FRAMING ERROR  MOS49140
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882A  23C5           915           BS    TSTBRK2                                          MOS49150
882C  9D01           916 TSTBRK1   SSR   R0,R1                                            MOS49160
882E  C310 0020      917           TAI   R1,X'20'                                         MOS49170
8832  2033           918           BNZS  TSTBRK1          WAIT FOR BREAK KEY RELEASE      MOS49180
8834  48F0 8AD2      919 TSTBRK2   LH    LINK,CONTIN+6    IF "CONTIN" = 1,          ***   MOS49190
8838  4230 8BF6      920           BNZ   OPTIN2           BRANCH & ABORT TESTING    ***   MOS49200
883C  48F0 8A0A      921           LH    R15,BRKVECT      CHECK FOR SPECIAL ROUTINE       MOS49210
8840  4330 8BF6      922           BZ    OPTIN2           BRK W/NO VECTOR: TO EXEC.       MOS49220
8844  40F0 8A26      923           STH   R15,BRK.SAV      SET UP FOR EXIT                 MOS49230
8848  2400           924 TSTBRK3   LIS   R0,0                                            MOS49240
884A  40C0 8A0A      925           STH   R0,BRKVECT       DELETE VECTOR AFTER ONE SHOT.   MOS49250
884E  D1C0 9E70      926           LM    R0,16*ADC+RSAVE  RESTORE REGISTERS               MOS49260
8852  48F0 8A26      927           LH    LINK,BRK.SAV     RESTORE RETURN ADDRESS          MOS49270
8856  030F           928           BR    LINK             RETURN TO PROGRAM               MOS49280
                     929 *-------------------------------                                 MOS49290
                     930 * SEE IF CURRENT LIST DEVICE IS OFF-LINE (R1, CC NON-ZERO IF OFF)  MOS49300
                     931 *                                                               MOS49310
8858  2401           932 TSTDU     LIS   R0,1                                           MOS49320
885A  4810 89E6      933           LH    R1,PASFLG                                      MOS49330
885E  2333           934           BZS   STSTDU0                                        MOS49340
8860  C8C0 00FC      935           LDAI  R0,X'FC'                                       MOS49350
8864  D310 800B      936 STSTDU0   LB    R1,IOSAVE+1      GET LIST DEVICE IDENTIFIER      MOS49360
8868  0A11           937           AAR   R1,R1            (R1) = 2,4,6,8,A...(SLHLS  R1,1)****  MOS49370
886A  D311 8010      938           LB    R1,IO(R1)        GET LIST DEVICE ADDRESS         MOS49380
886E  D210 89E4      939           STB   R1,SINK          SAVE LIST DEVICE ADDRESS        MOS49390
8872  9D11           940           SSR   R1,R1            GRAB STATUS                     MOS49400
8874  0410           941           NAR   R1,R0                                            MOS49410
8876  C310 0001      942           TAI   R1,1             CLI DU ?                        MOS49420
887A  2135           943           BNZS  STSTDU2          YES, BRANCH                     MOS49430
887C  C510 000C      944           CLAI  R1,X'0C'         PASLA DU ?                      MOS49440
8880  2332           945           BES   STSTDU2          YES, BRANCH                     MOS49450
8882  2511           946 STSTDU1   LCS   R1,1             FORCE R1 FOR RETURN CC = 0      MOS49460
8884  D300 89E4      947 STSTDU2   LB    R0,SINK          RESTORE LIST DEVICE ADDRESS     MOS49470
8888  C710 FFFF      948           XAI   R1,-1            SET CONDITION CODE              MOS49480
888C  030F           949           BR    LINK             RETURN                          MOS49490
                     950 * -------------------------------                               MOS49500
                     951 * TO DIRECT INPUT AND OUTPUT TO CONSOLE DEVICE                   MOS49510
                     952 *                                                               MOS49520
888E  D300 8010      953 SETKB     LB    R0,IO            GET KEYBOARD DEVICE             MOS49530
8892  9410           954           EXBR  R1,R0                                            MOS49540
8894  0610           955           OAR   R1,R0                                            MOS49550
8896  4010 800A      956           STH   R1,IOSAVE        KB DEVICE = LIST DEVICE         MOS49560
889A  030F           957           BR    LINK             RETURN                          MOS49570
                     958 *-------------------------------                                 MOS49580
                     959 *  TO PUT KEYBOARD DEVICE IN READ MODE                          MOS49590
                     960 *                                                               MOS49600
889C  D300 89EA      961 KBREAD    LB    R0,CONADR                                      MOS49610
88A0  DEC0 89EC      962           OC    R0,CONRD         OC CONSOLE READ COMMAND         MOS49620
88A4  DBC0 89E4      963           RD    R0,SINK                                        MCS49630
88A8  4890 89E6      964           LH    R9,PASFLG        PASLA ?                         MOS49640
88AC  4200 88AC      965           NOP   *                FOR SPECIAL KB DEVICE           MOS49650
88B0  2333           966 TTYGET    BZS   KBXIT            NO, RETURN                      MOS49660
88B2  DEC0 8A04      967           CC    R0,CONRQ2S                                     MOS49670
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88B6  0304              968  KBXIT   BR    R4                 RETURN                              MOS49680
                        969  *-----------------------------------                          ***    MOS49690
                        970  *  LIST DEVICE SET UP ROUTINE                                       MOS49700
                        971  *                                                                   MOS49710
88B8  4010 8A28         972  SETUP   STH   R1,SET.RTN                                          MOS49720
88BC  D310 800B         973          LB    R1,IOSAVE+1        GET LIST DEVICE IDENTIFIER       MOS49730
88C0  0A11              974          AAR   R1,R1              HW INDEX      (SLHLS  R1,1)      MOS49740
88C2  D3C1 8011         975          LB    R0,IO+1(R1)        GET LIST DEVICE ADDRESS          MOS49750
88C6  DEC1 89ED         976          OC    R0,CONWRT(R1)                                       MOS49760
88CA  4810 8A28         977          LH    R1,SET.RTN                                          MOS49770
88CE  03C1              978          BR    R1                 RETURN                           MOS49780
                        979  *-----------------------------------                          ***    MOS49790
                        980  *  LOW CORE SET UP ROUTINE                                          MOS49800
                        981  *                                                                   MOS49810
88D0  2410              982  LCORE   LIS   R1,0                                                MOS49820
88D2  2422              983          LIS   R2,2                                                MOS49830
88D4  C830 004E         984          LDAI  R3,X'4E'                                            MOS49840
88D8  2400              985          LIS   R0,0                                                MOS49850
88DA  4840 0020         986          LH    R4,X'20'           SAVE CONSOLE STATUS              MOS49860
88DE  4001 0000         987  ZERO1   STH   R0,0(R1)                                           MOS49870
88E2  C110 88DE         988          BXLE  R1,ZERO1           ZERO CORE FROM 0 THRU X'4F'      MOS49880
88E6  4040 0020         989          STH   R4,X'20'           RESTORE CONSOLE STATUS           MOS49890
88EA  C830 8922         990          LDAI  R3,II                                               MOS49900
88EE  4030 0036         991          STH   R3,X'36'           ILL INST INT NEW PSW LOC         MOS49910
88F2  C840 895A         992          LDAI  R4,MM                                               MOS49920
88F6  4040 003E         993          STH   R4,X'3E'           M. M. INT NEW PSW LOC            MOS49930
88FA  C840 9E50         994          LDAI  R4,RSAVE                                            MOS49940
                        995  *                                                                   MOS49950
                        996  *  SET UP LOW CORE FOR 16 BIT MACHINE                               MOS49960
                        997  *                                                                   MOS49970
88FE  4040 0022         998          STH   R4,X'22'           REG SAVE POINTER                 MOS49980
8902  030F              999          BR    LINK               RETURN                           MOS49990
                       1000  *-----------------------------------                          ***    MOS50000
                       1001  *  SPURIOUS INTERRUPT HANDLERS                                      MOS50010
                       1002  *                                                                   MOS50020
                       1003  *                                                                   MOS50030
                       1004  *                                                                   MOS50040
8904  40E0 89E0        1005  COMM    STH   R14,OPSW                                            MOS50050
8908  40F0 89E2        1006          STH   R15,OLOC                                            MOS50060
890C  4800 8008        1007  COMM1   LH    R0,PSW2                                             MOS50070
8910  9520             1008          EPSR  R2,R0              NO INT. , REG SET 15             MOS50080
8912  41F0 8502        1009          BAL   LINK,ERR           PRINT 'ERROR XXFN'               MOS50090
8916  40F0 8A0C        1010          STH   LINK,ISITERR       FORCE PRINT                      MOS50100
891A  41E0 855E        1011          BAL   RET,ERRPL1         PRINT 'PSW PPPP  LOC LLLL'       MOS50110
891E  4300 80CA        1012          B     OPTIN1             ENTER COMMAND MODE               MOS50120
                       1013  *                                                                   MOS50130
                       1014  *  ILLEGAL INSTRUCTION INTERRUPT TRAP                               MOS50140
                       1015  *                                                                   MOS50150
8922  C820 895A        1016  II      LDAI  R2,MM              *                          ***    MOS50160
8926  4020 003E        1017          STH   R2,X'3E'           RESTORE ETPE MM POINTER    ***    MOS50170
892A  C820 4632        1018          LDAI  R2,C'F2'                                            MOS50180
892E  4020 8A56        1019          STH   R2,ERRNO           SET ERROR NUMBER F2              MOS50190
8932  48E0 0030        1020          LH    R14,X'30'          OLD PSW                          MOS50200
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8936  48F0 0032          1021          LH    R15,X'32'          OLD LOC                                  MOS50210
893A  4300 8904          1022  II32    B     COMM               *                          ***           MOS50220
                         1023  *                                                                         MOS50230
                         1024  *  MACHINE MALFUNCTION INTERRUPT TRAP                                     MOS50240
                         1025  *                                                                         MOS50250
893E  95EE               1026  MM0     EPSR  R14,R14            CAPTURE MMINT PSW          ***           MOS50260
8940  C820 895A          1027          LDAI  R2,MM              *                          ***           MOS50270
8944  4020 003E          1028          STH   R2,X'3E'           RESTORE ETPE MM POINTER    ***           MOS50280
8948  08AE               1029          LDAR  R10,R14                                                     MOS50290
894A  C4A0 000F          1030          NAI   R10,X'000F'        *                          ***           MOS50300
894E  C3A0 0006          1031          TAI   R10,6              CC = MEMORY ERROR ?        ***           MOS50310
8952  2307               1032          BZS   MM1                NO, BRANCH                 ***           MOS50320
8954  41F0 9BA0          1033          BAL   LINK,PARERR         YES, PRINT ERROR (PARITY)  ***           MOS50330
8958  23C4               1034          BS    MM1                *                          ***           MOS50340
                         1035  *                                                            ***           MOS50350
895A  95AA               1036  MM      EPSR  R10,R10            CAPTURE MMINT PSW                        MOS50360
895C  C4A0 000F          1037          NAI   R10,X'000F'        *                          ***           MOS50370
8960  C820 4633          1038  MM1     LDAI  R2,C'F3'                                                    MOS50380
8964  4020 8A56          1039          STH   R2,ERRNO           SET ERROR NUMBER F3                      MOS50390
8968  48E0 0038          1040          LH    R14,X'38'          OLD PSW (16 BIT PROCESSOR)               MOS50400
896C  48F0 003A          1041          LH    R15,X'3A'          OLD LOC                                  MOS50410
8970  C4E0 FFF0          1042  MM32    NAI   R14,X'FFF0'                                                 MOS50420
8974  06EA               1043          OAR   R14,R10            R14 = COMPOSITE PSW                      MOS50430
8976  40E0 89E0          1044          STH   R14,OPSW                                                    MOS50440
897A  40F0 89E2          1045          STH   R15,CLOC                                                    MOS50450
897E  C810 7FFF          1046          LDAI  R1,X'7FFF'                                                  MOS50460
8982  2711               1047  MM16    SIS   R1,1               TIMEOUT                                  MOS50470
8984  2021               1048          BPS   MM16                                                        MOS50480
8986  C800 80F0          1049          LDAI  R0,X'80F0'         R0 = X'80F0'               ***           MOS50490
898A  9520               1050          EPSR  R2,R0              HALT PROCESSOR                           MOS50500
                         1051  *                                                                         MOS50510
                         1052  *    WHEN EXE/RUN IS DEPRESSED, ERROR MSG IS PRINTED.                     MOS50520
                         1053  *                                                                         MOS50530
898C  D320 8010          1054  MMCOM   LB    R2,IO              GET CONSOLE DEVICE POINTER               MOS50540
8990  2725               1055          SIS   R2,5               IS CONSOLE ON MICRO-IC BUS ?             MOS50550
8992  2334               1056          BZS   MMCOMA             YES, BRANCH                              MOS50560
8994  4820 89E6          1057          LH    R2,PASFLG          IS CONSOLE ON PASLA ?                    MOS50570
8998  233C               1058          BZS   MMCOM1             NO, BRANCH                               MOS50580
899A  D310 8010          1059  MMCOMA  LB    R1,IO              YES, GET CONSOLE DEVICE IDENT            MOS50590
899E  0A11               1060          AAR   R1,R1              SET INDEX     (SLHLS   R1,1)  ****       MOS50600
89A0  D321 8010          1061          LB    R2,IO(R1)          GET CONSOLE DEVICE ADDRESS               MOS50610
89A4  DE21 89F8          1062          OC    R2,CON2ND(R1)      ISSUE CONSOLE SPEED COMMAND              MOS50620
89A8  DE20 89EC          1063          OC    R2,CONRD           ISSUE CONSOLEREAD COMMAND                MOS50630
89AC  DB20 89E4          1064          RD    R2,SINK            DUMMY READ TO SET BUSY                   MOS50640
                         1065  *                                                                         MOS50650
89B0  D310 8011          1066  MMCOM1  LB    R1,IO+1            GET LIST DEVICE POINTER                  MOS50660
89B4  2715               1067          SIS   R1,5               IS LIST DEVICE ON MICRO-IO BUS ?         MOS50670
89B6  2334               1068          BZS   MMCOM1A            YES, BRANCH                              MOS50680
89B8  4810 89E8          1069          LH    R1,PASFLG2         IS LIST DEVICE ON PASLA ?                MOS50690
89BC  233E               1070          BZS   MMCOM2             NO, BRANCH                               MOS50700
89BE  D310 8011          1071  MMCOM1A LB    R1,IO+1            YES, GET LIST DEVICE POINTER             MOS50710
89C2  D320 8010          1072          LB    R2,IO              GET CONSOLE POINTER                      MOS50720
89C6  0512               1073          CLAR  R1,R2              CONSOLE = LIST  DEVICE ?                 MOS50730
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89C8  2338            1074          BES   MMCOM2              YES, BRANCH                                  MOS50740
89CA  0A11            1075          AAR   R1,R1               NO, SET INDEX   (SLHLS  R1,1)   ****    MOS50750
89CC  D321 8011       1076          LB    R2,IO+1(R1)         GET LIST DEVICE ADDRESS                      MOS50760
89D0  DE21 89F8       1077          OC    R2,LST2ND(R1)       ISSUE LIST SPEED COMMAND                     MOS50770
89D4  DE21 89ED       1078          OC    R2,LSTWRT(R1)       ISSUE LIST WRITE COMMAND                     MOS50780
                      1079  *                                                                              MOS50790
89D8  4300 890C       1080  MMCOM2  B     COMM1                                                            MOS50800
                      1081  * ********************************                                             MOS50810
                      1082  *  ETPE CONSTANTS & TABLES                                                     MOS50820
                      1083  *                                                                              MOS50830
89E0                  1084          ALIGN 8                                                                MOS50840
                      1085  *-----------------------------------                                          MOS50850
89E0  0000            1086  OPSW    DCX   0                                                                MOS50860
89E2  0000            1087  OLOC    DCX   0                                                                MOS50870
                      1088  *-----------------------------------                                          MOS50880
89E4  00              1089  SINK    DB    0                     BIT BUCKET                               MOS50890
89E5  00              1090          DB    *                                                              MOS50900
89E6  0000            1091  PASFLG  DCX   0                     SET WHEN CONSOLE ON PASLA/PALM           MOS50910
89E8  0000            1092  PASFLG2 DCX   0                     SET WHEN LIST DEVICE ON PASLA            MOS50920
                      1093  *-----------------------------------                                          MOS50930
                      1094  *  ETPE IO COMMANDS                                                          MOS50940
                      1095  *                                                                              MOS50950
89EA  0000            1096  CONADR  DCX   0                     CONSOLE DEVICE ADDRESS                   MOS50960
89EC  0000            1097  CONRD   DCX   0                     CONSOLE READ/WRITE COMMANDS              MOS50970
      0000 89ED       1098  CONWRT  EQU   CONRD+1                                                          MOS50980
      0000 89ED       1099  LSTWRT  EQU   CONWRT                LIST DEVICE WRITE COMMAND                MOS50990
89EE  B1A3            1100  CRTRD   DCX   B1A3                  FOR CRT                                  MOS51000
89F0  A4D8            1101  CLIFRD  DCX   A4D8                  *   CURRENT LOOP INTERFACE               MOS51010
89F2  0080            1102  LPWRT   DCX   0080                  *   LINE PRINTER                         MOS51020
89F4  A1A3            1103  CARRD   DCX   A1A3                  *   CAROUSEL 300                         MOS51030
89F6  8202            1104  MREADC  DCX   8202                  *   MICROBUS                             MOS51040
                      1105  *                                                                              MOS51050
89F8  0000            1106  CON2ND  DCX   0                     2ND COMMAND; ENABLE READ COMMAND         MOS51060
      0000 89F8       1107  LST2ND  EQU   CON2ND                LIST DEVICE SPEED COMMAND                MOS51070
      0000 89F9       1108  CONENRD EQU   CON2ND+1                                                         MOS51080
89FA  F871            1109  CRT2ND  DCX   F871                  FOR CRT                                  MOS51090
89FC  0064            1110  CLIF2ND DCX   0064                  *   CURRENT LOOP INTERFACE               MOS51100
89FE  0000            1111          DCX   0                     *   DUMMY HW FOR LP                      MOS51110
8A00  F061            1112  CAR2ND  DCX   F061                  *   CAROUSEL 300                         MOS51120
8A02  0300            1113          DCX   0300                  *   DUMMY HW FOR MICROBUS                MOS51130
                      1114  *                                                                              MOS51140
8A04  00              1115  CONRQ2S DB    0                     CONSOLE REQUEST TO SEND CMD              MOS51150
8A05  33              1116  CRTRQ2S DB    X'33'                 FOR CRT                                  MOS51160
8A06  00              1117          DB    0                     *   DUMMY BYTE FOR CLI                   MOS51170
8A07  00              1118          DB    0                     *   DUMMY BYTE FOR LP                    MOS51180
8A08  23              1119  CARRQ2S DB    X'23'                 *   CAROUSEL 300                         MOS51190
8A09  00              1120          DB    0                     *   DUMMY BYTE FOR MICROBUS              MOS51200
8A0A                  1121          DB    *                                                              MOS51210
                      1122  *-----------------------------------                                          MOS51220
8A0A  0000            1123  BRKVECT DC    Z(0)                BREAK KEY VECTOR                         MOS51230
8A0C  0000            1124  ISITERR DCX   0                                                              MOS51240
8A0E  0000            1125  NOERR   DCX   0                                                              MOS51250
8A10  0000            1126  SELTST  DCX   0                     HIGHEST SELECTED TEST NUMBER             MOS51260
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8A12  0000                  1127  WASDU     DCX   0                 1 IF KEYBOARD DEVICE WAS OFF          MOS51270
8A14  0000                  1128  WASDU1    DCX   0                 NON-ZERO IF TOTAL,TOTERR TO PRINT     MOS51280
8A16  0000                  1129  TOTAL     DCX   0                 NO. OF TIMES THE SELECTED TESTS RUN   MOS51290
8A18  0000                  1130  TOTERR    DCX   0                 TOTAL ERRORS DETECTED WHILE DU        MOS51300
8A1A  0000                  1131  BTESTNO   DCX   0                 CURRENT TEST NO. IN BINARY            MOS51310
8A1C  0000                  1132  COUNT     DCX   0                                                       MOS51320
8A1E  0000                  1133  NEXTST    DCX   0                 NEXT TEST NUMBER                      MOS51330
8A20  0000                  1134  PAUSE     DCX   0                                                       MOS51340
                            1135  *-----------------------------------                             ***   MOS51350
8A22  0000                  1136  COMRET    DCX   0                                                       MOS51360
8A24  0000                  1137  CUT.SAV   DCX   0                                                       MOS51370
8A26  0000                  1138  BRK.SAV   DCX   0                                                       MOS51380
8A28  0000                  1139  SET.RTN   DCX   0                                                       MOS51390
                            1140  *                                                                     MOS51400
8A2A  0001                  1141  DECTAB    DC    1,10,100,1000,10000                                   MOS51410
8A2C  000A
8A2E  0064
8A30  03E8
8A32  2710
8A34  3031 3233 3435 3637   1142  HEXTAB    DB    C'0123456789ABCDEF'                                   MOS51420
8A3C  3839 4142 4344 4546
8A44                        1143              DB    *                                                     MOS51430


                            1145  *-----------------------------------                                 MOS51450
                            1146  *  ETPE MESSAGES                                                      MOS51460
                            1147  *                                                                     MOS51470
8A44  5445 5354 2020 2A2A   1148  TSTMSG    DC    C'TEST  **',X'0D00'                                  MOS51480
8A4C  0D00
      0000 8A4A             1149  MTESTNO   EQU   TSTMSG+6                                            MOS51490
8A4E  4552 524F 5220 2A2A   1150  ERRMSG    DC    C'ERROR ****',X'0D00'                                 MOS51500
8A56  2A2A
8A58  0D00
      0000 8A54             1151  ETESTNO   EQU   ERRMSG+6              STORED BY ETPE                  MOS51510
      0000 8A56             1152  ERRNO     EQU   ERRMSG+8              STORE ERRNO AS CHAR CONSTANT    MOS51520
8A5A  544F 5441 4C20 2020   1153  TOTMSG    DC    C'TOTAL   TOTERR',X'0D00'                             MOS51530
8A62  544F 5445 5252
8A68  0D00
8A6A  4E4F 2045 5252 4F52   1154  NOERMSG   DC    C'NO ERROR',X'0D00'                                   MOS51540
8A72  0D00
8A74  5053 5720 2A2A 2A2A   1155  PSWMSG    DC    C'PSW **** LOC ****',X'0D00'                          MOS51550
8A7C  2020 4C4F 4320 2A2A
8A84  2A2A
8A86  0D00
      0000 8A78             1156  ASCIPSW   EQU   PSWMSG+4                                             MOS51560
      0000 8A7E             1157  LOCMSG    EQU   PSWMSG+10                                            MOS51570
      0000 8A82             1158  ASCILOC   EQU   PSWMSG+14                                            MOS51580
8A88  454E 4420 4F46 2054   1159  EOTMSG    DC    C'END OF TEST',X'0D00'                                MOS51590
8A90  4553 5420
8A94  0D00
8A96  3F0D                  1160  QMSG      DC    X'3F0D'                                               MOS51600
8A98  2A0D                  1161  AMSG      DC    X'2A0D'                                               MOS51610
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8A9A   FFFF                1162  BRKMSG   DC    X'FFFF',X'FFFF',C'BREAK TERMINATION',X'FFFF',X'0D0A'      MOS51620
8A9C   FFFF
8A9E   4252 4541 4B20 5445
8AA6   524D 494E 4154 494F
8AAE   4E20
8AB0   FFFF
8AB2   0D0A


                           1164  * ************************************************************************  MOS51640
                           1165  *  OPTION/COMMAND TABLE                                                   MOS51650
                           1166  *                                                                         MOS51660
       0000 8AB4           1167  OPT      EQU   *                                                          MOS51670
8AB4   5445 5354 2020      1168  TEST     DC    C'TEST  ',X'F800',X'0',X'0' *          0 TO A            MOS51680
8ABA   F800
8ABC   0000
8ABE   0000
8AC0   4C4F 4F50 2020      1169  LOOP     DC    C'LOOP  ',X'0',Z(LEVELIN),X'7FFF' *   MAX=X'7FFF'       MOS51690
8AC6   0000
8AC8   82AE
8ACA   7FFF
8ACC   434F 4E54 494E      1170  CONTIN   DC    C'CONTIN',X'0',Z(LEVELIN),X'1' *       0 OR 1            MOS51700
8AD2   0000
8AD4   82AE
8AD6   0001
8AD8   4E4F 4D53 4720      1171  NOMSG    DC    C'NOMSG ',X'0',Z(LEVELIN),X'1' *       0 OR 1            MOS51710
8ADE   0000
8AE0   82AE
8AE2   0001
8AE4   5343 4F50 4520      1172  SCOPE    DC    C'SCOPE ',X'0',Z(LEVELIN),X'5' *       MAX = 5           MOS51720
8AEA   0000
8AEC   82AE
8AEE   0005
8AF0   4441 5441 2020      1173  DATA     DC    C'DATA  ',X'FFFF',X'0',X'0' *         0 TO FFFF         MOS51730
8AF6   FFFF
8AF8   0000
8AFA   0000
8AFC   504F 554E 4420      1174  POUND    DC    C'POUND ',X'A',X'0',X'0' *             1 TO FFFF         MOS51740
8B02   000A
8B04   0000
8B06   0000
8B08   434F 4E20 2020      1175  CONSOLE  DC    C'CON   ',X'0',Z(CON),X'0' *                      ****     MOS51750
8B0E   0000
8B10   8B46
8B12   0000
       0000 8B14           1176  OPTEND2  EQU   *                                                          MOS51760
       0000 8B14           1177  OPTEND   EQU   OPTEND2                                                   MOS51770
                           1178  *                                                                         MOS51780
                           1179  * ************************************************************************  MOS51790
                           1180  *                                                                         MOS51800
8B14   4C4F 4C49 4D20      1181  LOLIM    DC    C'LOLIM ',X'0',Z(LEVELIN),X'7FFC' *     0000              MOS51810
8B1A   0000
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EXEC - ETPE R03-05 (16 BIT/STRIPPED & MODIFIED)

```
8B1C   82AE
8B1E   7FFC
8B20   4849 4C49 4D20      1182  HILIM    DC    C'HILIM ',X'7FFF',Z(LEVELIN),X'7FFF' *  7FFF              MOS51820
8B26   7FFF
8B28   82AE
8B2A   7FFF
                           1183  * ************************************************************************ MOS51830
                           1184  *                                                                          MOS51840
8B2C   4F50 5449 4F4E      1185  OPTION   DC    C'OPTION',X'0',X'0',X'0'                                   MOS51850
8B32   0000
8B34   0000
8B36   0000
8B38   5255 4E20 2020      1186  RUN      DC    C'RUN   ',X'0',X'0',X'0'                                   MOS51860
8B3E   0000
8B40   0000
8B42   0000
8B44   FFFF                1187           DC    -1                                                         MOS51870
                           1188  * ************************************************************************ MOS51880
                           1189  *                                                              ****        MOS51890
8B46   8800                1190  CON      DCX   8800              RETURN TO CONSOLE (ILLEGAL)   ****        MOS51900
8B48   4300 80BE           1191           B     OPTIN              RETURN TO EXEC                ****        MOS51910
                           1192  *                                                              ****        MOS51920
                           1193  * ************************************************************************ MOS51930
                           1194  *                                                                          MOS51940
8B4C   48E0 8ABA           1195  INIT     LH    R14,TEST+6                                                 MOS51950
8B50   C6E0 8000           1196           OAI   R14,X'8000'        FORCE TEST 0                           MOS51960
8B54   40E0 8ABA           1197           STH   R14,TEST+6                                                 MOS51970
8B58   C3F0 0040           1198           TAI   R14,X'40'          IS TEST 9 SELECTED ?                   MOS51980
8B5C   2335                1199           BZS   INIT6              NO, BRANCH                             MOS51990
8B5E   C3E0 0020           1200           TAI   R14,X'20'          YES, IS TEST A SELECTED ?              MOS52000
8B62   4230 8BE0           1201           BNZ   ILTSPRT           YES, BRANCH                            MOS52010
                           1202  *                                                                          MOS52020
8B66   08EF                1203  INIT6    LDAR  R14,LINK           SAVE RETURN ADDRESS                    MOS52030
8B68   48F0 8B1A           1204           LH    LINK,LOLIM+6       GET LOLIM                              MOS52040
8B6C   C5F0 7FFF           1205           CLAI  LINK,X'7FFF'       IS IT BELOW TEST PRGM ?                MOS52050
8B70   4380 8BE6           1206           BNL   HILOPRT            NO, BRANCH TO ERROR                    MOS52060
8B74   45F0 8B26           1207           CLH   LINK,HILIM+6       IS LOLIM > HILIM ?                     MOS52070
8B78   4380 8BE6           1208           BNL   HILOPRT           NO, BRANCH TO ERROR                    MOS52080
8B7C   48F0 8B26           1209           LH    LINK,HILIM+6       GET HILIM                              MOS52090
8B80   C5E0 8000           1210           CLAI  LINK,X'8000'       IS IT BELOW TEST PROGRAM ?             MOS52100
8B84   4380 8BE6           1211           BNL   HILOPRT            NO, BRANCH TO ERROR                    MOS52110
8B88   2411                1212           LIS   R1,1                                                       MOS52120
8B8A   DE10 800E           1213           OC    R1,NORM            PUT DISPLAY IN NORMAL MODE             MOS52130
8B8E   48C0 0020           1214           LH    R12,X'20'          SAVE CONSOLE STATUS                    MOS52140
8B92   2531                1215           LCS   R3,1                                                       MOS52150
8B94   41D0 8BB8           1216           BAL   R13,INIT1          TEST LOW MEMORY WITH -1                MOS52160
8B98   C830 AAAA           1217           LDAI  R3,X'AAAA'                                                 MOS52170
8B9C   41D0 8BB8           1218           BAL   R13,INIT1          TEST LOW MEMORY WITH AAAA              MOS52180
8BA0   C830 5555           1219           LDAI  R3,X'5555'                                                 MOS52190
8BA4   41D0 8BB8           1220           BAL   R13,INIT1          TEST LOW MEMORY WITH 5555              MOS52200
8BA8   2430                1221           LIS   R3,0                                                       MOS52210
8BAA   41D0 8BB8           1222           BAL   R13,INIT1          TEST LOW MEMORY WITH 0                 MOS52220
8BAE   41F0 88D0           1223           BAL   LINK,LCORE         RE-INITIALIZE LOW MEMORY               MOS52230
```

```
8BB2  40C0 0020          1224          STH   R12,X'20'          RESTORE CONSOLE STATUS                MOS52240
8BB6  03CE               1225          BR    R14                RETURN TO INITRET (EXEC)              MOS52250
                         1226  *                                                                      MOS52260
                         1227  *----------------------------------                                    MOS52270
8BB8  2460               1228  INIT1   LIS   R6,0                                                    MOS52280
8BBA  2472               1229          LIS   R7,2                                                    MOS52290
8BBC  C880 003E          1230          LDAI  R8,X'3E'                                                MOS52300
8BC0  4036 0000          1231  INIT2   STH   R3,0(R6)           STORE PATTERN IN LOW MEMORRY          MOS52310
8BC4  C160 8BC0          1232          BXLE  R6,INIT2                                                MOS52320
8BC8  2460               1233          LIS   R6,0                                                    MOS52330
8BCA  9426               1234  INIT3   EXBR  R2,R6                                                   MOS52340
8BCC  9812               1235          WHR   R1,R2              DISPLAY ADDRESS UNDER TEST            MOS52350
8BCE  4846 0000          1236          LH    R4,0(R6)                                                MOS52360
8BD2  0543               1237          CLAR  R4,R3              VERIFY IF LOW MEMORY IS GOOD          MOS52370
8BD4  2333               1238          BES   INIT4                                                   MOS52380
8BD6  41F0 9BAE          1239          BAL   LINK,ERROR         NO, BRANCH                            MOS52390
8BDA  C160 8BCA          1240  INIT4   BXLE  R6,INIT3           YES, FINISH VERIFYING LOW MWEMORY     MOS52400
8BDE  03CD               1241          BR    R13                RETURN TO INIT ROUTINE                MOS52410
                         1242  *----------------------------------                                    MOS52420
                         1243  *                                                                      MOS52430
8BE0  C850 9CE2          1244  ILTSPRT LDAI  R5,TSTREJ          PRINT: "ILLEGAL TEST SEQUENCE"        MOS52440
8BE4  23C3               1245          BS    HILOPRT1           BRANCH                                MOS52450
                         1246  *                                                                      MOS52460
8BE6  C850 9CC8          1247  HILOPRT LDAI  R5,HILOMSG         PRINT: "LOLIM > HILIM IS ILLEGAL"     MOS52470
                         1248  *                                                                      MOS52480
8BEA  4050 8A0C          1249  HILOPRT1 STH  R5,ISITERR                                              MOS52490
8BEE  41F0 8656          1250          BAL   LINK,PRINT         UNCONDITIONALLY PRINT:                MOS52500
8BF2  4300 80BE          1251          B     OPTIN              ABORT TESTING SEQUENCE                MOS52510
                         1252  *                                                                      MOS52520
                         1253  * ********************************************************************** MOS52530
                         1254  *                                                              ****    MOS52540
8BF6  C850 8A9A          1255  OPTIN2  LDAI  R5,BRKMSG          PRINT: "BREAK TERMINATION"    ****    MOS52550
8BFA  22C8               1256          BS    HILOPRT1           BRANCH                        ****    MOS52560
                         1257  *                                                              ****    MOS52570
                         1258  * ********************************************************************** MOS52580
8BFC  5331 3620 3139 2D32 1259  TITLE   DC    C'S16 19-221 MOS MEMORY TEST PART 2 '                   MOS52590
8C04  3231 204D 4F53 204D
8C0C  454D 4F52 5920 5445
8C14  5354 2050 4152 5420
8C1C  3220
8C1E  3036 2D32 3134 4630 1260          DC    C'06-214F02R00'    TEST PROGRAM NUMBER                   MOS52600
8C26  3252 3030
8C2A  0D0A               1261          DC    X'0D0A'                                                 MOS52610
                         1262  *                                                                      MOS52620
8C2C  F800               1263  DEFTESTS DCX  F800               DEFINES TESTS 0,1,2,3, & 4            MOS52630
                         1264  *                                AS THE DEFAULT TESTS                  MOS52640
8C2E  000A               1265  MAXTST  DCX   A                  DEFINES TESTS 0,1,2,3,4,5,6,7,8,9&A   MOS52650
                         1266  *                                AS LEGAL TEST NUMBERS.                MOS52660

                         1268  *                                                                      MOS52680
                         1269  *  TESTS TABLE                                                         MOS52690
```

EXEC - ETPE R03-05 (16 BIT/STRIPPED & MODIFIED)

```
                        1270  *                                                                    MOS52700
8C30                    1271          ALIGN 4                                                      MOS52710
8C30    8C46            1272  TESTS   DC    A(TEST0)          MEMORY SEARCH TEST                   MOS52720
8C32    8C8A            1273          DC    A(TEST1)          BIT SET-RESET TEST                   MOS52730
8C34    8D1A            1274          DC    A(TEST2)          MARCHING PATTERN TEST                MOS52740
8C36    8E34            1275          DC    A(TEST3)          0 & 1 WALK TEST                      MOS52750
8C38    8EF6            1276          DC    A(TEST4)          DOUBLE OPERATION COLUMN DISTURB TEST MOS52760
8C3A    9072            1277          DC    A(TEST5)          SHORT COUNT RELOCATABLE              MOS52770
                        1278  *                               HAMMER DISTURB TEST                  MOS52780
8C3C    91F8            1279          DC    A(TEST6)          DIAGONAL GALPAT TEST                 MOS52790
8C3E    9380            1280          DC    A(TEST7)          MEMORY HOLD TEST                     MOS52800
8C40    94F2            1281          DC    A(TEST8)          LONG COUNT RELOCATABLE               MOS52810
                        1282  *                               HAMMER DISTURB TEST                  MOS52820
8C42    967A            1283          DC    A(TEST9)          ECC DISTURB TEST                     MOS52830
8C44    9912            1284          DC    A(TESTA)          PARITY DISTURB TEST                  MOS52840
                        1285  * ********************************************************************* MOS52850
                        1286  *       END   ETPE R03-05 (MODIFIED)                          ***      MOS52860
```

TEST 0

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                                1288  *        TEST 0                    MEMORY SEARCH TEST                          MOS52880
                                1289  *                                                                            MOS52890
                                1290  *        PURPOSE:                                                            MOS52900
                                1291  *              THIS UTILITY ENABLES THE USER TO LIST EXISTANT,               MOS52910
                                1292  *              RESPONSIVE LIMITS OF MEMORY.                                  MOS52920
                                1293  *                                                                            MOS52930
                                1294  *        ASSUMPTIONS:                                                        MOS52940
                                1295  *              MINIMUM MEMORY ALLOWABLE IS 64K BYTES.                        MOS52950
                                1296  *                                                                            MOS52960
                                1297  *        DESIGN SPECIFICATIONS:                                              MOS52970
                                1298  *              FORCE MEMORY LIMITS OF 0000-7FFF                              MOS52980
                                1299  *                                                                            MOS52990
                                1300  *        OPTIONS:       NONE                                                 MOS53000
                                1301  *                                                                            MOS53010
                                1302  *        HOW TO RUN THE TEST:                                                MOS53020
                                1303  *              ENTER "RUN" AND THE AVAILABLE MEMORY LOCATIONS WILL           MOS53030
                                1304  *              BE PRINTED ON THE LIST DEVICE.                                MOS53040
                                1305  *                                                                            MOS53050
                                1306  *        NOTE:                                                               MOS53060
                                1307  *                THIS TEST RESETS "LOLIM" AND "HILIM" TO CORRESPOND      MOS53070
                                1308  *              TO THE BLOCK OF MEMORY PRINTED OUT.                           MOS53080

8C46   2460                    1310  TEST0    LIS   R6,0                                                          MOS53100
8C48   4060 8B1A               1311           STH   R6,LOLIM+6          STORE X'0' IN LOLIM                       MOS53110
8C4C   C880 7FFF               1312           LDAI  R8,X'7FFF'                                                    MOS53120
8C50   4080 8B26               1313           STH   R8,HILIM+6          STORE X'7FFF' IN HILIM                    MOS53130
8C54   2404                   1314           LIS   R0,4                                                          MOS53140
8C56   0816                   1315           LDAR  R1,R6                                                         MOS53150
8C58   C820 9D6B               1316           LDAI  R2,LOMSG+1                                                    MOS53160
8C5C   41F0 85F6               1317           BAL   LINK,HEXASC         PUT LOLIM IN MEMORY MESSAGE               MOS53170
8C60   0818                   1318           LDAR  R1,R8                                                         MOS53180
8C62   C820 9D71               1319           LDAI  R2,HIMSG+1                                                    MOS53190
8C66   41F0 85F6               1320           BAL   LINK,HEXASC         PUT HILIM IN MEMORY MESSAGE               MOS53200
8C6A   C810 2030               1321           LDAI  R1,C' 0'                                                      MOS53210
8C6E   D210 9D6A               1322           STB   R1,LOMSG            PUT 0 IN FIRST MEMORY PRINTOUT            MOS53220
8C72   D210 9D70               1323           STB   R1,HIMSG            PUT 0 IN SECOND MEMORY PRINTOUT           MOS53230
8C76   C850 9CB6               1324           LDAI  R5,ASMEMMSG         LOAD MESSAGE ADDRESS                      MOS53240
8C7A   41F0 8656               1325           BAL   LINK,PRINT          PRINT MEMORY MESSAGE                      MOS53250
8C7E   C850 9D6A               1326           LDAI  R5,LOMSG                                                      MOS53260
8C82   41F0 8656               1327           BAL   LINK,PRINT          PRINT LIMITS OF MEMORY UNDER TEST         MOS53270
8C86   4300 83CE               1328           B     KEEP7                                                         MOS53280
                                1329  * ************************************************************************  MOS53290
                                1330  *        END   TEST 0                                                        MOS53300
```

TEST 1

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                                1332  *       TEST 1                BIT SET - RESET TEST                      MOS53320
                                1333  *                                                                       MOS53330
                                1334  *       PURPOSE:                                                        MOS53340
                                1335  *            THIS TEST INSURES THAT ALL BITS IN THE AREA OF MEMORY       MOS53350
                                1336  *            BEING TESTED CAN BE BOTH SET AND RESET.                    MOS53360
                                1337  *                                                                       MOS53370
                                1338  *       ASSUMPTIONS:                                                    MOS53380
                                1339  *            MINIMUM 64KB MOS MEMORY                                    MOS53390
                                1340  *                                                                       MOS53400
                                1341  *       DESIGN SPECIFICATIONS:                                          MOS53410
                                1342  *            1. A WRITE AND THEN A READ IS EXECUTED TO ALL MEMORY       MOS53420
                                1343  *               WITHIN THE "LOLIM" AND "HILIM" LIMITS.                  MOS53430
                                1344  *            2. IF AN ERROR IS DETECTED, THE "SCOPE" OPTION             MOS53440
                                1345  *               DICTATES HOW THE PROGRAM WILL REACT.                    MOS53450
                                1346  *                                                                       MOS53460
                                1347  *       OPTIONS:                                                        MOS53470
                                1348  *            SCOPE - ERROR OPTION MODE                                  MOS53480
                                1349  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST             MOS53490
                                1350  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST     MOS53500
                                1351  *                2 - PRINT ERROR DATA AND CONTINUE TEST                 MOS53510
                                1352  *                3 - PRINT ERROR DATA AND HALT                          MOS53520
                                1353  *                4 - IGNORE ERROR                                       MOS53530
                                1354  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST         MOS53540
                                1355  *                                                                       MOS53550
                                1356  *       HOW TO RUN THE TEST:                                            MOS53560
                                1357  *            1. ENTER THE "SCOPE" OPTION VIA THE CONSOLE DEVICE.        MOS53570
                                1358  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                  MOS53580

8C8A  4860 8B1A                 1360  TEST1   LH    R6,LOLIM+6        INITIALIZE MEMORY LIMITS                MOS53600
8C8E  4880 8B26                 1361          LH    R8,HILIM+6                                                MOS53610
8C92  2472                      1362          LIS   R7,2                                                      MOS53620
8C94  2411                      1363          LIS   R1,1              LOAD DISPLAY ADDRESS                    MOS53630
8C96  2531                      1364          LCS   R3,1                                                      MOS53640
                                1365  *                                                                       MOS53650
8C98  C360 7FC0                 1366  STORE11 TAI   R6,X'7FC0'                                                MOS53660
8C9C  2133                      1367          BNZS  T1.1                                                      MOS53670
8C9E  C860 0040                 1368          LDAI  R6,X'40'          FORCE LOLIM                             MOS53680
8CA2  4036 0000                 1369  T1.1    STH   R3,0(R6)         STORE BACKGROUND OF ALL 1'S             MOS53690
8CA6  C160 8CA2                 1370          BXLE  R6,T1.1                                                   MOS53700
8CAA  C840 3031                 1371          LDAI  R4,C'01'                                                  MOS53710
8CAE  4040 8A56                 1372          STH   R4,ERRNO          ERRNO = C'01'                           MOS53720
8CB2  4860 8B1A                 1373          LH    R6,LOLIM+6                                                MOS53730
                                1374  *                                                                       MOS53740
8CB6  C360 7FC0                 1375  READ11  TAI   R6,X'7FC0'                                                MOS53750
8CBA  2133                      1376          BNZS  T1.11                                                     MOS53760
8CBC  C860 0040                 1377          LDAI  R6,X'40'          FORCE LOLIM                             MOS53770
8CC0  41F0 87C2                 1378  T1.11   BAL   LINK,TSTBRKX      IF "BREAK" GO TO TSTEND ELSE RETURN     MOS53780
8CC4  4846 0000                 1379          LH    R4,0(R6)          LOAD DATA FROM LOC                      MOS53790
8CC8  0543                      1380          CLAR  R4,R3             IS DATA AT LOC. OK ?                    MOS53800
8CCA  2137                      1381          BNES  RTN11F            NO, BRANCH                              MOS53810
8CCC  C160 8CC0                 1382  RTN11   BXLE  R6,T1.11          CONTINUE UNTIL DONE                     MOS53820
```

TEST 1

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8CD0  4860 8B1A          1383          LH    R6,LOLIM+6                                    MOS53830
8CD4  2430               1384          LIS   R3,0                                          MOS53840
8CD6  2304               1385          BS    STORE10          BRANCH                       MOS53850
                         1386  *                                                           MOS53860
8CD8  41F0 9BAE          1387  RTN11F  BAL   LINK,ERROR        ERROR ROUTINE                MOS53870
8CDC  22C8               1388          BS    RTN11            RETURN                       MOS53880
                         1389  *                                                           MOS53890
8CDE  C360 7FC0          1390  STORE10 TAI   R6,X'7FC0'                                    MOS53900
8CE2  2133               1391          BNZS  T1.2                                          MOS53910
8CE4  C860 0040          1392          LDAI  R6,X'40'         FORCE LOLIM                  MOS53920
8CE8  4036 0000          1393  T1.2    STH   R3,0(R6)         STORE BACKGROUND OF ALL 0'S  MOS53930
8CEC  C160 9CE8          1394          BXLE  R6,T1.2                                       MOS53940
8CF0  6110 8A56          1395          AHM   R1,ERRNO         ERRNO = C'02'                MOS53950
8CF4  4860 8B1A          1396          LH    R6,LOLIM+6                                    MOS53960
                         1397  *                                                           MOS53970
8CF8  C360 7FC0          1398  READ10  TAI   R6,X'7FC0'                                    MOS53980
8CFC  2133               1399          BNZS  T1.21                                         MOS53990
8CFE  C860 0040          1400          LDAI  R6,X'40'         FORCE LOLIM                  MOS54000
8D02  41F0 87C2          1401  T1.21   BAL   LINK,TSTBRKX     IF "BREAK" GO TO TSTEND ELSE RETURN MOS54010
8D06  4846 0000          1402          LH    R4,0(R6)         LOAD DATA FROM LOC           MOS54020
8D0A  2135               1403          BNZS  RTN10F           IF DATA NOT 0, BRANCH (DATA NG) MOS54030
8D0C  C160 8D02          1404  RTN10   BXLE  R6,T1.21         CONTINUE UNTIL DONE          MOS54040
                         1405  *                                                           MOS54050
8D10  4300 83A8          1406          B     TSTEND           END OF TEST (RETURN TO EXEC) MOS54060
                         1407  *                                                           MOS54070
8D14  41F0 9BAE          1408  RTN10F  BAL   LINK,ERROR        ERROR ROUTINE                MOS54080
8D18  2206               1409          BS    RTN10            RETURN                       MOS54090
                         1410  *                                                           MOS54100
                         1411  * ***************************************************************** MOS54110
                         1412  *       END   TEST 1                                        MOS54120
```

TEST 2

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                                1414  *       TEST 2                  MARCHING PATTERN TEST                   MOS54140
                                1415  *                                                                       MOS54150
                                1416  *       PURPOSE:                                                        MOS54160
                                1417  *            THIS TEST CHECKS THAT THREE DIFFERENT BASE PATTERNS         MOS54170
                                1418  *            CAN BE WRITTEN, COMPLEMENTED, AND MARCHED THROUGH THE      MOS54180
                                1419  *            AVAILABLE MEMORY WITHOUT ERROR.                            MOS54190
                                1420  *                                                                       MOS54200
                                1421  *       ASSUMPTIONS:                                                    MOS54210
                                1422  *            MINIMUM 64KB MOS MEMORY                                    MOS54220
                                1423  *                                                                       MOS54230
                                1424  *       DESIGN SPECIFICATIONS:                                          MOS54240
                                1425  *            1. (IN ASCENDING ORDER) WRITE AND READ THE BASE PATTERN.   MOS54250
                                1426  *            2. (IN DESCENDING ORDER) WRITE AND READ THE                MOS54260
                                1427  *               COMPLEMENT PATTERN.                                     MOS54270
                                1428  *                                                                       MOS54280
                                1429  *       OPTIONS:                                                        MOS54290
                                1430  *            SCOPE - ERROR OPTION MODE                                  MOS54300
                                1431  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST             MOS54310
                                1432  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST     MOS54320
                                1433  *                2 - PRINT ERROR DATA AND CONTINUE TEST                 MOS54330
                                1434  *                3 - PRINT ERROR DATA AND HALT                          MOS54340
                                1435  *                4 - IGNORE ERROR                                       MOS54350
                                1436  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST         MOS54360
                                1437  *                                                                       MOS54370
                                1438  *       HOW TO RUN THE TEST:                                            MOS54380
                                1439  *            1. ENTER THE "SCOPE" OPTION VIA THE CONSOLE DEVICE.        MOS54390
                                1440  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                  MOS54400

8D1A  2411                      1442  TEST2   LIS   R1,1            LOAD DISPLAY ADDRESS                    MOS54420
8D1C  C840 893E                 1443          LDAI  R4,MM0                                                    MOS54430
8D20  4040 003E                 1444          STH   R4,X'3E'         SET NEW MM POINTER                       MOS54440
8D24  24A0                      1445          LIS   R10,0                                                     MOS54450
8D26  25B1                      1446          LCS   R11,1                                                     MOS54460
8D28  24D0                      1447          LIS   R13,0            W/BACKGROUND = 0'S                       MOS54470
8D2A  41E0 8D58                 1448          BAL   R14,CHKLOC       DO A SINGLE DISTURB TEST (MIN-MAX)       MOS54480
                                1449  *                                                                       MOS54490
8D2E  25A1                      1450          LCS   R10,1                                                     MOS54500
8D30  24B0                      1451          LIS   R11,0            W/BACKGROUND = F'S                       MOS54510
8D32  41E0 8D58                 1452          BAL   R14,CHKLOC       DO A SINGLE DISTURB TEST (MIN-MAX)       MOS54520
                                1453  *                                                                       MOS54530
8D36  24D2                      1454          LIS   R13,2            W/BACKGROUND = A'S                       MOS54540
8D38  41E0 8D58                 1455          BAL   R14,CHKLOC       DO A SINGLE DISTURB TEST (MIN-MAX)       MOS54550
                                1456  *                                                                       MOS54560
8D3C  24A0                      1457          LIS   R10,0                                                     MOS54570
8D3E  25B1                      1458          LCS   R11,1            W/BACKGROUND = 5'S                       MOS54580
8D40  41E0 8D58                 1459          BAL   R14,CHKLOC       DO A SINGLE DISTURB TEST (MIN-MAX)       MOS54590
                                1460  *                                                                       MOS54600
8D44  C8D0 0100                 1461          LDAI  R13,X'100'       W/BACKGROUND =128-0'S,128-F'S,..         MOS54610
8D48  41E0 8D58                 1462          BAL   R14,CHKLOC       DO A SINGLE DISTURB TEST (MIN-MAX)       MOS54620
                                1463  *                                                                       MOS54630
8D4C  25A1                      1464          LCS   R10,1                                                     MOS54640
```

TEST 2

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8D4E  24B0           1465          LIS   R11,0              W/BACKGROUND =128-F'S,128-0'S, ETC     MOS54650
8D50  41E0 8D58      1466          BAL   R14,CHKLOC         DO A SINGLE DISTURB TEST (MIN-MAX)     MOS54660
                     1467  *                                                                       MOS54670
8D54  43C0 83A8      1468          B     TSTEND             END OF TEST (RETURN TO EXEC)           MOS54680
                     1469  *                                                                       MOS54690
                     1470  * ***************************************************************       MOS54700
                     1471  *                                                                       MOS54710
8D58  4860 8B1A      1472  CHKLOC  LH    R6,LOLIM+6         INITIALIZE MEMORY LIMITS               MOS54720
8D5C  4880 8B26      1473          LH    R8,HILIM+6                                                MOS54730
8D60  2472           1474          LIS   R7,2                                                      MOS54740
                     1475  *                                                                       MOS54750
8D62  C360 7FC0      1476  CHKLOC1 TAI   R6,X'7FC0'                                              MOS54760
8D66  2133           1477          BNZS  T2.1                                                      MOS54770
8D68  C860 0040      1478          LDAI  R6,X'40'           FORCE LOLIM                            MOS54780
8D6C  083A           1479  T2.1    LDAR  R3,R10             STORE APPROPRIATE BACKGROUND PATTERN   MOS54790
8D6E  C36D 0000      1480          TAI   R6,0(R13)                                                 MOS54800
8D72  2332           1481          BZS   CHKLOC2                                                   MOS54810
8D74  083B           1482          LDAR  R3,R11                                                    MOS54820
8D76  4036 0000      1483  CHKLOC2 STH   R3,0(R6)           IN MEMORY                              MOS54830
8D7A  C160 8D6C      1484  CHKLOC25 BXLE R6,T2.1            FROM LOLIM TO HILIM                    MOS54840
8D7E  4860 8B1A      1485          LH    R6,LOLIM+6                                                MOS54850
                     1486  *                                                                       MOS54860
8D82  C360 7FC0      1487  CHKLOC3 TAI   R6,X'7FC0'                                              MOS54870
8D86  2133           1488          BNZS  T2.2                                                      MOS54880
8D88  C860 0040      1489          LDAI  R6,X'40'                                                  MOS54890
8D8C  C840 3033      1490  T2.2    LDAI  R4,C'03'                                                  MOS54900
8D90  4040 8A56      1491          STH   R4,ERRNO           ERRNO = C'03'                          MOS54910
8D94  41F0 87C2      1492          BAL   LINK,TSTBRKX       IF "BREAK" GO TO TSTEND ELSE RETURN    MOS54920
8D98  083A           1493          LDAR  R3,R10             GET APPROPRIATE BACKGROUND PATTERN     MOS54930
8D9A  C36D 0000      1494          TAI   R6,0(R13)                                                 MOS54940
8D9E  2332           1495          BZS   CHKLOC4                                                   MOS54950
8DA0  083B           1496          LDAR  R3,R11                                                    MOS54960
8DA2  4846 0000      1497  CHKLOC4 LH    R4,0(R6)           GET DATA FROM LOC UNDER TEST           MOS54970
8DA6  0543           1498          CLAR  R4,R3              EQUAL ?                                MOS54980
8DA8  213E           1499          BNES  CHKLOC5F           NO, BRANCH                             MOS54990
8DAA  C730 FFFF      1500  CHKLOC5 XAI   R3,-1              COMPLEMENT DATA PATTERN                MOS55000
8DAE  4036 0000      1501          STH   R3,0(R6)           STORE C.D.P. AT LOC                    MOS55010
8DB2  6110 8A56      1502          AHM   R1,ERRNO           ERRNO = C'04'                          MOS55020
8DB6  4846 0000      1503          LH    R4,0(R6)           GET DATA FROM LOC UNDER TEST           MOS55030
8DBA  0543           1504          CLAR  R4,R3              DATA = C.D.P. ?                        MOS55040
8DBC  2137           1505          BNES  CHKLOC6F           NO, BRANCH                             MOS55050
8DBE  C160 8D8C      1506  CHKLOC6 BXLE  R6,T2.2            CONTINUE UNTIL DONE(INCREMENTING)      MOS55060
8DC2  2307           1507          BS    CHKLOC6A           BRANCH                                 MOS55070
                     1508  *                                                                       MOS55080
8DC4  41F0 9BAE      1509  CHKLOC5F BAL  LINK,ERROR         ERROR ROUTINE                          MOS55090
8DC8  220F           1510          BS    CHKLOC5            RETURN                                 MOS55100
                     1511  *                                                                       MOS55110
8DCA  41F0 9BAE      1512  CHKLOC6F BAL  LINK,ERROR         ERROR ROUTINE                          MOS55120
8DCE  2208           1513          BS    CHKLOC6                                                   MOS55130
                     1514  *                                                                       MOS55140
8DD0  4860 8B26      1515  CHKLOC6A LH   R6,HILIM+6                                               MOS55150
8DD4  C460 7FFE      1516          NAI   R6,X'7FFE'                                                MOS55160
8DD8  4880 8B1A      1517          LH    R8,LOLIM+6         ESTABLISH MEMORY LIMITS                MOS55170
```

TEST 2

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8DDC   2572          1518           LCS   R7,2                                                  MOS55180
8DDE   C380 7FC0     1519           TAI   R8,X'7FC0'                                            MOS55190
8DE2   2133          1520           BNZS  CHKLOC7                                               MOS55200
8DE4   C880 0040     1521           LDAI  R8,X'40'                                              MOS55210
                     1522  *                                                                    MOS55220
8DE8   083B          1523  CHKLOC7  LDAR  R3,R11              GET C.D.P. FOR LOC UNDER TEST     MOS55230
8DEA   C36D 0000     1524           TAI   R6,0(R13)                                             MOS55240
8DEE   2332          1525           BZS   CHKLOC8                                               MOS55250
8DF0   083A          1526           LDAR  R3,R10                                                MOS55260
8DF2   C840 3035     1527  CHKLOC8  LDAI  R4,C'05'                                              MOS55270
8DF6   4040 8A56     1528           STH   R4,ERRNO              ERRNO = C'05'                   MOS55280
8DFA   41F0 87C2     1529           BAL   LINK,TSTBRKX          IF "BREAK" GO TO TSTEND ELSE RETURN MOS55290
8DFE   C360 7FC0     1530           TAI   R6,X'7FC0'                                            MOS55300
8E02   4330 8E22     1531           BZ    CHKLOC10                                              MOS55310
8E06   4846 0000     1532           LH    R4,0(R6)              GET DATA FROM LOC UNDER TEST    MOS55320
8E0A   0543          1533           CLAR  R4,R3                 DATA = C.D.P. ?                 MOS55330
8E0C   213E          1534           BNES  CHKLOC9F              NO, BRANCH                      MOS55340
8E0E   C730 FFFF     1535  CHKLOC9  XAI   R3,-1                 COMPLEMENT C.D.P. (O.D.P.)      MOS55350
8E12   4036 0000     1536           STH   R3,0(R6)              STORE PATTERN AT LOC            MOS55360
8E16   6110 8A56     1537           AHM   R1,ERRNO              ERRNO = C'06'                   MOS55370
8E1A   4846 0000     1538           LH    R4,0(R6)              GET DATA FROM LOC UNDER TEST    MOS55380
8E1E   0543          1539           CLAR  R4,R3                 DATA = O.D.P. ?                 MOS55390
8E20   2137          1540           BNES  CHKLOC1F              NO, BRANCH                      MOS55400
8E22   C060 8DE8     1541  CHKLOC10 BXH   R6,CHKLOC7           CONTINUE UNTIL DONE(DECREMENTING) MOS55410
                     1542  *                                                                    MOS55420
8E26   03CE          1543           BR    R14                   RETURN                          MOS55430
                     1544  *                                                                    MOS55440
8E28   41F0 9BAE     1545  CHKLOC9F BAL   LINK,ERROR            ERROR ROUTINE                   MOS55450
8E2C   22CF          1546           BS    CHKLOC9               RETURN                          MOS55460
                     1547  *                                                                    MOS55470
8E2E   41F0 9BAE     1548  CHKLOC1F BAL   LINK,ERROR            ERROR ROUTINE                   MOS55480
8E32   2208          1549           BS    CHKLOC10              RETURN                          MOS55490
                     1550  *                                                                    MOS55500
                     1551  * ********************************************************************** MOS55510
                     1552  *        END   TEST 2                                                 MOS55520
```

TEST 3

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                        1554  *       TEST 3                    0 & 1 WALK TEST                          MOS55540
                        1555  *                                                                          MOS55550
                        1556  *       PURPOSE:                                                           MOS55560
                        1557  *            THIS TEST WALKS A 0 THROUGH A FIELD OF 1'S AND A 1            MOS55570
                        1558  *            THROUGH A FIELD OF 0'S.                                       MOS55580
                        1559  *                                                                          MOS55590
                        1560  *       ASSUMPTIONS:                                                       MOS55600
                        1561  *            MINIMUM 64KB MOS MEMORY                                       MOS55610
                        1562  *                                                                          MOS55620
                        1563  *       DESIGN SPECIFICATIONS:                                             MOS55630
                        1564  *            1. WITH A BACKGROUND OF ALL 1'S, A 0 IS WALKED THROUGH        MOS55640
                        1565  *               EACH HALFWORD OF MEMORY. A READ AND COMPARE IS DONE         MOS55650
                        1566  *               ON EACH LOCATION.                                          MOS55660
                        1567  *            2. WITH A BACKGROUND OF ALL 0'S, A 1 IS WALKED THROUGH        MOS55670
                        1568  *               EACH HALFWORD OF MEMORY. A COMPARE IS DONE ON EACH          MOS55680
                        1569  *               LOCATION.                                                  MOS55690
                        1570  *                                                                          MOS55700
                        1571  *       OPTIONS:                                                           MOS55710
                        1572  *            SCOPE - ERROR OPTION MODE                                     MOS55720
                        1573  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST                MOS55730
                        1574  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST        MOS55740
                        1575  *                2 - PRINT ERROR DATA AND CONTINUE TEST                    MOS55750
                        1576  *                3 - PRINT ERROR DATA AND HALT                             MOS55760
                        1577  *                4 - IGNORE ERROR                                          MOS55770
                        1578  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST            MOS55780
                        1579  *                                                                          MOS55790
                        1580  *       HOW TO RUN THE TEST:                                               MOS55800
                        1581  *            1. ENTER THE "SCOPE" OPTION VIA THE CONSOLE DEVICE.           MOS55810
                        1582  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                     MOS55820

8E34  2411              1584  TEST3   LIS   R1,1              LOAD DISPLAY ADDRESS                     MOS55840
8E36  4860 8B1A         1585          LH    R6,LOLIM+6        INITIALIZE MEMORY LIMITS                 MOS55850
8E3A  4880 8B26         1586          LH    R8,HILIM+6                                                 MOS55860
8E3E  2472              1587          LIS   R7,2                                                       MOS55870
8E40  C840 893E         1588          LDAI  R4,MM0                                                     MOS55880
8E44  4040 003E         1589          STH   R4,X'3E'          SET NEW MM POINTER                       MOS55890
8E48  2531              1590          LCS   R3,1                                                       MOS55900
                        1591  *                                                                        MOS55910
8E4A  C360 7FC0         1592  STORE31 TAI   R6,X'7FC0'                                                 MOS55920
8E4E  2133              1593          BNZS  T3.1                                                       MOS55930
8E50  C860 0040         1594          LDAI  R6,X'40'          FORCE LOLIM                              MOS55940
8E54  4036 0000         1595  T3.1    STH   R3,0(R6)          STORE BACKGROUND OF ALL 1'S              MOS55950
8E58  C160 8E54         1596  T3S0    BXLE  R6,T3.1                                                    MOS55960
8E5C  4860 8B1A         1597          LH    R6,LOLIM+6                                                 MOS55970
8E60  C840 3037         1598          LDAI  R4,C'07'                                                   MOS55980
8E64  4040 8A55         1599          STH   R4,ERRNO          ERRNO = C'07'                            MOS55990
                        1600  *                                                                        MOS56000
8E68  C360 7FC0         1601          TAI   R6,X'7FC0'                                                 MOS56010
8E6C  2133              1602          BNZS  T3S1                                                       MOS56020
8E6E  C860 0040         1603          LDAI  R6,X'40'                                                   MOS56030
8E72  C8D0 0010         1604  T3S1    LDAI  R13,16                                                     MOS56040
```

TEST 3

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8E76  41F0 87C2          1605          BAL   LINK,TSTBRKX      IF "BREAK" GO TO TSTEND ELSE RETURN   MOS56050
8E7A  C8C0 8000          1606          LDAI  R12,X'8000'       LOAD R12 (BIT 0 SET)                  MOS56060
8E7E  2531               1607  T3S2    LCS   R3,1              SET ALL BITS IN R3                    MOS56070
8E80  073C               1608          XAR   R3,R12            RESET A BIT (0-15) IN R3              MOS56080
8E82  4036 0000          1609          STH   R3,0(R6)          STORE DATA AT LOC                     MOS56090
8E86  4846 0000          1610          LH    R4,0(R6)          GET DATA FROM LOC                     MOS56100
8E8A  0543               1611          CLAR  R4,R3             DATA EQUAL ?                          MOS56110
8E8C  213A               1612          BNES  T3S3F             NO, BRANCH                            MOS56120
8E8E  90C1               1613  T3S3    SRHLS R12,1             WALK 0 THRU HALFWORD OF 1'S           MOS56130
8E90  27D1               1614          SIS   R13,1             DONE W/THIS HALFWORD ?                MOS56140
8E92  203A               1615          BNZS  T3S2              NO, BRANCH UNTIL FINISHED             MOS56150
8E94  C160 8E72          1616  T3S3.4  BXLE  R6,T3S1           CONTINUE UNTIL DONE(INCREMENTING)     MOS56160
8E98  4860 8B1A          1617          LH    R6,LOLIM+6                                              MOS56170
8E9C  2430               1618          LIS   R3,0                                                    MOS56180
8E9E  23C4               1619          BS    STORE30           BRANCH                                MOS56190
                         1620  *                                                                     MOS56200
8EA0  41F0 9BAE          1621  T3S3F   BAL   LINK,ERROR         ERROR ROUTINE                         MOS56210
8EA4  22CB               1622          BS    T3S3              RETURN                                MOS56220
                         1623  *                                                                     MOS56230
8EA6  C360 7FC0          1624  STORE30 TAI   R6,X'7FC0'                                             MOS56240
8EAA  2133               1625          BNZS  T3.2                                                    MOS56250
8EAC  C860 0040          1626          LDAI  R6,X'40'          FORCE LOLIM                           MOS56260
8EB0  4036 0000          1627  T3.2    STH   R3,0(R6)          STORE BACKGROUND OF ALL 0'S           MOS56270
8EB4  C160 8EB0          1628  T3S3.6  BXLE  R6,T3.2                                                MOS56280
8EB8  4860 8B1A          1629          LH    R6,LOLIM+6                                              MOS56290
8EBC  6110 8A56          1630          AHM   R1,ERRNO          ERRNO = C'08'                         MOS56300
                         1631  *                                                                     MOS56310
8EC0  C360 7FC0          1632  T3S4    TAI   R6,X'7FC0'                                             MOS56320
8EC4  2133               1633          BNZS  T3.3                                                    MOS56330
8EC6  C860 0040          1634          LDAI  R6,X'40'          FORCE LOLIM                           MOS56340
8ECA  C8D0 0010          1635  T3.3    LDAI  R13,16                                                  MOS56350
8ECE  41F0 87C2          1636          BAL   LINK,TSTBRKX      IF "BREAK" GO TO TSTEND ELSE RETURN   MOS56360
8ED2  C830 8000          1637          LDAI  R3,X'8000'        LOAD R3 (BIT 0 SET)                   MOS56370
                         1638  *                                                                     MOS56380
8ED6  4036 0000          1639  T3S5    STH   R3,0(R6)          STORE DATA AT LOC                     MOS56390
8EDA  4846 0000          1640          LH    R4,0(R6)          GET DATA FROM LOC                     MOS56400
8EDE  0543               1641          CLAR  R4,R3             DATA EQUAL ?                          MOS56410
8EE0  2138               1642          BNES  T3S6F             NO, BRANCH                            MOS56420
8EE2  9031               1643  T3S6    SRHLS R3,1              WALK BIT THRU HALFWORD                MOS56430
8EE4  27D1               1644          SIS   R13,1             DONE W/THIS HALFWORD ?                MOS56440
8EE6  2038               1645          BNZS  T3S5              NO, BRANCH UNTIL FINISHED             MOS56450
8EE8  C160 8ECA          1646  T3S7    BXLE  R6,T3.3           CONTINUE UNTIL DONE (INCREMENTING)    MOS56460
                         1647  *                                                                     MOS56470
8EEC  4300 83A8          1648          B     TSTEND            END OF TEST (RETURN TC EXEC)          MOS56480
                         1649  *                                                                     MOS56490
8EF0  41F0 9BAE          1650  T3S6F   BAL   LINK,ERROR         ERROR ROUTINE                         MOS56500
8EF4  22C9               1651          BS    T3S6              RETURN                                MOS56510
                         1652  * ********************************************************************* MOS56520
                         1653  *       END   TEST 3                                                  MOS56530
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TEST 4

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                        1655  *       TEST 4                    DOUBLE OPERATION COLUMN DISTURB TEST   MOS56550
                        1656  *                                                                        MOS56560
                        1657  *       PURPOSE:                                                         MOS56570
                        1658  *            THIS TEST CHECKS THAT A DOUBLE OPERATION ON AN ADJACENT     MOS56580
                        1659  *            COLUMN DOES NOT DISTURB THE TEST COLUMN.                   MOS56590
                        1660  *                                                                        MOS56600
                        1661  *       ASSUMPTIONS:                                                     MOS56610
                        1662  *            MINIMUM 64 KB MOS MEMORY                                   MOS56620
                        1663  *                                                                        MOS56630
                        1664  *       DESIGN SPECIFICATIONS:                                           MOS56640
                        1665  *            1. WITH 6 DIFFERENT BACKROUND PATTERSN, A W-R-WC-           MOS56650
                        1666  *               RC-W-R-WC-RC SERIES IS EXECUTED AT EACH LOCATION.        MOS56660
                        1667  *            2. A COMPARE IS DONE UPON EACH READ OPERATION.              MOS56670
                        1668  *            3. A TEST (COMPARISON) OF THE REST OF MEMORY IS DONE        MOS56680
                        1669  *               AFTER EACH SERIES OF OPERATIONS.                         MOS56690
                        1670  *                                                                        MOS56700
                        1671  *       OPTIONS:                                                         MOS56710
                        1672  *            SCOPE - ERROR OPTION MODE                                  MOS56720
                        1673  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST             MOS56730
                        1674  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST     MOS56740
                        1675  *                2 - PRINT ERROR DATA AND CONTINUE TEST                 MOS56750
                        1676  *                3 - PRINT ERROR DATA AND HALT                          MOS56760
                        1677  *                4 - IGNORE ERROR                                       MOS56770
                        1678  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST         MOS56780
                        1679  *                                                                        MOS56790
                        1680  *       HOW TO RUN THE TEST                                              MOS56800
                        1681  *            1. ENTER THE "SCOPE" OPTION VIA THE CONSOLE DEVICE.         MOS56810
                        1682  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                   MOS56820

8EF6  2411              1684  TEST4   LIS   R1,1              LOAD DISPLAY ADDRESS                   MOS56840
8EF8  24A0              1685          LIS   R10,0                                                     MOS56850
8EFA  25B1              1686          LCS   R11,1                                                     MOS56860
8EFC  24D0              1687          LIS   R13,0             W/BACKGROUND = 0'S                     MOS56870
8EFE  41E0 8F14         1688          BAL   R14,CHKCOL        DO A DOUBLE OPERATION COLUMN           MOS56880
                        1689  *                               DISTURB AND COMPLEMENT TEST            MOS56890
8F02  24D2              1690          LIS   R13,2             W/BACKGROUND = 5'S                     MOS56900
8F04  41E0 8F14         1691          BAL   R14,CHKCOL        DO A DOUBLE OPERATION COLUMN           MOS56910
                        1692  *                               DISTURB AND COMPLEMENT TEST            MOS56920
8F08  C8D0 0100         1693          LDAI  R13,X'100'        W/BACKGROUND =128-0'S,128-F'S,..       MOS56930
8F0C  41E0 8F14         1694          BAL   R14,CHKCOL        DO A DOUBLE OPERATION COLUMN           MOS56940
                        1695  *                               DISTURB AND COMPLEMENT TEST            MOS56950
8F10  4300 83A8         1696          B     TSTEND            END OF TEST (RETURN TO EXEC)           MOS56960
                        1697  * ********************************************************************** MOS56970
8F14  4860 8B1A         1698  CHKCOL  LH    R6,LOLIM+6        INITIALIZE MEMORY LIMITS               MOS56980
8F18  4880 8B26         1699          LH    R8,HILIM+6                                               MOS56990
8F1C  2472              1700          LIS   R7,2                                                     MOS57000
8F1E  C360 7FC0         1701          TAI   R6,X'7FC0'                                               MOS57010
8F22  2133              1702          BNZS  CHKCOL1                                                  MOS57020
8F24  C860 0040         1703          LDAI  R6,X'40'          FORCE LOLIM                            MOS57030
8F28  083A              1704  CHKCOL1 LDAR  R3,R10            GET PROPER BACKGROUND PATTERN          MOS57040
8F2A  C36D 0000         1705          TAI   R6,0(R13)                                                MOS57050
```

TEST 4

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8F2E  2332          1706          BZS   CHKCOL2                                    MOS57060
8F30  083B          1707          LDAR  R3,R11                                     MOS57070
8F32  4036 0000     1708  CHKCCL2 STH   R3,0(R6)        STORE BACKGROUND PATTERN   MOS57080
8F36  C160 8F28     1709  CHKCOL25 BXLE R6,CHKCOL1      TO ALL OF MEMORY UNDER TEST MOS57090
8F3A  4860 8B1A     1710          LH    R6,LOLIM+6                                 MOS57100
8F3E  C360 7FC0     1711          TAI   R6,X'7FC0'                                 MOS57110
8F42  2133          1712          BNZS  CHKCOL3                                    MOS57120
8F44  C860 0040     1713          LDAI  R6,X'40'      FORCE LOLIM                  MOS57130
                    1714  *                                                        MOS57140
8F48  C840 3033     1715  CHKCOL3 LDAI  R4,C'03'                                   MOS57150
8F4C  4040 8A56     1716          STH   R4,ERRNO      ERRNO = C'03'                MOS57160
8F50  41F0 87C2     1717          BAL   LINK,TSTBRKX  IF "BREAK" GO TO TSTEND ELSE RETURN MOS57170
8F54  083A          1718          LDAR  R3,R10        GET ORIGINAL DATA PATTERN (C.D.P.) MOS57180
8F56  C36D 0000     1719          TAI   R6,0(R13)                                  MOS57190
8F5A  2332          1720          BZS   CHKCOL4                                    MOS57200
8F5C  083B          1721          LDAR  R3,R11                                     MOS57210
8F5E  4846 0000     1722  CHKCOL4 LH    R4,0(R6)      GET DATA FROM LOC            MOS57220
8F62  0543          1723          CLAR  R4,R3         DATA EQUAL ?                 MOS57230
8F64  4230 9042     1724          BNE   CHKCOL5F      NO, BRANCH                   MOS57240
8F68  C730 FFFF     1725  CHKCOL5 XAI   R3,-1         COMPLEMENT DATA PATTERN (C.D.P.) MOS57250
8F6C  4036 0000     1726          STH   R3,0(R6)      STORE C.D.P. AT LOC          MOS57260
8F70  6110 8A56     1727          AHM   R1,ERRNO      ERRNO = C'04'                MOS57270
8F74  4846 0000     1728          LH    R4,0(R6)      GET DATA FROM LOC            MOS57280
8F78  0543          1729          CLAR  R4,R3         DATA EQUAL ?                 MOS57290
8F7A  4230 904A     1730          BNE   CHKCOL6F      NO,  BRANCH                  MOS57300
8F7E  C730 FFFF     1731  CHKCOL6 XAI   R3,-1         COMPLEMENT C.D.P. (O.D.P.)   MOS57310
8F82  4036 0000     1732          STH   R3,0(R6)      STORE O.D.P. AT LOC          MOS57320
8F86  C840 3039     1733          LDAI  R4,C'09'                                   MOS57330
8F8A  4040 8A56     1734          STH   R4,ERRNO      ERRNO = C'09'                MOS57340
8F8E  4846 0000     1735          LH    R4,0(R6)      GET DATA FROM LOC            MOS57350
8F92  0543          1736          CLAR  R4,R3         DATA EQUAL ?                 MOS57360
8F94  4230 9052     1737          BNE   CHKCOL7F      NO, BRANCH                   MOS57370
8F98  C730 FFFF     1738  CHKCOL7 XAI   R3,-1         COMPLEMENT O.D.P.(C.D.P.)    MOS57380
8F9C  4036 0000     1739          STH   R3,0(R6)      STORE C.D.P. AT LOC          MOS57390
8FA0  C840 3041     1740          LDAI  R4,C'0A'                                   MOS57400
8FA4  4040 8A56     1741          STH   R4,ERRNO      ERRNO = C'0A'                MOS57410
8FA8  4846 0000     1742          LH    R4,0(R6)      GET DATA FROM LOC            MOS57420
8FAC  0543          1743          CLAR  R4,R3         DATA EQUAL ?                 MOS57430
8FAE  4230 905A     1744          BNE   CHKCOL8F      NO, BRANCH                   MOS57440
8FB2  C160 8F48     1745  CHKCOL8 BXLE  R6,CHKCOL3    CONTINUE UNTIL DONE(INCREMENTING MOS57450
8FB6  4860 8B26     1746          LH    R6,HILIM+6    INITIALIZE MEMORY LIMITS     MOS57460
8FBA  C460 FFFE     1747          NAI   R6,-2         (HILIM MUST BE EVEN)         MOS57470
8FBE  4880 8B1A     1748          LH    R8,LOLIM+6                                 MOS57480
8FC2  2572          1749          LCS   R7,2                                       MOS57490
8FC4  C380 7FC0     1750          TAI   R8,X'7FC0'                                 MOS57500
8FC8  2133          1751          BNZS  CHKCOL9                                    MOS57510
8FCA  C880 0040     1752          LDAI  R8,X'40'      FORCE LOLIM                  MOS57520
                    1753  *                                                        MOS57530
8FCE  083B          1754  CHKCOL9 LDAR  R3,R11        GET COMPLEMENT DATA PATTERN(C.D.P.) MOS57540
8FD0  C36D 0000     1755          TAI   R6,0(R13)                                  MOS57550
8FD4  2332          1756          BZS   CHKCOLA                                    MOS57560
8FD6  083A          1757          LDAR  R3,R10                                     MOS57570
8FD8  C840 3035     1758  CHKCOLA LDAI  R4,C'05'                                   MOS57580
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TEST 4

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8FDC  4040 8A56  1759          STH   R4,ERRNO          ERRNO = C'05'                              MOS57590
8FE0  41F0 87C2  1760          BAL   LINK,TSTBRKX      IF "BREAK" GO TO TSTEND ELSE RETURN        MOS57600
8FE4  4846 0000  1761          LH    R4,0(R6)          GET DATA FROM LOC                          MOS57610
8FE8  0543       1762          CLAR  R4,R3             DATA EQUAL ?                               MOS57620
8FEA  4230 9062  1763          BNE   CHKCOLBF          NO, BRANCH                                 MOS57630
8FEE  C730 FFFF  1764  CHKCOLB  XAI   R3,-1            COMPLEMENT C.D.P.(O.D.P.)                  MOS57640
8FF2  4036 0000  1765          STH   R3,0(R6)          STORE O.D.P. AT LOC                        MOS57650
8FF6  6110 8A56  1766          AHM   R1,ERRNO          ERRNO = C'06'                              MOS57660
8FFA  4846 0000  1767          LH    R4,0(R6)          GET DATA FROM LOC                          MOS57670
8FFE  0543       1768          CLAR  R4,R3             DATA EQUAL ?                               MOS57680
9000  4230 906A  1769          BNE   CHKCOLCF          NO, BRANCH                                 MOS57690
9004  C730 FFFF  1770  CHKCOLC  XAI   R3,-1            COMPLEMENT O.D.P. (C.D.P.)                 MOS57700
9008  4036 0000  1771          STH   R3,0(R6)          STORE C.D.P. AT LOC                        MOS57710
900C  C840 3042  1772          LDAI  R4,C'0B'                                                     MOS57720
9010  4040 8A56  1773          STH   R4,ERRNO          ERRNO = C'0B'                              MOS57730
9014  4846 0000  1774          LH    R4,0(R6)          GET DATA FROM LOC                          MOS57740
9018  0543       1775          CLAR  R4,R3             DATA EQUAL ?                               MOS57750
901A  213E       1776          BNES  CHKCOLDF          NO, BRANCH                                 MOS57760
901C  C730 FFFF  1777  CHKCOLD  XAI   R3,-1            COMPLEMENT C.D.P.(O.D.P.)                  MOS57770
9020  4036 0000  1778          STH   R3,0(R6)          STORE O.D.P. AT LOC                        MOS57780
9024  6110 8A56  1779          AHM   R1,ERRNO          ERRNO = C'0C'                              MOS57790
9028  4846 0000  1780          LH    R4,0(R6)          GET DATA FROM LOC                          MOS57800
902C  0543       1781          CLAR  R4,R3             DATA EQUAL ?                               MOS57810
902E  2137       1782          BNES  CHKCOLEF          NO, BRANCH                                 MOS57820
9030  C060 8FCE  1783  CHKCOLE  BXH   R6,CHKCOL9       CONTINUE UNTIL DONE(DECREMENTING)          MOS57830
9034  03CE       1784          BR    R14               RETURN                                     MOS57840
                 1785  *-------------------------------                                           MOS57850
9036  41F0 9BAE  1786  CHKCOLDF BAL   LINK,ERROR       ERROR ROUTINE                              MOS57860
903A  220F       1787          BS    CHKCOLD           RETURN                                     MOS57870
                 1788  *                                                                          MOS57880
903C  41F0 9BAE  1789  CHKCOLEF BAL   LINK,ERROR       ERROR ROUTINE                              MOS57890
9040  22C8       1790          BS    CHKCOLE           RETURN                                     MOS57900
                 1791  *                                                                          MOS57910
9042  41F0 9BAE  1792  CHKCOL5F BAL   LINK,ERROR       ERROR ROUTINE                              MOS57920
9046  4300 8F68  1793          B     CHKCOL5           RETURN                                     MOS57930
                 1794  *                                                                          MOS57940
904A  41F0 9BAE  1795  CHKCOL6F BAL   LINK,ERROR       ERROR ROUTINE                              MOS57950
904E  4300 8F7E  1796          B     CHKCOL6           RETURN                                     MOS57960
                 1797  *                                                                          MOS57970
9052  41F0 9BAE  1798  CHKCOL7F BAL   LINK,ERROR       ERROR ROUTINE                              MOS57980
9056  4300 8F98  1799          B     CHKCOL7           RETURN                                     MOS57990
                 1800  *                                                                          MOS58000
905A  41F0 9BAE  1801  CHKCOL8F BAL   LINK,ERROR       ERROR ROUTINE                              MOS58010
905E  4300 8FB2  1802          B     CHKCOL8           RETURN                                     MOS58020
                 1803  *                                                                          MOS58030
9062  41F0 9BAE  1804  CHKCOLBF BAL   LINK,ERROR       ERROR ROUTINE                              MOS58040
9066  4300 8FEE  1805          B     CHKCOLB           RETURN                                     MOS58050
                 1806  *                                                                          MOS58060
906A  41F0 9BAE  1807  CHKCOLCF BAL   LINK,ERROR       ERROR ROUTINE                              MOS58070
906E  4300 9004  1808          B     CHKCOLC           RETURN                                     MOS58080
                 1809  * ************************************************************************ MOS58090
                 1810  *       END   TEST 4                                                       MOS58100
```

TEST 5

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                        1812  *       TEST 5                  SHORT COUNT RELOCATABLE                 MOS58120
                        1813  *                               HAMMER DISTURB TEST                     MOS58130
                        1814  *                                                                       MOS58140
                        1815  *       PURPOSE:                                                        MOS58150
                        1816  *            THIS TEST EXECUTES A SMALL, RELOCATABLE PROGRAM             MOS58160
                        1817  *            (16 HALFWORDS) THROUGHOUT MEMORY, LOOKING FOR "SOFT"       MOS58170
                        1818  *            FAILURES.                                                  MOS58180
                        1819  *                                                                       MOS58190
                        1820  *       ASSUMPTIONS:                                                    MOS58200
                        1821  *            MINIMUM 64KB MOS MEMORY                                    MOS58210
                        1822  *                                                                       MOS58220
                        1823  *       DESIGN SPECIFICATIONS:                                          MOS58230
                        1824  *            1. THE TEST PROGRAM MUST USE 16 HALFWORDS HEAVILY,         MOS58240
                        1825  *               DUE TO THE INTERNAL CHIP ADDRESSING SCHEME.             MOS58250
                        1826  *            2. THE TEST RUNS WITH A BACKGROUND PATTERN EQUAL TO         MOS58260
                        1827  *               THE CONTENTS OF "DATA".                                 MOS58270
                        1828  *            3. THE TEST LOOPS 10 TIMES(INTERNAL TO THE MODULE).        MOS58280
                        1829  *            4. THE ROUTINE (ROUTIN) IS EXECUTED 10 TIMES. THE ENTIRE   MOS58290
                        1830  *               ROUTINE IS THEN RELOCATED IN MEMORY AND EXECUTED 10     MOS58300
                        1831  *               TIMES. "ROUTIN" IS MOVED UP IN MEMORY UNTIL THE LAST    MOS58310
                        1832  *               TEST HALFWORD IS IN THE LAST MEMORY HALFWORD.            MOS58320
                        1833  *                                                                       MOS58330
                        1834  *       OPTIONS:                                                        MOS58340
                        1835  *            DATA  - 16-BIT DATA PATTERN USED AS BACKGROUND             MOS58350
                        1836  *            POUND - NUMBER OF TIMES A'S & 5'S ARE POUNDED IN MEMORY    MOS58360
                        1837  *            SCOPE - ERROR OPTION MODE                                  MOS58370
                        1838  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST             MOS58380
                        1839  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST     MOS58390
                        1840  *                2 - PRINT ERROR DATA AND CONTINUE TEST                 MOS58400
                        1841  *                3 - PRINT ERROR DATA AND HALT                          MOS58410
                        1842  *                4 - IGNORE ERROR                                       MOS58420
                        1843  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST         MOS58430
                        1844  *                                                                       MOS58440
                        1845  *       HOW TO RUN THE TEST:                                            MOS58450
                        1846  *            1. ENTER THE "SCOPE" OPTION VIA THE CONSOLE DEVICE.         MOS58460
                        1847  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                   MOS58470

9072  4860 8B1A         1849  TEST5   LH    R6,LOLIM+6          INITIALIZE MEMORY LIMITS            MOS58490
9076  4880 8B26         1850          LH    R8,HILIM+6                                              MOS58500
907A  0806              1851          LDAR  R0,R6               R0 = LOLIM                          MOS58510
907C  0898              1852          LDAR  R9,R8               R9 = HILIM                          MOS58520
907E  2472              1853          LIS   R7,2                                                    MOS58530
9080  2411              1854          LIS   R1,1                LOAD DISPLAY ADDRESS                MOS58540
9082  C8A0 5555         1855          LDAI  R10,X'5555'                                             MOS58550
9086  C8B0 AAAA         1856          LDAI  R11,X'AAAA'                                             MOS58560
908A  C850 003E         1857          LDAI  R5,ENDMOV5-STLOOP+2 LOAD TEST ADDRESS DIFFERENCE        MOS58570
908E  2521              1858          LCS   R2,1                                                    MOS58580
                        1859  *                                                                     MOS58590
9090  C360 7FC0         1860          TAI   R6,X'7FC0'                                              MOS58600
9094  2133              1861          BNZS  T5S1                                                    MOS58610
9096  C860 0040         1862          LDAI  R6,X'40'            FORCE LOLIM                         MOS58620
```

TEST 5

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909A  4026 0000          1863  T5S1     STH   R2,0(R6)          STORE BACKGROUND OF ALL 1'S          MOS58630
909E  C160 909A          1864  T5S1.5   BXLE  R6,T5S1                                              MOS58640
90A2  4860 8B1A          1865           LH    R6,LOLIM+6                                           MOS58650
90A6  0B85               1866           SAR   R8,R5             ESTABLISH HIGH LIMIT               MOS58660
90A8  4210 9672          1867           BM    T8LOPRT           IF NEGATIVE, ERROR                 MOS58670
90AC  C585 0046          1868           CLAI  R8,X'46'(R5)      MEMORY SPECIFIED LARGE ENOUGH ?    MOS58680
90B0  4280 9672          1869           BL    T8LOPRT           NO, ERROR                          MOS58690
90B4  4080 9DC4          1870           STH   R8,VHILIM         SAVE TESTING HILIM VALUE           MOS58700
90B8  41E0 90E6          1871           BAL   R14,SFTSET        DO SHORT HAMMER DISTURB TEST       MOS58710
                         1872  *                                                                    MOS58720
90BC  4860 8B1A          1873           LH    R6,LOLIM+6        INITIALIZE MEMORY LIMITS           MOS58730
90C0  0889               1874           LDAR  R8,R9             GET BG BXLE HILIM VALUE            MOS58740
90C2  2420               1875           LIS   R2,0                                                 MOS58750
90C4  C360 7FC0          1876           TAI   R6,X'7FC0'                                           MOS58760
90C8  2133               1877           BNZS  T5S2                                                 MOS58770
90CA  C860 0040          1878           LDAI  R6,X'40'          FORCE LOLIM                        MOS58780
90CE  4026 0000          1879  T5S2     STH   R2,0(R6)          STORE BACKGROUND OF ALL 0'S        MOS58790
90D2  C160 90CE          1880  T5S2.5   BXLE  R6,T5S2                                              MOS58800
90D6  4860 8B1A          1881           LH    R6,LOLIM+6                                           MOS58810
90DA  4880 9DC4          1882           LH    R8,VHILIM         RESTORE TESTING HILIM VALUE        MOS58820
90DE  41E0 90E6          1883           BAL   R14,SFTSET        DO SHORT HAMMER DISTURB TEST       MOS58830
                         1884  *                                                                    MOS58840
90E2  4300 83A8          1885           B     TSTEND            END OF TEST (RETURN TO EXEC)       MOS58850
                         1886  *                                                                    MOS58860
                         1887  * ********************************************************************** MOS58870
                         1888  *                                                                    MOS58880
90E6  C360 7FC0          1889  SFTSET   TAI   R6,X'7FC0'                                           MOS58890
90EA  2133               1890           BNZS  SFTSET1                                              MOS58900
90EC  C860 0040          1891           LDAI  R6,X'40'          FORCE LOLIM                        MOS58910
                         1892  *                                                                    MOS58920
90F0  48C0 8B02          1893  SFTSET1  LH    R12,POUND+6       LOAD EXECUTION COUNTER             MOS58930
90F4  41F0 87C2          1894           BAL   LINK,TSTBRKX      IF "BREAK" GO TO TSTEND ELSE RETURN MOS58940
90F8  D000 9DF0          1895           STM   R0,MOSSAVE+32     SAVE REGISTERS (0-F)               MOS58950
90FC  0816               1896           LDAR  R1,R6                                                MOS58960
90FE  D120 919C          1897           LM    R2,STLOOP         RELOCATE PROGRAM IN MEMORY         MOS58970
9102  D021 0002          1898           STM   R2,2(R1)                                             MOS58980
9106  D120 91B8          1899           LM    R2,STLOOP+28                                         MOS58990
910A  D021 001E          1900           STM   R2,30(R1)                                            MOS59000
910E  D1E0 91D4          1901           LM    R14,STLOOP+56                                        MOS59010
9112  D0E1 003A          1902           STM   R14,58(R1)                                           MOS59020
9116  2441               1903           LIS   R4,1                                                 MOS59030
9118  9461               1904           EXBR  R6,R1                                                MOS59040
911A  9846               1905           WHR   R4,R6             DISPLAY ADDRESS UNDER TEST         MOS59050
911C  D100 9DF0          1906           LM    R0,MOSSAVE+32     RESTORE REGISTERS (0-F)            MOS59060
9120  4060 9DC2          1907           STH   R6,VLOLIM         SAVE LOCATION UNDER TEST           MOS59070
9124  41D6 0002          1908           BAL   R13,2(R6)         BRANCH TO "STLOOP"                 MOS59080
                         1909  *                                                                    MOS59090
                         1910  *        TEST BACKGROUND PATTERN                                     MOS59100
                         1911  *                                                                    MOS59110
9128  D000 9DF0          1912  BGTST    STM   R0,MOSSAVE+32                                         MOS59120
912C  C840 3045          1913           LDAI  R4,C'0E'                                             MOS59130
9130  4040 8A56          1914           STH   R4,ERRNO          ERRNO = C'0E'                      MOS59140
9134  0832               1915           LDAR  R3,R2             LOAD BACKGROUND PATTERN            MOS59150
```

TEST 5

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9136  0886           1916           LDAR  R8,R6                                    MOS59160
9138  08C6           1917           LDAR  R12,R6          SAVE LOC UNDER TEST      MOS59170
913A  0885           1918           SAR   R8,R5           ESTABLISH START OF SUB-4 MOS59180
913C  0860           1919           LDAR  R6,R0           GET START OF BACKGROUND TEST AREA MOS59190
913E  0568           1920           CLAR  R6,R8           IS LOLIM NOT < START OF SUB-2 ? MOS59200
9140  4380 9162      1921           BNL   BGTST3          NO, BRANCH TO TEST HIGH MEMORY MOS59210
9144  C360 7FC0      1922           TAI   R6,X'7FC0'                               MOS59220
9148  2133           1923           BNZS  BGTST1                                   MOS59230
914A  C860 0040      1924           LDAI  R6,X'40'        FORCE LOLIM              MOS59240
914E  4846 0000      1925 BGTST1    LH    R4,0(R6)        GET DATA FROM BACKGROUND LOC MOS59250
9152  0543           1926           CLAR  R4,R3           DATA EQUAL ?             MOS59260
9154  2134           1927           BNES  BGTST2.5                                 MOS59270
9156  C160 914E      1928 BGTST2    BXLE  R6,BGTST1       CONTINUE LOW BACKGROUND TESTING MOS59280
915A  2304           1929           BS    BGTST3                                   MOS59290
                     1930 *                                                        MOS59300
915C  41F0 9BAE      1931 BGTST2.5  BAL   LINK,ERROR      PRINT ERROR TTOE         MOS59310
9160  2205           1932           BS    BGTST2                                   MOS59320
                     1933 *                                                        MOS59330
9162  086C           1934 BGTST3    LDAR  R6,R12          RESTORE LOC UNDER TEST   MOS59340
9164  0A65           1935           AAR   R6,R5                                    MOS59350
9166  2662           1936           AIS   R6,2            START AT LOC+2 AFTER SUB MOS59360
9168  0889           1937           LDAR  R8,R9           GET END OF BACKGROUND TEST AREA MOS59370
916A  0568           1938           CLAR  R6,R8           IS BG LOC < TEST LOC ?   MOS59380
916C  4380 918E      1939           BNL   BGTST6          NO, BRANCH TO TEST NEXT LOC MOS59390
9170  C360 7FC0      1940           TAI   R6,X'7FC0'                               MOS59400
9174  2133           1941           BNZS  BGTST4                                   MOS59410
9176  C860 0040      1942           LDAI  R6,X'40'        FORCE LOLIM              MOS59420
917A  4846 0000      1943 BGTST4    LH    R4,0(R6)        GET DATA FROM BG LOC     MOS59430
917E  0543           1944           CLAR  R4,R3           DATA EQUAL ?             MOS59440
9180  2134           1945           BNES  BGTST5.5        NO, ERROR                MOS59450
9182  C160 917A      1946 BGTST5    BXLE  R6,BGTST4       CONTINUE HIGH BACKGROUND TESTING MOS59460
9186  2304           1947           BS    BGTST6                                   MOS59470
                     1948 *                                                        MOS59480
9188  41F0 9BAE      1949 BGTST5.5  BAL   LINK,ERROR      PRINT ERROR TTOE         MOS59490
918C  2205           1950           BS    BGTST5                                   MOS59500
                     1951 *                                                        MOS59510
918E  D100 9DF0      1952 BGTST6    LM    R0,MOSSAVE+32   RESTORE REGISTERS        MOS59520
9192  4026 0000      1953           STH   R2,0(R6)        RESTORE BACKGROUND PATTERN AT LOC MOS59530
9196  C160 90F0      1954 BGTST7    BXLE  R6,SFTSET1      CONTINUE UNTIL DONE (INCREMENTING) MOS59540
919A  030E           1955           BR    R14                                      MOS59550
                     1956 *                                                        MOS59560
                     1957 * ********************************************************************** MOS59570
                     1958 *       (R6)                                            MOS59580
919C  40A6 0000      1959 STLOCP    STH   R10,0(R6)       STORE FIRST DATA PATTERN MOS59590
91A0  45A6 0000      1960           CLH   R10,0(R6)       DATA EQUAL ?             MOS59600
91A4  4230 91D8      1961           BNE   FITERR1         NO, BRANCH TO ERROR      MOS59610
91A8  40E6 0000      1962 LOPRTN1   STH   R11,0(R6)       YES, STORE SECOND DATA PATTERN MOS59620
91AC  45E6 0000      1963           CLH   R11,0(R6)       DATA EQUAL?              MOS59630
91B0  4230 91DC      1964           BNE   FITERR2         NO, BRANCH TO ERROR      MOS59640
91B4  0A65           1965 LOPRTN2   AAR   R6,R5           ALIGN TO SECOND LOC      MOS59650
91B6  40A6 0000      1966           STH   R10,0(R6)       STORE FIRST DATA PATTERN MOS59660
91BA  45A6 0000      1967           CLH   R10,0(R6)       DATA EQUAL ?             MOS59670
91BE  4230 91D8      1968           BNE   FITERR1         NO, BRANCH TO ERROR      MOS59680
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TEST 5

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91C2   40B6 0000          1969  LOPRTN3  STH   R11,0(R6)          YES, STORE SECOND DATA PATTERN          MOS59690
91C6   45B6 0000          1970           CLH   R11,0(R6)          DATA EQUAL ?                            MOS59700
91CA   4230 91DC          1971           BNE   FITERR2            NO, BRANCH TO ERROR                     MOS59710
91CE   0B65              1972           SAR   R6,R5              REVERT TO FIRST LOCATION                MOS59720
91D0   27C1              1973  LOPRTN4  SIS   R12,1              DECREMENT POUND COUNTER                 MOS59730
91D2   4236 0002          1974           BNZ   2(R6)              BRANCH IF NOT DONE                      MOS59740
91D6   03CD              1975  LOPRTN5  BR    R13                RETURN                                  MOS59750
       0000 91D8          1976  ENDMOV5  EQU   *                  (R6)+62                                 MOS59760
                          1977  *                                                                         MOS59770
                          1978  * ********************************************************************** MOS59780
                          1979  *                                                                         MOS59790
91D8   083A              1980  FITERR1  LDAR  R3,R10             LOAD EXPECTED DATA                      MOS59800
91DA   23C2              1981           BS    FITERR3                                                    MOS59810
                          1982  *                                                                         MOS59820
91DC   083B              1983  FITERR2  LDAR  R3,R11             LOAD EXPECTED DATA                      MOS59830
                          1984  *                                                                         MOS59840
91DE   C840 3044          1985  FITERR3  LDAI  R4,C'0D'                                                  MOS59850
91E2   4040 8A56          1986           STH   R4,ERRNO           SET ERRNO = C'0D'                       MOS59860
91E6   4846 0000          1987           LH    R4,0(R6)                                                  MOS59870
91EA   41F0 9BAE          1988           BAL   LINK,ERROR         PRINT ERROR TTOD                        MOS59880
91EE   4560 9DC2          1989           CLH   R6,VLOLIM          IS LOC UNDER TEST TRUE ?                MOS59890
91F2   033D              1990           BER   R13                YES, RETURN                             MOS59900
91F4   0B65              1991           SAR   R6,R5              NO, CORRECT THE LOC                     MOS59910
91F6   030D              1992           BR    R13                RETURN                                  MOS59920
                          1993  *                                                                         MOS59930
                          1994  * ********************************************************************** MOS59940
                          1995  *        END   TEST 5                                                     MOS59950
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TEST 6

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                                1997  *       TEST 6                    DIAGONAL GALPAT TEST                          MOS59970
                                1998  *                                                                               MOS59980
                                1999  *       PURPOSE:                                                              MOS59990
                                2000  *            THE TEST RUNS A GALLOPING PATTERN ON ALL DIAGONALS OF             MOS60000
                                2001  *            EACH 16K RAM AND CHECKS THAT NO BACKGROUND LOCATIONS              MOS60010
                                2002  *            HAVE CHANGED DURING THE DIAGONAL TEST.                            MOS60020
                                2003  *                                                                             MOS60030
                                2004  *       ASSUMPTIONS:                                                          MOS60040
                                2005  *            MINIMUM 64KB MOS MEMORY                                          MOS60050
                                2006  *                                                                             MOS60060
                                2007  *       DESIGN SPECIFICATIONS:                                                MOS60070
                                2008  *            1. THE TEST IS EXECUTED FOR EACH OF THE SIX BACKGROUND            MOS60080
                                2009  *               PATTERNS.                                                     MOS60090
                                2010  *            2. AN ALTERNATE R-W-R-W-R-W-R-W-R(ETC) IS DONE TO A TEST          MOS60100
                                2011  *               CELL AND FOLLOWING CELLS ON THE DIAGONAL SUCESSIVELY.         MOS60110
                                2012  *            3. THE TEST CELL IS MOVED ONE CELL UP THE DIAGONAL AND            MOS60120
                                2013  *               THE PROCEDURE IS REPEATED.                                    MOS60130
                                2014  *            4. AFTER THE DIAGONAL IS COMPLETED, THE BACKROUND                 MOS60140
                                2015  *               PATTERN IN THE REST OF EACH 16K CHIP AS TESTED.               MOS60150
                                2016  *            5. THE DIAGONAL IS THEN MOVED AND 2-4 ABOVE ARE REPEATED          MOS60160
                                2017  *               UNTIL ALL DIAGONALS HAVE BEEN TRAVERSED.                      MOS60170
                                2018  *                                                                             MOS60180
                                2019  *       OPTIONS:                                                              MOS60190
                                2020  *            SCOPE - ERROR OPTION MODE                                        MOS60200
                                2021  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST                   MOS60210
                                2022  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST           MOS60220
                                2023  *                2 - PRINT ERROR DATA AND CONTINUE TEST                       MOS60230
                                2024  *                3 - PRINT ERROR DATA AND HALT                                MOS60240
                                2025  *                4 - IGNORE ERROR                                             MOS60250
                                2026  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST               MOS60260
                                2027  *                                                                             MOS60270
                                2028  *       HOW TO RUN THE TEST:                                                  MOS60280
                                2029  *            1. ENTER THE "SCOPE" OPTION VIA THE CONSOLE DEVICE.               MOS60290
                                2030  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                         MOS60300

91F8  2410          2032  TEST6   LIS   R1,0                                                                        MOS60320
91FA  4010 9DC2     2033          STH   R1,VLOLIM          FORCE VLOLIM = 0                                         MOS60330
91FE  2404          2034          LIS   R0,4                                                                       MOS60340
9200  C820 9D6A     2035          LDAI  R2,LOMSG                                                                   MOS60350
9204  41F0 85F6     2036          BAL   LINK,HEXASC        PUT 0 IN ADDRESS MESSAGE                                MOS60360
9208  C810 7FFF     2037          LDAI  R1,X'7FFF'                                                                 MOS60370
920C  4010 9DC4     2038          STH   R1,VHILIM          FORCE VHILIM = 0                                        MOS60380
9210  C820 9D70     2039          LDAI  R2,HIMSG                                                                   MOS60390
9214  41F0 85F6     2040          BAL   LINK,HEXASC        PUT 7FFF IN ADDRESS MESSAGE                             MOS60400
9218  C850 9D50     2041          LDAI  R5,T6MSG                                                                   MOS60410
921C  41F0 8656     2042          BAL   LINK,PRINT         PRINT LIMITS UNDER DIAG. GALPAT TEST                    MOS60420
9220  C850 9D6A     2043          LDAI  R5,LOMSG                                                                   MOS60430
9224  41F0 8656     2044          BAL   LINK,PRINT                                                                 MOS60440
9228  2411          2045          LIS   R1,1               LOAD DISPLAY ADDRESS                                    MOS60450
922A  C820 0102     2046          LDAI  R2,X'102'          LOAD CELL INCREMENT VALUE                               MOS60460
922E  C890 00FE     2047          LDAI  R9,X'FE'           LOAD TOP OF COLUMN MASK VALUE                           MOS60470
```

TEST 6

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9232  C8C0 7FFE          2048          LDAI  R12,X'7FFE'        LOAD CHIP LIMIT MASK                    MOS60480
9236  24A0               2049          LIS   R10,0                                                   MOS60490
9238  25E1               2050          LCS   R11,1                                                   MOS60500
923A  24D0               2051          LIS   R13,0             W/BACKGROUND = 0'S                    MOS60510
923C  41E0 926A          2052          BAL   R14,TEST6ALL      DO DIAGONAL GALPAT TEST               MOS60520
                         2053  *                                                                      MOS60530
9240  25A1               2054          LCS   R10,1                                                   MOS60540
9242  24B0               2055          LIS   R11,0             W/BACKGROUND = F'S                    MOS60550
9244  41E0 926A          2056          BAL   R14,TEST6ALL      DO DIAGONAL GALPAT TEST               MOS60560
                         2057  *                                                                      MOS60570
9248  24D2               2058          LIS   R13,2             W/BACKGROUND = A'S/CHIP               MOS60580
924A  41E0 926A          2059          BAL   R14,TEST6ALL      DO DIAGONAL GALPAT TEST               MOS60590
                         2060  *                                                                      MOS60600
924E  24A0               2061          LIS   R10,0                                                   MOS60610
9250  25E1               2062          LCS   R11,1             W/BACKGROUND = 5'S/CHIP               MOS60620
9252  41E0 926A          2063          BAL   R14,TEST6ALL      DO DIAGONAL GALPAT TEST               MOS60630
                         2064  *                                                                      MOS60640
9256  C8D0 0100          2065          LDAI  R13,X'100'        W/BACKGROUND =128-0'S,128-F'S,..      MOS60650
925A  41E0 926A          2066          BAL   R14,TEST6ALL      DO DIAGONAL GALPAT TEST               MOS60660
                         2067  *                                                                      MOS60670
925E  25A1               2068          LCS   R10,1                                                   MOS60680
9260  24B0               2069          LIS   R11,0             W/BACKGROUND =128-F'S,128-0'S,..      MOS60690
9262  41E0 926A          2070          BAL   R14,TEST6ALL      DO DIAGONAL GALPAT TEST               MOS60700
                         2071  *                                                                      MOS60710
9266  4300 83A8          2072          B     TSTEND            END OF TEST (RETURN TC EXEC)          MOS60720
                         2073  *                                                                      MOS60730
                         2074  * ********************************************************************* MOS60740
                         2075  *                                                                      MOS60750
926A  4860 9DC2          2076  TEST6ALL LH   R6,VLOLIM         LOAD AVAILABLE MEMORY LIMITS          MOS60760
926E  4880 9DC4          2077          LH    R8,VHILIM                                               MOS60770
9272  2472               2078          LIS   R7,2                                                    MOS60780
                         2079  *                                                                      MOS60790
9274  C360 7FC0          2080          TAI   R6,X'7FC0'                                              MOS60800
9278  2133               2081          BNZS  T6S1                                                    MOS60810
927A  C860 0040          2082          LDAI  R6,X'40'          FORCE LOLIM                           MOS60820
927E  083A               2083  T6S1    LDAR  R3,R10            GET APPROPRIATE BACKGROUND PATTERN    MOS60830
9280  C36D 0000          2084          TAI   R6,0(R13)                                               MOS60840
9284  2332               2085          BZS   T6S2                                                    MOS60850
9286  083B               2086          LDAR  R3,R11                                                  MOS60860
9288  4036 0000          2087  T6S2    STH   R3,0(R6)          STORE BACKGROUND PATTERN              MOS60870
928C  C160 927E          2088  T6S2.5  BXLE  R6,T6S1           TO ALL AVAILABLE MEMORY               MOS60880
                         2089  *                                                                      MOS60890
9290  2400               2090  T6S3    LIS   R0,0              R0 = X0                               MOS60900
9292  0880               2091  T6S4    LDAR  R8,R0             R8 = TEST CELL                        MOS60910
9294  0870               2092  T6S5    LDAR  R7,R0             R7 = RUNNING CELL                     MOS60920
9296  C380 7FC0          2093  T6S6    TAI   R8,X'7FC0'        TEST CELL < X'40' ?                   MOS60930
929A  4330 9310          2094          BZ    INCRTC2           YES, BRANCH                           MOS60940
929E  C370 7FC0          2095          TAI   R7,X'7FC0'        RUNNING CELL < X'40' ?                MOS60950
92A2  4330 92F0          2096          BZ    INCRRC            YES, BRANCH                           MOS60960
92A6  0578               2097          CLAR  R7,R8             RUNNING CELL = TEST CALL ?            MOS60970
92A8  4330 92F0          2098          BE    INCRRC            YES, INCREMENT THE RUNNING CELL       MOS60980
92AC  0868               2099          LDAR  R6,R8             R6 = TEST CELL                        MOS60990
92AE  083B               2100          LDAR  R3,R11            LOAD COMPLEMENT DATA PATTERN(C.D.P.)  MOS61000
```

TEST 6

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92B0  C36D 0000  2101          TAI   R6,0(R13)                                    MOS61010
92B4  2332       2102          BZS   T6S7                                         MOS61020
92B6  083A       2103          LDAR  R3,R10                                       MOS61030
92B8  4036 0000  2104  T6S7    STH   R3,0(R6)      STORE C.D.P. AT TEST CELL LOC  MOS61040
92BC  C840 3130  2105          LDAI  R4,C'10'                                     MOS61050
92C0  4040 8A56  2106          STH   R4,ERRNO      ERRNO = C'10'                  MOS61060
92C4  4846 0000  2107          LH    R4,0(R6)      GET TEST CELL DATA             MOS61070
92C8  0543       2108          CLAR  R4,R3         DATA EQUAL TO C.D.P. ?         MOS61080
92CA  4230 9370  2109          BNE   T6ER10                                       MOS61090
92CE  4036 0000  2110  T6S8    STH   R3,0(R6)      STORE C.D.P. AT TC LOC         MOS61100
92D2  0867       2111          LDAR  R6,R7         R6 = RUNNING CELL              MOS61110
92D4  6110 8A56  2112          AHM   R1,ERRNO      ERRNO = C'11'                  MOS61120
92D8  083A       2113          LDAR  R3,R10        LOAD O.D.P. AT RUNNING CELL LOC MOS61130
92DA  C36D 0000  2114          TAI   R6,0(R13)                                    MOS61140
92DE  2332       2115          BZS   T6S9                                         MOS61150
92E0  083B       2116          LDAR  R3,R11                                       MOS61160
92E2  4846 0000  2117  T6S9    LH    R4,0(R6)      GET RUNNING CELL DATA          MOS61170
92E6  0543       2118          CLAR  R4,R3         RC DATA = BACKGROUND DATA ?    MOS61180
92E8  4230 9378  2119          BNE   T6ER11                                       MOS61190
92EC  4036 0000  2120  T6S10   STH   R3,0(R6)      STORE O.D.P. AT RUNNING CELL LOC MOS61200
                 2121  *                                                          MOS61210
92F0  0867       2122  INCRRC  LDAR  R6,R7         R6 = RUNNING CELL              MOS61220
92F2  0469       2123          NAR   R6,R9                                        MOS61230
92F4  0569       2124          CLAR  R6,R9         RUNNING CELL = TOP OF COLUMN ? MOS61240
92F6  2335       2125          BES   INCRTC        YES, INCREMENT THE TEST CELL   MOS61250
92F8  0A72       2126          AAR   R7,R2         NO, INCREMENT RUNNING CELL (+X'102') MOS61260
92FA  047C       2127          NAR   R7,R12        STAY WITHIN CHIP (FIRST 16KB)  MOS61270
92FC  43C0 9296  2128          B     T6S6          CONTINUE TESTING               MOS61280
                 2129  *                                                          MOS61290
9300  0868       2130  INCRTC  LDAR  R6,R8         R6 = TEST CELL                 MOS61300
9302  083A       2131          LDAR  R3,R10        GET APPROPRIATE BACKGROUND PATTERN MOS61310
9304  C36D 0000  2132          TAI   R6,0(R13)                                    MOS61320
9308  2332       2133          BZS   INCRTC1                                      MOS61330
930A  083B       2134          LDAR  R3,R11                                       MOS61340
930C  4036 0000  2135  INCRTC1 STH   R3,0(R6)      RESTORE TEST CELL TO BACKGROUND PATRN MOS61350
9310  0868       2136  INCRTC2 LDAR  R6,R8                                        MOS61360
9312  0469       2137          NAR   R6,R9                                        MOS61370
9314  0569       2138          CLAR  R6,R9         TEST CELL = TOP OF COLUMN ?    MOS61380
9316  2335       2139          BES   INCRX0        YES, INCREMENT X0              MOS61390
9318  0A82       2140          AAR   R8,R2         NO, INCREMENT TEST CELL (+X'102') MOS61400
931A  048C       2141          NAR   R8,R12        STAY WITHIN CHIP (FIRST 16KB)  MOS61410
931C  4300 9294  2142          B     T6S5          CONTINUE TEST                  MOS61420
                 2143  *                                                          MOS61430
9320  41F0 87C2  2144  INCRX0  BAL   LINK,TSTBRKX   IF "BREAK" GO TO TSTEND ELSE RETURN MOS61440
                 2145  *                                                          MOS61450
9324  D000 9DF0  2146  CKBG60  STM   R0,MOSSAVE+32  SAVE REGISTERS                MOS61460
9328  C860 0040  2147          LDAI  R6,X'40'                                     MOS61470
932C  C880 7FFE  2148          LDAI  R8,X'7FFE'    STAY WITHIN CHIP (FIRST 32KB)  MOS61480
9330  2472       2149          LIS   R7,2          LOAD INCREMENT VALUE           MOS61490
9332  C840 3045  2150          LDAI  R4,C'0E'                                     MOS61500
9336  4040 8A56  2151          STH   R4,ERRNO      ERRNO = C'0E'                  MOS61510
                 2152  *                                                          MOS61520
933A  083A       2153  CKBG61  LDAR  R3,R10        GET APPROPRIATE BACKGROUND PATTERN MOS61530
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TEST 6

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933C  C36D 0000          2154          TAI   R6,0(R13)                                    MOS61540
9340  2332               2155          BZS   CKBG62                                       MOS61550
9342  083B               2156          LDAR  R3,R11                                       MOS61560
9344  4846 0000          2157  CKBG62  LH    R4,0(R6)          LOAD BACKGROUND PATTERN    MOS61570
9348  0543               2158          CLAR  R4,R3             DATA EQUAL ?               MOS61580
934A  2134               2159          BNES  CKBG64                                       MOS61590
934C  C160 933A          2160  CKBG63  BXLE  R6,CKBG61         CONTINUE UNTIL DONE        MOS61600
9350  2304               2161          BS    CKBG65                                       MOS61610
                         2162  *                                                          MOS61620
9352  41F0 9BAE          2163  CKBG64  BAL   LINK,ERROR                                    MOS61630
9356  2205               2164          BS    CKBG63                                       MOS61640
                         2165  *                                                          MOS61650
9358  D100 9DF0          2166  CKBG65  LM    R0,MOSSAVE+32     RESTORE REGISTERS          MOS61660
935C  CA00 0100          2167          AAI   R0,X'100'        INCREMENT X0               MOS61670
9360  9480               2168          EXBR  R8,R0                                        MOS61680
9362  2471               2169          LIS   R7,1                                         MOS61690
9364  9878               2170          WHR   R7,R8             DISPLAY ADDRESS UNDER TEST MOS61700
9366  C500 8000          2171          CLAI  R0,X'8000'        WAS THIS THE LAST DIAGONAL ? MOS61710
936A  4280 9292          2172          BL    T6S4              NO, BRANCH                 MOS61720
936E  030E               2173          BR    R14               YES, RETURN                MOS61730
                         2174  *                                                          MOS61740
9370  41F0 9BAF          2175  T6ER10  BAL   LINK,ERROR         PRINT ERROR TT10           MOS61750
9374  4300 92CE          2176          B     T6S8                                         MOS61760
                         2177  *                                                          MOS61770
9378  41F0 9BAE          2178  T6ER11  BAL   LINK,ERROR         PRINT ERROR TT11           MOS61780
937C  4300 92EC          2179          B     T6S10                                        MOS61790
                         2180  *                                                          MOS61800
                         2181  * ************************************************************ MOS61810
                         2182  *       END   TEST 6                                       MOS61820
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TEST 7

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                        2184  *       TEST 7                    MEMORY HOLD TEST                        MOS61840
                        2185  *                                                                         MOS61850
                        2186  *       PURPOSE                                                           MOS61860
                        2187  *            THIS TEST CHECKS THE ABILITY OF THE MOS MEMORY REFRESH      MOS61870
                        2188  *            CIRCUIT TO OPERATE IN THE EVENT OF A POWER FAILURE.         MOS61880
                        2189  *                                                                         MOS61890
                        2190  *       ASSUMPTIONS:                                                      MOS61900
                        2191  *            MINIMUM 64KB MOS MEMORY & BATTERY BACK-UP POWER SUPPLY.     MOS61910
                        2192  *                                                                         MOS61920
                        2193  *       DESIGN SPECIFICATIONS:                                            MOS61930
                        2194  *            1. A BACKGROUND PATTERN IS WRITTEN TO ALL MEMORY.           MOS61940
                        2195  *            2. POWER IS REMOVED FOR 30 SECONDS(MINIMUM).               MOS61950
                        2196  *            3. UPON RESTART, THE PROGRAM READS MEMORY 8 TIMES           MOS61960
                        2197  *               CHECKING FOR ERRORS.                                    MOS61970
                        2198  *                                                                         MOS61980
                        2199  *       OPTIONS                                                           MOS61990
                        2200  *            SCOPE - ERROR OPTION MODE                                  MOS62000
                        2201  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST              MOS62010
                        2202  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST      MOS62020
                        2203  *                2 - PRINT ERROR DATA AND CONTINUE TEST                  MOS62030
                        2204  *                3 - PRINT ERROR DATA AND HALT                           MOS62040
                        2205  *                4 - IGNORE ERROR                                        MOS62050
                        2206  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST          MOS62060
                        2207  *                                                                         MOS62070
                        2208  *       HOW TO RUN THE TEST:                                              MOS62080
                        2209  *            1. ENTER THE "SCOPE" OPTION VIA THE CONSOLE DEVICE.         MOS62090
                        2210  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                   MOS62100

9380  4860 8B1A         2212  TEST7   LH    R6,LOLIM+6          INITIALIZE MEMORY LIMITS                MOS62120
9384  4880 8B26         2213          LH    R8,HILIM+6                                                  MOS62130
9388  2788              2214          SIS   R8,8                                                        MOS62140
938A  2478              2215          LIS   R7,8                                                        MOS62150
938C  2411              2216          LIS   R1,1                LOAD DISPLAY ADDRESS                    MOS62160
938E  24A0              2217          LIS   R10,0               LOAD 4 DATA PATTERNS                    MOS62170
9390  25B1              2218          LCS   R11,1                                                       MOS62180
9392  C8C0 AAAA         2219          LDAI  R12,X'AAAA'                                                 MOS62190
9396  C8D0 5555         2220          LDAI  R13,X'5555'                                                 MOS62200
939A  C360 7FC0         2221          TAI   R6,X'7FC0'                                                  MOS62210
939E  2133              2222          BNZS  T7S1                                                        MOS62220
93A0  C860 0040         2223          LDAI  R6,X'40'            FORCE LOLIM                             MOS62230
93A4  40A6 0000         2224  T7S1    STH   R10,0(R6)                                                   MOS62240
93A8  40B6 0002         2225          STH   R11,2(R6)                                                   MOS62250
93AC  40C6 0004         2226          STH   R12,4(R6)                                                   MOS62260
93B0  40D6 0006         2227          STH   R13,6(R6)           STORE DATA PATTERNS                     MOS62270
93B4  C160 93A4         2228  T7S1.5  BXLE  R6,T7S1             FROM LOLIM TO HILIM                     MOS62280
93B8  C850 9402         2229          LDAI  R5,T7MM1                                                    MOS62290
93BC  4050 003E         2230          STH   R5,X'3E'            SET VECTOR FOR MM ON POWER DOWN         MOS62300
93C0  C850 9E30         2231          LDAI  R5,MMSAVE                                                   MOS62310
93C4  4050 0022         2232          STH   R5,X'22'            SET T7 MM POINTER                       MOS62320
93C8  9555              2233          EPSR  R5,R5                                                       MOS62330
93CA  C450 FFF0         2234          NAI   R5,X'FFF0'          MASK OFF CC TO ZERO                     MOS62340
```

TEST 7

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93CE  4050 003C          2235          STH   R5,X'3C'                                    MOS62350
93D2  C850 9D78          2236  T7OUTMSG LDAI  R5,T7MSG          UNCONDITIONALLY PRINT:    MOS62360
93D6  4050 8A0C          2237          STH   R5,ISITEBR                                  MOS62370
93DA  41F0 8656          2238          BAL   LINK,PRINT         "POWER DOWN PROC. FOR 30 SECONDS"  MOS62380
93DE  2450               2239          LIS   R5,0                                        MOS62390
93E0  4050 8A0C          2240          STH   R5,ISITEBR                                  MOS62400
93E4  25E1               2241          LCS   R14,1              ESTABLISH WAIT COUNTERS   MOS62410
93E6  C820 0080          2242  T7S2    LDAI  R2,128                                      MOS62420
                         2243  *                                                         MOS62430
93EA  2721               2244  T7S3    SIS   R2,1                                        MOS62440
93EC  2031               2245          BNZS  T7S3               WAIT 256* SF INSTRUCTION TIMES  MOS62450
93EE  C8F0 94EA          2246          LDAI  LINK,T7END                                  MOS62460
93F2  40F0 8A0A          2247          STH   LINK,BRKVECT       SET BREAK VECTOR          MOS62470
93F6  41F0 8704          2248          BAL   LINK,TSTBRK        IF "BREAK" GO TO T7END ELSE RETURN  MOS62480
93FA  27E1               2249          SIS   R14,1                                       MOS62490
93FC  203F               2250          BNZS  T7S2               WAIT 30 SECONDS FOR MM    MOS62500
93FE  4300 93D2          2251          B     T7OUTMSG           ON POWER DOWN             MOS62510
                         2252  *                                                         MOS62520
                         2253  * ********************************************************************  MOS62530
                         2254  *                                                         MOS62540
9402  C8E0 9418          2255  T7MM1   LDAI  R14,T7MM2          SET VECTOR FOR MM         MOS62550
9406  40E0 003E          2256          STH   R14,X'3E'          ON POWER UP               MOS62560
940A  95EE               2257          EPSR  R14,R14                                     MOS62570
940C  C6E0 8000          2258          OAI   R14,X'8000'        FORCE BUSY BIT SET        MOS62580
9410  C4E0 FFF0          2259          NAI   R14,X'FFF0'        MASK OFF CC TO ZERO       MOS62590
9414  954E               2260          EPSR  R4,R14             WAIT FOR SECOND MM  (PSW = X'80F0')  MOS62600
9416  220A               2261          BS    T7MM1              BRANCH ON RUN W/O SECOND MM  MOS62610
                         2262  *                                                         MOS62620
                         2263  * ********************************************************************  MOS62630
                         2264  *                                                         MOS62640
9418  D3E0 8010          2265  T7MM2   LB    R14,IO             GET CONSOLE POINTER       MOS62650
941C  27E5               2266          SIS   R14,5              IS CONSOLE ON PASLA ?     MOS62660
941E  2334               2267          BZS   T7MM2A             YES, BRANCH               MOS62670
9420  48E0 89E6          2268          LH    R14,PASFLG         IS CONSOLE ON PASLA ?     MOS62680
9424  233C               2269          BZS   T7MM3              NO, BRANCH                MOS62690
9426  D3E0 8010          2270  T7MM2A  LB    R14,IO             GET CONSOLE POINTER       MOS62700
942A  0AEE               2271          AAR   R14,R14            SET INDEX                 MOS62710
942C  D34E 8010          2272          LB    R4,IO(R14)         GET CONSOLE ADDRESS       MOS62720
9430  DE4E 89F8          2273          OC    R4,CON2ND(R14)     ISSUE CONSOLE SPEED COMMAND  MOS62730
9434  DE40 89EC          2274          OC    R4,CONRD           ISSUE CONSOLE READ COMMAND  MOS62740
9438  DB40 89E4          2275          RD    R4,SINK            DUMMY READ TO SET BUSY    MOS62750
                         2276  *                                                         MOS62760
943C  D3E0 8011          2277  T7MM3   LB    R14,IO+1           GET LIST DEVICE POINTER   MOS62770
9440  27F5               2278          SIS   R14,5              IS LIDT DEVICE ON MICRO-IO BUS ?  MOS62780
9442  2334               2279          BZS   T7MM3A             YES, BRANCH               MOS62790
9444  48E0 89E8          2280          LH    R14,PASFLG2        IS LIST DEV ON PASLA ?    MOS62800
9448  233D               2281          BZS   T7MMCOM            NO, BRANCH                MOS62810
944A  D3E0 8011          2282  T7MM3A  LB    R14,IO+1           GET LIST POINTER          MOS62820
944E  D340 8010          2283          LB    R4,IO              GET CONSOLE POINTER       MOS62830
9452  05E4               2284          CLAR  R14,R4             CONSOLE = LIST POINTER ?  MOS62840
9454  2337               2285          BES   T7MMCOM            YES, BRANCH               MOS62850
9456  D34E 8011          2286          LB    R4,IO+1(R14)       GET LIST DEV ADDRESS      MOS62860
945A  DE4E 89F8          2287          OC    R4,LST2ND(R14)     ISSUE LIST SPEED COMMAND  MOS62870
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TEST 7

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945E  DE4E 89ED          2288          OC    R4,LSTWRT(R14)      ISSUE LIST WRITE COMMAND                MOS62880
                         2289  *                                                                          MOS62890
9462  48E0 8008          2290  T7MMCOM IH    R14,PSW2                                                    MOS62900
9466  950E               2291          EPSR  R0,R14              PSW = X'30F0'                           MOS62910
9468  C840 893E          2292          LDAI  R4,MM0                                                      MOS62920
946C  4040 003E          2293          STH   R4,X'3E'            SET NEW MM POINTER                      MOS62930
9470  C840 9E50          2294          LDAI  R4,RSAVE                                                    MOS62940
9474  4040 0022          2295          STH   R4,X'22'            RESET ETPE MM POINTER                   MOS62950
9478  24E8               2296          LIS   R14,8               LOAD MEMORY CHECK COUNTER               MOS62960
947A  C840 3230          2297          LDAI  R4,C'20'                                                    MOS62970
947E  4040 8A56          2298          STH   R4,ERRNO            ERRNO = C'20'                           MOS62980
9482  2472               2299          LIS   R7,2                                                        MOS62990
                         2300  *                                                                          MOS63000
9484  4860 8B1A          2301  T7S4    LH    R6,LOLIM+6                                                  MOS63010
9488  6110 8A56          2302          AHM   R1,ERRNO            INCREMENT ERRNO (21-28)                 MOS63020
948C  C360 7FC0          2303          TAI   R6,X'7FC0'                                                  MOS63030
9490  2133               2304          BNZS  T7S5                                                        MOS63040
9492  C860 0040          2305          LDAI  R6,X'40'            FORCE LOLIM                             MOS63050
                         2306  *                                                                          MOS63060
9496  083A               2307  T7S5    LDAR  R3,R10              GET FIRST DATA PATTERN                  MOS63070
9498  4846 0000          2308          LH    R4,0(R6)            LOAD DATA FROM LOC                      MOS63080
949C  0543               2309          CLAR  R4,R3               DATA EQUAL ?                            MOS63090
949E  2333               2310          BES   T7S6                YES, BRANCH                             MOS63100
94A0  41F0 9BAE          2311          BAL   LINK,ERROR          NO, ERROR                               MOS63110
94A4  083B               2312  T7S6    LDAR  R3,R11              GET SECOND DATA PATTERN                 MOS63120
94A6  2662               2313          AIS   R6,2                INCREMENT LOC COUNTER                   MOS63130
94A8  4846 0000          2314          LH    R4,0(R6)            LOAD DATA FROM LOC                      MOS63140
94AC  0543               2315          CLAR  R4,R3               DATA EQUAL ?                            MOS63150
94AE  2333               2316          BES   T7S7                YES, BRANCH                             MOS63160
94B0  41F0 9BAE          2317          BAL   LINK,ERROR          NO, ERROR                               MOS63170
94B4  083C               2318  T7S7    LDAR  R3,R12              GET THIRD DATA PATTERN                  MOS63180
94B6  2662               2319          AIS   R6,2                INCREMENT LOC COUNTER                   MOS63190
94B8  4846 0000          2320          LH    R4,0(R6)            LOAD DATA FROM LOC                      MOS63200
94BC  0543               2321          CLAR  R4,R3               DATA EQUAL ?                            MOS63210
94BE  2333               2322          BES   T7S8                YES, BRANCH                             MOS63220
94C0  41F0 9BAE          2323          BAL   LINK,ERROR          NO, ERROR                               MOS63230
94C4  083D               2324  T7S8    LDAR  R3,R13              GET FOURTH DATA PATTERN                 MOS63240
94C6  2662               2325          AIS   R6,2                INCREMENT LOC COUNTER                   MOS63250
94C8  4846 0000          2326          LH    R4,0(R6)            LOAD DATA FROM LOC                      MOS63260
94CC  0543               2327          CLAR  R4,R3               DATA EQUAL ?                            MOS63270
94CE  2333               2328          BES   T7S9                YES, BRANCH                             MOS63280
94D0  41F0 9BAE          2329          BAL   LINK,ERROR          NO, ERROR                               MOS63290
94D4  C160 9496          2330  T7S9    BXLE  R6,T7S5             CHECK LOLIM TO HILIM                    MOS63300
94D8  C8F0 94EA          2331          LDAI  LINK,T7END                                                  MOS63310
94DC  40F0 8A0A          2332          STH   LINK,BRKVECT                                                MOS63320
94E0  41F0 87D4          2333          BAL   LINK,TSTBRK         IF "BREAK" GO TO T7END ELSE RETURN      MOS63330
94E4  27E1               2334          SIS   R14,1               CHECKED MEMORY 8 TIMES ?                MOS63340
94E6  4230 9484          2335          BNZ   T7S4                NO, REPEATE                             MOS63350
94EA  41F0 88D0          2336  T7END   BAL   LINK,LCORE         RESET LOW CORE                          MOS63360
94EE  4300 83A8          2337          B     TSTEND              YES, END OF TEST(RETURN TO EXEC)        MOS63370
                         2338  *                                                                          MOS63380
                         2339  * ************************************************************************ MOS63390
                         2340  *       END   TEST 7                                                       MOS63400
```

TEST 8

```
                                2342  *       TEST 8 (OPTIONAL TEST)    LONG COUNT RELOCATABLE                  MOS63420
                                2343  *                                 HAMMER DISTURB TEST                     MOS63430
                                2344  *                                                                         MOS63440
                                2345  *       PURPOSE:                                                          MOS63450
                                2346  *             THE TEST EXERCISES THE MOS MEMORY IN AN ENVIRONMENT        MOS63460
                                2347  *             SIMILAR TO THAT OF AN OPERATING SYSTEM.                    MOS63470
                                2348  *                                                                         MOS63480
                                2349  *       ASSUMPTIONS:                                                      MOS63490
                                2350  *             MINIMUM 64KB MOS MEMORY                                     MOS63500
                                2351  *                                                                         MOS63510
                                2352  *       DESIGN SPECIFICATIONS:                                            MOS63520
                                2353  *             THIS IS AN "OVERNIGHT" (VERY LONG) TEST DESIGNED TO         MOS63530
                                2354  *             POINT OUT POSSIBLE "SOFT" FAILURE LOCATIONS IN MOS          MOS63540
                                2355  *             MEMORY.   (SIMILAR TO TEST 5)                               MOS63550
                                2356  *                                                                         MOS63560
                                2357  *       OPTIONS:                                                          MOS63570
                                2358  *             DATA  - 16-BIT BACKGROUND DATA PATTERN                      MOS63580
                                2359  *             SCOPE - ERROR OPTION MODE                                   MOS63590
                                2360  *                 0 - PRINT ERROR DATA AND SKIP TO NEXT TEST              MOS63600
                                2361  *                 1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST      MOS63610
                                2362  *                 2 - PRINT ERROR DATA AND CONTINUE TEST                  MOS63620
                                2363  *                 3 - PRINT ERROR DATA AND HALT                           MOS63630
                                2364  *                 4 - IGNORE ERROR                                        MOS63640
                                2365  *                 5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST          MOS63650
                                2366  *                                                                         MOS63660
                                2367  *       HOW TO RUN THE TEST:                                              MOS63670
                                2368  *             1. ENTER "SCOPE" & "DATA" OPTIONS VIA CONSOLE DEVICE.       MOS63680
                                2369  *             2. ENTER "RUN" AND THE TEST WILL EXECUTE.                   MOS63690

94F2  4860 8B1A                 2371  TEST8   LH    R6,LOLIM+6          INITIALIZE MEMORY LIMITS              MOS63710
94F6  4880 8B26                 2372          LH    R8,HILIM+6                                                MOS63720
94FA  08A6                      2373          LDAR  R10,R6              R10 = LOLIM                           MOS63730
94FC  08B8                      2374          LDAR  R11,R8              R11 = HILIM                           MOS63740
94FE  0878                      2375          LDAR  R7,R8                                                     MOS63750
9500  0876                      2376          SAR   R7,R6                                                     MOS63760
9502  C570 009C                 2377          CLAI  R7,ENDMOV8-MOVPRG+6 IS HILIM - LOLIM LARGE ENOUGH ?       MOS63770
9506  4280 9672                 2378          BL    T8LOPRT             IF NOT, BRANCH AND PRINT ERROR        MOS63780
950A  2411                      2379          LIS   R1,1                LOAD DISPLAY ADDRESS                  MOS63790
950C  4850 8AF6                 2380          LH    R5,DATA+6           LOAD BACKGROUND DATA PATTERN          MOS63800
9510  2472                      2381          LIS   R7,2                                                      MOS63810
9512  C820 0098                 2382          LDAI  R2,ENDMOV8-MOVPRG+2                                       MOS63820
9516  C360 7FC0                 2383          TAI   R6,X'7FC0'                                                MOS63830
951A  2133                      2384          BNZS  T8SW                                                      MOS63840
951C  C860 0040                 2385          LDAI  R6,X'40'                                                  MOS63850
9520  4056 0000                 2386  T8SW    STH   R5,0(R6)             STORE BACKGROUND DATA PATTERN         MOS63860
9524  C160 9520                 2387  T8SW1   BXLE  R6,T8SW             FROM LOLIM TO HILIM                   MOS63870
9528  4860 8B1A                 2388          LH    R6,LOLIM+6                                                MOS63880
952C  C360 7FC0                 2389  T8SW2   TAI   R6,X'7FC0'                                               MOS63890
9530  2133                      2390          BNZS  T8SW3                                                     MOS63900
9532  C860 0040                 2391          LDAI  R6,X'40'            FORCE LOLIM                           MOS63910
                                2392  *                                                                       MOS63920
```

TEST 8

```
9536   D000 9DF0          2393  T8SW3    STM   R0,MOSSAVE+32       SAVE REGISTERS (0-F)                    MOS63930
953A   0816               2394            LDAR  R1,R6                                                       MOS63940
953C   D120 95DC          2395            LM    R2,MOVPRG           MOVE SUB INTO TEST AREA                 MOS63950
9540   D021 0002          2396            STM   R2,2(R1)                                                    MOS63960
9544   D120 95F8          2397            LM    R2,MOVPRG+28                                                MOS63970
9548   D021 001E          2398            STM   R2,30(R1)                                                   MOS63980
954C   D120 9614          2399            LM    R2,MOVPRG+56                                                MOS63990
9550   D021 003A          2400            STM   R2,58(R1)                                                   MOS64000
9554   D120 9630          2401            LM    R2,MOVPRG+84                                                MOS64010
9558   D021 0056          2402            STM   R2,86(R1)                                                   MOS64020
955C   D120 964C          2403            LM    R2,MOVPRG+112                                               MOS64030
9560   D021 0072          2404            STM   R2,114(R1)                                                  MOS64040
9564   D1E0 9668          2405            LM    R11,MOVPRG+140                                              MOS64050
9568   D0B1 008E          2406            STM   R11,142(R1)                                                 MOS64060
956C   D100 9DF0          2407            LM    R0,MOSSAVE+32       RESTORE REGISTERS                       MOS64070
9570   C840 893E          2408            LDAI  R4,MM0                                                      MOS64080
9574   4040 003E          2409            STH   R4,X'3E'            SET NEW MM POINTER                      MOS64090
9578   0B82               2410            SAR   R8,R2                                                       MOS64100
                          2411  *                                                                           MOS64110
957A   41F0 87C2          2412  T8SX      BAL   LINK,TSTBRKX        IF "BREAK" GO TO "OPTIN" ELSE RETURN    MOS64120
957E   C840 3044          2413            LDAI  R4,C'0D'                                                    MOS64130
9582   4040 8A56          2414            STH   R4,ERRNO            ERRNO = C'0D'                           MOS64140
9586   41E6 0002          2415            BAL   R14,2(R6)           BRANCH TO "MOVPRG"                      MOS64150
                          2416  *                                                                           MOS64160
958A   D000 9DF0          2417            STM   R0,MOSSAVE+32       SAVE REGISTERS (0-F)                    MOS64170
958E   0816               2418            LDAR  R1,R6                                                       MOS64180
9590   D1B1 008C          2419            LM    R11,140(R1)         RELOCATE SUB IN MEMORY (+2)             MOS64190
9594   D0B1 008E          2420            STM   R11,142(R1)                                                 MOS64200
9598   D121 0070          2421            LM    R2,112(R1)                                                  MOS64210
959C   D021 0072          2422            STM   R2,114(R1)                                                  MOS64220
95A0   D121 0054          2423            LM    R2,84(R1)                                                   MOS64230
95A4   D021 0056          2424            STM   R2,86(R1)                                                   MOS64240
95A8   D121 0038          2425            LM    R2,56(R1)                                                   MOS64250
95AC   D021 003A          2426            STM   R2,58(R1)                                                   MOS64260
95B0   D121 001C          2427            LM    R2,28(R1)                                                   MOS64270
95B4   D021 001E          2428            STM   R2,30(R1)                                                   MOS64280
95B8   D121 0000          2429            LM    R2,0(R1)                                                    MOS64290
95BC   D021 0002          2430            STM   R2,2(R1)                                                    MOS64300
95C0   9461               2431            EXBR  R6,R1                                                       MOS64310
95C2   2441               2432            LIS   R4,1                                                        MOS64320
95C4   9846               2433            WHR   R4,R6               DISPLAY ADDRESS UNDER TEST              MOS64330
95C6   D100 9DF0          2434            LM    R0,MOSSAVE+32       RESTORE REGISTERS (0-F)                 MOS64340
                          2435  *                                                                           MOS64350
95CA   4056 FFFE          2436            STH   R5,-2(R6)           RESTORE BACKGROUND AT OLD TEST LOC      MOS64360
95CE   086B               2437            LDAR  R8,R11                                                      MOS64370
95D0   0B82               2438            SAR   R8,R2                                                       MOS64380
95D2   0568               2439            CLAR  R6,R8               DONE ?                                  MOS64390
95D4   4280 957A          2440            BL    T8SX                NO, BRANCH (CONTINUE)                   MOS64400
95D8   4300 83A8          2441            B     TSTEND              YES, END OF TEST(RETURN TO EXEC)        MOS64410
                          2442  *                                                                           MOS64420
                          2443  * ************************************************************************  MOS64430
                          2444  *       (R6)                                                                MOS64440
95DC   2430               2445  MOVPRG    LIS   R3,0                INITIALIZE DATA PATTERN                 MOS64450
```

TEST 8

```
95DE   9D14            2446          SSR   R1,R4          EXERCISE BIT NO.3 IN INSTR. STREAM   MOS64460
                       2447  *                                                                  MOS64470
95E0   4036 0000       2448  MOVPRG1 STH   R3,0(R6)       STORE PATRN AT LOW TEST LOC          MOS64480
95E4   4846 0000       2449          LH    R4,0(R6)       LOAD FROM LOW LOC                    MOS64490
95E8   0543            2450          CLAR  R4,R3          EQUAL ?                              MOS64500
95EA   2134            2451          BNES  MOVPRG2F       NO, BRANCH                           MOS64510
95EC   2731            2452  MOVPRG2 SIS   R3,1           YES, DECREMENT DATA PATTERN          MOS64520
95EE   2037            2453          BNZS  MOVPRG1        REPEATE TILL DONE                    MOS64530
95F0   2304            2454          BS    MOVPRG22       BRANCH                               MOS64540
                       2455  *                                                                  MOS64550
95F2   41F0 9BAE       2456  MOVPRG2F BAL  LINK,ERROR     ERROR ROUTINE                        MOS64560
95F6   2205            2457          BS    MOVPRG2        RETURN                               MOS64570
                       2458  *                                                                  MOS64580
95F8   0B4E            2459  MOVPRG22 LDAR R4,R11                                              MOS64590
95FA   0B46            2460          SAR   R4,R6                                               MOS64600
95FC   0542            2461          CLAR  R4,R2          IS TEST AREA LARGE ENOUGH ?          MOS64610
95FE   218F            2462          BLS   MOVPRG28       NO, BRANCH                           MOS64620
9600   0A62            2463          AAR   R6,R2          YES, INCREMENT TEST CELL             MOS64630
9602   4036 0000       2464  MOVPRG15 STH  R3,0(R6)       STORE PATRN AT HIGH TEST LOC         MOS64640
9606   4846 0000       2465          LH    R4,0(R6)       LOAD FROM HIGH LOC                   MOS64650
960A   0543            2466          CLAR  R4,R3          EQUAL ?                              MOS64660
960C   2135            2467          BNES  MOVPRG9F       NO, BRANCH                           MOS64670
960E   2731            2468  MOVPRG25 SIS  R3,1           YES, DECREMENT DATA PATTERN          MOS64680
9610   2037            2469          BNZS  MOVPRG15       REPEAT TILL DONE                     MOS64690
9612   0B62            2470          SAR   R6,R2          DECREMENT TEST CELL                  MOS64700
9614   2304            2471          BS    MOVPRG28       BRANCH                               MOS64710
                       2472  *                                                                  MOS64720
9616   41F0 9BAE       2473  MOVPRG9F BAL  LINK,ERROR     ERROR ROUTINE                        MOS64730
961A   2206            2474          BS    MOVPRG25       BRANCH                               MOS64740
                       2475  *                                                                  MOS64750
961C   0886            2476  MOVPRG28 LDAR R8,R6                                               MOS64760
961E   08C6            2477          LDAR  R12,R6         SAVE TEST LOCATION COUNTER           MOS64770
9620   0835            2478          LDAR  R3,R5          GET BACKGROUND DATA PATTERN          MOS64780
9622   C840 3045       2479          LDAI  R4,C'0E'                                            MOS64790
9626   4040 8A56       2480          STH   R4,ERRNO       ERRNO = C'0E'                        MOS64800
962A   086A            2481          LDAR  R6,R10                                              MOS64810
962C   C360 7FC0       2482          TAI   R6,X'7FC0'     IS LOC < X'40' ?                     MOS64820
9630   2133            2483          BNZS  MOVPRG29       NO, BRANCH                           MOS64830
9632   C860 0040       2484          LDAI  R6,X'40'       YES, FORCE LOC TO X'40'              MOS64840
9636   0568            2485  MOVPRG29 CLAR  R6,R8         IS LOW BACKGROUND AREA PRESENT ?     MOS64850
9638   238C            2486          BNLS  MOVPRG5        NO, BRANCH                           MOS64860
963A   4846 0000       2487  MOVPRG3 LH    R4,0(R6)                                            MOS64870
963E   0543            2488          CLAR  R4,R3          IS LOW BACKGROUND PATTERN OK ?       MOS64880
9640   2135            2489          BNES  MOVPRG4F       NO, BRANCH                           MOS64890
9642   2662            2490  MOVPRG4 AIS   R6,2           INCREMENT LOW LOCATION COUNTER       MOS64900
9644   0568            2491          CLAR  R6,R8          FINISHED LOW BACKGROUND TESTING ?    MOS64910
9646   2086            2492          BLS   MOVPRG3                                             MOS64920
9648   2304            2493          BS    MOVPRG5        BRANCH                               MOS64930
                       2494  *                                                                  MOS64940
964A   41F0 9BAE       2495  MOVPRG4F BAL  LINK,ERROR     ERROR ROUTINE                        MOS64950
964E   2206            2496          BS    MOVPRG4        BRANCH                               MOS64960
                       2497  *                                                                  MOS64970
9650   0868            2498  MOVPRG5 LDAR  R6,R8          RESTORE LOC COUNTER                  MOS64980
```

TEST 8

```
9652  0A62            2499           AHR   R6,R2                                          MOS64990
9654  2662            2500           AIS   R6,2                                           MOS65000
9656  056B            2501  MOVPRG6  CLAR  R6,R11          LOC > HILIM ?                 MOS65010
9658  238A            2502           BNLS  MOVPRG8          YES, DONE                     MOS65020
965A  4846 0000       2503           LH    R4,0(R6)                                       MOS65030
965E  0543            2504           CLAR  R4,R3            NO, IS HI BACKGROUND PATTERN OK ?  MOS65040
9660  2133            2505           BNES  MOVPRG7F         NO, BRANCH                    MOS65050
9662  2662            2506  MOVPRG7  AIS   R6,2             INCREMENT HI LOC              MOS65060
9664  22C7            2507           BS    MOVPRG6          CONTINUE (BRANCH)             MOS65070
                      2508  *                                                            MOS65080
9666  41F0 9BAE       2509  MOVPRG7F BAL   LINK,ERROR       ERROR ROUTINE                 MOS65090
966A  2204            2510           BS    MOVPRG7          RETURN                        MOS65100
                      2511  *                                                            MOS65110
966C  C86C 0002       2512  MOVPRG8  LDAI  R6,2(R12)        INCREMENT LOCATION COUNTER    MOS65120
9670  03CE            2513           BR    R14              RETURN                        MOS65130
      0000 9672       2514  ENDMOV8  EQU   *                (R6)+178                      MOS65140
                      2515  *                                                            MOS65150
                      2516  * ********************************************************** MOS65160
                      2517  *                                                            MOS65170
9672  C850 9D9E       2518  T8LOPRT  LDAI  R5,T8LOMSG       PRINT: "HILIM - LOLIM IS < REQUIRED"  MOS65180
9676  4300 8BEA       2519           B     HILOPRT1         BRANCH                        MOS65190
                      2520  *                                                            MOS65200
                      2521  * ********************************************************** MOS65210
                      2522  *        END   TEST 8                                        MOS65220
```

TEST 9 ECC DISTURB TEST

```
                                2524  *       TEST 9-1                MARCHING PATTERN TEST                   MOS65240
                                2525  *                                                                       MOS65250
                                2526  *       PURPOSE:                                                        MOS65260
                                2527  *             THIS TEST CHECKS THAT THREE DIFFERENT BASE PATTERNS        MOS65270
                                2528  *             CAN BE WRITTEN, COMPLEMENTED, AND MARCHED THROUGH THE     MOS65280
                                2529  *             AVAILABLE MEMORY WITHOUT ERROR.                           MOS65290
                                2530  *                                                                       MOS65300
                                2531  *       ASSUMPTIONS:                                                    MOS65310
                                2532  *             MINIMUM 64KB MOS MEMORY                                   MOS65320
                                2533  *                                                                       MOS65330
                                2534  *       DESIGN SPECIFICATIONS:                                          MOS65340
                                2535  *             1. (IN ASCENDING ORDER) WRITE AND READ THE BASE PATTERN.   MOS65350
                                2536  *             2. (IN DESCENDING ORDER) WRITE AND READ THE                MOS65360
                                2537  *                COMPLEMENT PATTERN.                                    MOS65370
                                2538  *                                                                       MOS65380
                                2539  *       OPTIONS:                                                        MOS65390
                                2540  *             SCOPE - ERROR OPTION MODE                                 MOS65400
                                2541  *                 0 - PRINT ERROR DATA AND SKIP TO NEXT TEST            MOS65410
                                2542  *                 1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST    MOS65420
                                2543  *                 2 - PRINT ERROR DATA AND CONTINUE TEST                MOS65430
                                2544  *                 3 - PRINT ERROR DATA AND HALT                         MOS65440
                                2545  *                 4 - IGNORE ERROR                                      MOS65450
                                2546  *                 5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST        MOS65460
                                2547  *                                                                       MOS65470
                                2548  *       HOW TO RUN THE TEST:                                            MOS65480
                                2549  *             1. ENTER THE "SCOPE" OPTION VIA THE CONSOLE DEVICE.        MOS65490
                                2550  *             2. ENTER "RUN" AND THE TEST WILL EXECUTE.                  MOS65500

967A  2411                      2552  TEST9   LIS   R1,1             LOAD DISPLAY ADDRESS                    MOS65520
967C  C840 893E                 2553          LDAI  R4,MM0                                                    MOS65530
9680  4C40 003E                 2554          STH   R4,X'3E'          SET NEW MM POINTER                      MOS65540
9684  24A0                      2555          LIS   R10,0                                                     MOS65550
9686  C8E0 8001                 2556          LDAI  R11,X'8001'                                               MOS65560
968A  24D0                      2557          LIS   R13,0             W/BACKGROUND = 0'S                      MOS65570
968C  41E0 96C0                 2558          BAL   R14,KHKLOC        DO A SINGLE DISTURB TEST (MIN-MAX)      MOS65580
                                2559  *                                                                       MOS65590
9690  C8A0 8001                 2560          LDAI  R10,X'8001'                                               MOS65600
9694  24B0                      2561          LIS   R11,0             W/BACKGROUND = F'S                      MOS65610
9696  41E0 96C0                 2562          BAL   R14,KHKLOC        DO A SINGLE DISTURB TEST (MIN-MAX)      MOS65620
                                2563  *                                                                       MOS65630
969A  24D2                      2564          LIS   R13,2             W/BACKGROUND = A'S                      MOS65640
969C  41E0 96C0                 2565          BAL   R14,KHKLOC        DO A SINGLE DISTURB TEST (MIN-MAX)      MOS65650
                                2566  *                                                                       MOS65660
96A0  24A0                      2567          LIS   R10,0                                                     MOS65670
96A2  C8E0 8001                 2568          LDAI  R11,X'8001'       W/BACKGROUND = 5'S                      MOS65680
96A6  41E0 96C0                 2569          BAL   R14,KHKLOC        DO A SINGLE DISTURB TEST (MIN-MAX)      MOS65690
                                2570  *                                                                       MOS65700
96AA  C8D0 0100                 2571          LDAI  R13,X'100'        W/BACKGROUND =128-0'S,128-F'S,..        MOS65710
96AE  41E0 96C0                 2572          BAL   R14,KHKLOC        DO A SINGLE DISTURB TEST (MIN-MAX)      MOS65720
                                2573  *                                                                       MOS65730
96B2  C8A0 8001                 2574          LDAI  R10,X'8001'                                               MOS65740
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TEST 9 ECC DISTURB TEST

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96B6  24B0           2575          LIS   R11,0             W/BACKGROUND =128-F'S,128-0'S, ETC   MOS65750
96B8  41E0 96C0      2576          BAL   R14,KHKLOC        DO A SINGLE DISTURB TEST (MIN-MAX)   MOS65760
                     2577  *                                                                    MOS65770
96BC  4300 9794      2578          B     TEST9B            END TEST GOTO NEXT HALF OF TEST      MOS65780
                     2579  *                                                                    MOS65790
                     2580  * ********************************************************************MOS65800
                     2581  *                                                                    MOS65810
96C0  4860 8B1A      2582  KHKLCC  LH    R6,LOLIM+6        INITIALIZE MEMORY LIMITS             MOS65820
96C4  4880 8B26      2583          LH    R8,HILIM+6                                             MOS65830
96C8  2472           2584          LIS   R7,2                                                   MOS65840
96CA  C360 7FC0      2585          TAI   R6,X'7FC0'                                             MOS65850
96CE  2133           2586          BNZS  KHKLOC1                                                MOS65860
96D0  C860 0040      2587          LDAI  R6,X'40'          FORCE LOLIM                          MOS65870
                     2588  *                                                                    MOS65880
96D4  083A           2589  KHKLOC1 LDAR  R3,R10            STORE APPROPRIATE BACKGROUND PATTERN MOS65890
96D6  C36D 0000      2590          TAI   R6,0(R13)                                              MOS65900
96DA  2332           2591          BZS   KHKLOC2                                                MOS65910
96DC  083B           2592          LDAR  R3,R11                                                 MOS65920
96DE  4036 0000      2593  KHKLOC2 STH   R3,0(R6)          IN MEMORY                            MOS65930
96E2  C160 96D4      2594  KHKLOC25 BXLE R6,KHKLOC1        FROM LOLIM TO HILIM                  MOS65940
96E6  4860 8B1A      2595          LH    R6,LOLIM+6                                             MOS65950
96EA  C360 7FC0      2596          TAI   R6,X'7FC0'                                             MOS65960
96EE  2133           2597          BNZS  KHKLOC3                                                MOS65970
96F0  C860 0040      2598          LDAI  R6,X'40'          FORCE LOLIM                          MOS65980
                     2599  *                                                                    MOS65990
96F4  C840 3033      2600  KHKLOC3 LDAI  R4,C'03'                                               MOS66000
96F8  4040 8A56      2601          STH   R4,ERRNO          ERRNO = C'03'                        MOS66010
96FC  41F0 87C2      2602          BAL   LINK,TSTBRKX      IF "BREAK" GO TO TSTEND ELSE RETURN  MOS66020
9700  083A           2603          LDAR  R3,R10            GET APPROPRIATE BACKGROUND PATTERN   MOS66030
9702  C36D 0000      2604          TAI   R6,0(R13)                                              MOS66040
9706  2332           2605          BZS   KHKLOC4                                                MOS66050
9708  083B           2606          LDAR  R3,R11                                                 MOS66060
970A  4846 0000      2607  KHKLOC4 LH    R4,0(R6)          GET DATA FROM LOC UNDER TEST         MOS66070
970E  0543           2608          CLAR  R4,R3             EQUAL ?                              MOS66080
9710  213E           2609          BNES  KHKLOC5F          NO, BRANCH                           MOS66090
9712  C730 8001      2610  KHKLOC5 XAI   R3,X'8001'        COMPLEMENT DATA PATTERN              MOS66100
9716  4036 0000      2611          STH   R3,0(R6)          STORE C.D.P. AT LOC                  MOS66110
971A  6110 8A56      2612          AHM   R1,ERRNO          ERRNO = C'04'                        MOS66120
971E  4846 0000      2613          LH    R4,0(R6)          GET DATA FROM LOC UNDER TEST         MOS66130
9722  0543           2614          CLAR  R4,R3             DATA = C.D.P. ?                      MOS66140
9724  2137           2615          BNES  KHKLOC6F          NO, BRANCH                           MOS66150
9726  C160 96F4      2616  KHKLOC6 BXLE  R6,KHKLOC3        CONTINUE UNTIL DONE(INCREMENTING)    MOS66160
972A  2307           2617          BS    KHKLOC6A          BRANCH                               MOS66170
                     2618  *---------------------------------                                   MOS66180
972C  41F0 9BAE      2619  KHKLOC5F BAL  LINK,ERROR        ERROR ROUTINE                        MOS66190
9730  220F           2620          BS    KHKLOC5           RETURN                               MOS66200
                     2621  *                                                                    MOS66210
9732  41F0 9BAE      2622  KHKLOC6F BAL  LINK,ERROR        ERROR ROUTINE                        MOS66220
9736  2208           2623          BS    KHKLOC6                                                MOS66230
                     2624  *---------------------------------                                   MOS66240
9738  4860 8B26      2625  KHKLOC6A LH   R6,HILIM+6                                            MOS66250
973C  C460 7FFE      2626          NAI   R6,X'7FFE'                                             MOS66260
9740  4880 8B1A      2627          LH    R8,LOLIM+6        ESTABLISH MEMORY LIMITS              MOS66270
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TEST 9 ECC DISTURB TEST

```
9744  2572            2628           LCS   R7,2                                    MOS66280
9746  C380 7FC0       2629           TAI   R8,X'7FC0'                              MOS66290
974A  2133            2630           BNZS  KHKLOC7                                 MOS66300
974C  C880 0040       2631           LDAI  R8,X'40'          FORCE LOLIM           MOS66310
                      2632  *                                                       MOS66320
9750  083B            2633  KHKLOC7  LDAR  R3,R11            GET C.D.P. FOR LOC UNDER TEST MOS66330
9752  C36D 0000       2634           TAI   R6,0(R13)                               MOS66340
9756  2332            2635           BZS   KHKLOC8                                 MOS66350
9758  083A            2636           LDAR  R3,R10                                  MOS66360
975A  C840 3035       2637  KHKLOC8  LDAI  R4,C'05'                               MOS66370
975E  4040 8A56       2638           STH   R4,ERRNO           ERRNO = C'05'        MOS66380
9762  41F0 87C2       2639           BAL   LINK,TSTBRKX       IF "BREAK" GO TO TSTEND ELSE RETURN MOS66390
9766  4846 0000       2640           LH    R4,0(R6)           GET DATA FROM LOC UNDER TEST MOS66400
976A  0543            2641           CLAR  R4,R3              DATA = C.D.P. ?      MOS66410
976C  213E            2642           BNES  KHKLOC9F           NO, BRANCH           MOS66420
976E  C730 8001       2643  KHKLOC9  XAI   R3,X'8001'         COMPLEMENT C.D.P. (O.D.P.) MOS66430
9772  4036 0000       2644           STH   R3,0(R6)           STORE PATTERN AT LOC MOS66440
9776  6110 8A56       2645           AHM   R1,ERRNO           ERRNO = C'06'        MOS66450
977A  4846 0000       2646           LH    R4,0(R6)           GET DATA FROM LOC UNDER TEST MOS66460
977E  0543            2647           CLAR  R4,R3              DATA = O.D.P. ?      MOS66470
9780  2137            2648           BNES  KHKLOC1F           NO, BRANCH           MOS66480
9782  C060 9750       2649  KHKLOC10 BXH   R6,KHKLOC7         CONTINUE UNTIL DONE(DECREMENTING) MOS66490
                      2650  *                                                       MOS66500
9786  030E            2651           BR    R14                RETURN               MOS66510
                      2652  *-----------------------------------                    MOS66520
9788  41F0 9BAE       2653  KHKLOC9F BAL   LINK,ERROR         ERROR ROUTINE        MOS66530
978C  220F            2654           BS    KHKLOC9            RETURN               MOS66540
                      2655  *                                                       MOS66550
978E  41F0 9BAE       2656  KHKLOC1F BAL   LINK,ERROR         ERROR ROUTINE        MOS66560
9792  2208            2657           BS    KHKLOC10           RETURN               MOS66570
                      2658  *                                                       MOS66580
                      2659  * ***********************************************************************  MOS66590
                      2660  *        END   TEST 9-1                                                    MOS66600
```

TEST 9 ECC DISTURB TEST

```
                    2662  *       TEST 9-2                DOUBLE OPERATION COLUMN DISTURB TEST   MOS66620
                    2663  *                                                                      MOS66630
                    2664  *       PURPOSE:                                                       MOS66640
                    2665  *            THIS TEST CHECKS THAT A DOUBLE OPERATION ON AN ADJACENT   MOS66650
                    2666  *            COLUMN DOES NOT DISTURB THE TEST COLUMN.                  MOS66660
                    2667  *                                                                      MOS66670
                    2668  *       ASSUMPTIONS:                                                   MOS66680
                    2669  *            MINIMUM 64 KB MOS MEMORY                                  MOS66690
                    2670  *                                                                      MOS66700
                    2671  *       DESIGN SPECIFICATIONS:                                         MOS66710
                    2672  *            1. WITH 6 DIFFERENT BACKROUND PATTERSN, A W-R-WC-         MOS66720
                    2673  *               RC-W-R-WC-RC SERIES IS EXECUTED AT EACH LOCATION.      MOS66730
                    2674  *            2. A COMPARE IS DONE UPON EACH READ OPERATION.            MOS66740
                    2675  *            3. A TEST (COMPARISON) OF THE REST OF MEMORY IS DONE      MOS66750
                    2676  *               AFTER EACH SERIES OF OPERATIONS.                       MOS66760
                    2677  *                                                                      MOS66770
                    2678  *       OPTIONS:                                                       MOS66780
                    2679  *            SCOPE - ERROR OPTION MODE                                 MOS66790
                    2680  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST            MOS66800
                    2681  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST    MOS66810
                    2682  *                2 - PRINT ERROR DATA AND CONTINUE TEST                MOS66820
                    2683  *                3 - PRINT ERROR DATA AND HALT                         MOS66830
                    2684  *                4 - IGNORE ERROR                                      MOS66840
                    2685  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST        MOS66850
                    2686  *                                                                      MOS66860
                    2687  *       HOW TO RUN THE TEST                                            MOS66870
                    2688  *            1. ENTER THE "SCOPE" OPTION VIA THE CONSOLE DEVICE.       MOS66880
                    2689  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                 MOS66890

9794  2411          2691  TEST9B  LIS   R1,1              LOAD DISPLAY ADDRESS                   MOS66910
9796  24A0          2692          LIS   R10,0                                                    MOS66920
9798  C8B0 8001     2693          LDAI  R11,X'8001'                                              MOS66930
979C  24D0          2694          LIS   R13,0             W/BACKGROUND = 0'S                     MOS66940
979E  41E0 97B4     2695          BAL   R14,KHKCOL        DO A DOUBLE OPERATION COLUMN           MOS66950
                    2696  *                               DISTURB AND COMPLEMENT TEST            MOS66960
97A2  24D2          2697          LIS   R13,2             W/BACKGROUND = 5'S                     MOS66970
97A4  41E0 97B4     2698          BAL   R14,KHKCOL        DO A DOUBLE OPERATION COLUMN           MOS66980
                    2699  *                               DISTURB AND COMPLEMENT TEST            MOS66990
97A8  C8D0 0100     2700          LDAI  R13,X'100'        W/BACKGROUND =128-0'S,128-F'S,..       MOS67000
97AC  41E0 97B4     2701          BAL   R14,KHKCOL        DO A DOUBLE OPERATION COLUMN           MOS67010
                    2702  *                               DISTURB AND COMPLEMENT TEST            MOS67020
97B0  4300 83A8     2703          B     TSTEND            END OF TEST (RETURN TO EXEC)           MOS67030
                    2704  * ********************************************************************** MOS67040
97B4  4860 8B1A     2705  KHKCOL  LH    R6,LOLIM+6        INITIALIZE MEMORY LIMITS               MOS67050
97B8  4880 8B26     2706          LH    R8,HILIM+6                                               MOS67060
97BC  2472          2707          LIS   R7,2                                                     MOS67070
97BE  C360 7FC0     2708          TAI   R6,X'7FC0'                                               MOS67080
97C2  2133          2709          BNZS  KHKCOL1                                                  MOS67090
97C4  C860 0040     2710          LDAI  R6,X'40'          FORCE LOLIM                            MOS67100
97C8  083A          2711  KHKCOL1 LDAR  R3,R10            GET PROPER BACKGROUND PATTERN          MOS67110
97CA  C36D 0000     2712          TAI   R6,0(R13)                                                MOS67120
```

TEST 9 ECC DISTURB TEST

```
97CE  2332           2713           BZS   KHKCOL2                                                  MOS67130
97D0  083B           2714           LDAR  R3,R11                                                   MOS67140
97D2  4036 0000      2715  KHKCOL2  STH   R3,0(R6)          STORE BACKGROUND PATTERN               MOS67150
97D6  C160 97C8      2716  KHKCOL25 BXLE  R6,KHKCOL1         TO ALL OF MEMORY UNDER TEST            MOS67160
97DA  4860 8B1A      2717           LH    R6,LOLIM+6                                                MOS67170
97DE  C360 7FC0      2718           TAI   R6,X'7FC0'                                                MOS67180
97E2  2133           2719           BNZS  KHKCOL3                                                   MOS67190
97E4  C860 0040      2720           LDAI  R6,X'40'           FORCE LOLIM                            MOS67200
                     2721  *                                                                        MOS67210
97E8  C840 3033      2722  KHKCOL3  LDAI  R4,C'03'                                                 MOS67220
97EC  4040 8A56      2723           STH   R4,ERRNO           ERRNO = C'03'                          MOS67230
97F0  41F0 87C2      2724           BAL   LINK,TSTBRKX       IF "BREAK" GO TO TSTEND ELSE RETURN    MOS67240
97F4  083A           2725           LDAR  R3,R10             GET ORIGINAL DATA PATTERN (O.D.P.)     MOS67250
97F6  C36D 0000      2726           TAI   R6,0(R13)                                                 MOS67260
97FA  2332           2727           BZS   KHKCOL4                                                   MOS67270
97FC  083B           2728           LDAR  R3,R11                                                    MOS67280
97FE  4846 0000      2729  KHKCOL4  LH    R4,0(R6)          GET DATA FROM LOC                      MOS67290
9802  0543           2730           CLAR  R4,R3              DATA EQUAL ?                           MOS67300
9804  4230 98E2      2731           BNE   KHKCOL5F           NO, BRANCH                             MOS67310
9808  C730 8001      2732  KHKCOL5  XAI   R3,X'8001'         COMPLEMENT DATA PATTERN (C.D.P.)       MOS67320
980C  4036 0000      2733           STH   R3,0(R6)           STORE C.D.P. AT LOC                    MOS67330
9810  6110 8A56      2734           AHM   R1,ERRNO           ERRNO = C'04'                          MOS67340
9814  4846 0000      2735           LH    R4,0(R6)          GET DATA FROM LOC                      MOS67350
9818  0543           2736           CLAR  R4,R3              DATA EQUAL ?                           MOS67360
981A  4230 98EA      2737           BNE   KHKCOL6F           NO,  BRANCH                            MOS67370
981E  C730 8001      2738  KHKCOL6  XAI   R3,X'8001'         COMPLEMENT C.D.P. (O.D.P.)             MOS67380
9822  4036 0000      2739           STH   R3,0(R6)           STORE O.D.P. AT LOC                    MOS67390
9826  C840 3039      2740           LDAI  R4,C'09'                                                  MOS67400
982A  4040 8A56      2741           STH   R4,ERRNO           ERRNO = C'09'                          MOS67410
982E  4846 0000      2742           LH    R4,0(R6)          GET DATA FROM LOC                      MOS67420
9832  0543           2743           CLAR  R4,R3              DATA EQUAL ?                           MOS67430
9834  4230 98F2      2744           BNE   KHKCOL7F           NO, BRANCH                             MOS67440
9838  C730 8001      2745  KHKCOL7  XAI   R3,X'8001'         COMPLEMENT O.D.P.(C.D.P.)              MOS67450
983C  4036 0000      2746           STH   R3,0(R6)           STORE C.D.P. AT LOC                    MOS67460
9840  C840 3041      2747           LDAI  R4,C'0A'                                                  MOS67470
9844  4040 8A56      2748           STH   R4,ERRNO           ERRNO = C'0A'                          MOS67480
9848  4846 0000      2749           LH    R4,0(R6)          GET DATA FROM LOC                      MOS67490
984C  0543           2750           CLAR  R4,R3              DATA EQUAL ?                           MOS67500
984E  4230 98FA      2751           BNE   KHKCOL8F           NO, BRANCH                             MOS67510
9852  C160 97E8      2752  KHKCOL8  BXLE  R6,KHKCOL3         CONTINUE UNTIL DONE(INCREMENTING       MOS67520
9856  4860 8B26      2753           LH    R6,HILIM+6         INITIALIZE MEMORY LIMITS               MOS67530
985A  C460 7FFE      2754           NAI   R6,X'7FFE'         (HILIM MUST BE EVEN)                   MOS67540
985E  4880 8B1A      2755           LH    R8,LOLIM+6                                                MOS67550
9862  2572           2756           LCS   R7,2                                                      MOS67560
9864  C380 7FC0      2757           TAI   R8,X'7FC0'                                                MOS67570
9868  2133           2758           BNZS  KHKCOL9                                                   MOS67580
986A  C880 0040      2759           LDAI  R8,X'40'           FORCE LOLIM                            MOS67590
                     2760  *                                                                        MOS67600
986E  083B           2761  KHKCOL9  LDAR  R3,R11             GET COMPLEMENT DATA PATTERN(C.D.P.)     MOS67610
9870  C36D 0000      2762           TAI   R6,0(R13)                                                 MOS67620
9874  2332           2763           BZS   KHKCOLA                                                   MOS67630
9876  083A           2764           LDAR  R3,R10                                                    MOS67640
9878  C840 3035      2765  KHKCOLA  LDAI  R4,C'05'                                                 MOS67650
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TEST 9 ECC DISTURB TEST

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987C  4040 8A56          2766           STH   R4,ERRNO          ERRNO = C'05'                                MOS67660
9880  41F0 87C2          2767           BAL   LINK,TSTBRKX      IF "BREAK" GO TO TSTEND ELSE RETURN          MOS67670
9884  4846 0000          2768           LH    R4,0(R6)          GET DATA FROM LOC                            MOS67680
9888  0543               2769           CLAR  R4,R3             DATA EQUAL ?                                 MOS67690
988A  4230 9902          2770           BNE   KHKCOLBF         NO, BRANCH                                   MOS67700
988E  C730 8001          2771  KHKCOLB  XAI   R3,X'8001'       COMPLEMENT C.D.P.(O.D.P.)                    MOS67710
9892  4036 0000          2772           STH   R3,0(R6)          STORE O.D.P. AT LOC                          MOS67720
9896  6110 8A56          2773           AHM   R1,ERRNO          ERRNO = C'06'                                MOS67730
989A  4846 0000          2774           LH    R4,0(R6)          GET DATA FROM LOC                            MOS67740
989E  0543               2775           CLAR  R4,R3             DATA EQUAL ?                                 MOS67750
98A0  4230 990A          2776           BNE   KHKCOLCF         NO, BRANCH                                   MOS67760
98A4  C730 8001          2777  KHKCOLC  XAI   R3,X'8001'       COMPLEMENT O.D.P. (C.D.P.)                   MOS67770
98A8  4036 0000          2778           STH   R3,0(R6)          STORE C.D.P. AT LOC                          MOS67780
98AC  C840 3042          2779           LDAI  R4,C'0B'                                                       MOS67790
98B0  4040 8A56          2780           STH   R4,ERRNO          ERRNO = C'0B'                                MOS67800
98B4  4846 0000          2781           LH    R4,0(R6)          GET DATA FROM LOC                            MOS67810
98B8  0543               2782           CLAR  R4,R3             DATA EQUAL ?                                 MOS67820
98BA  213E               2783           BNES  KHKCOLDF         NO, BRANCH                                   MOS67830
98BC  C730 8001          2784  KHKCOLD  XAI   R3,X'8001'       COMPLEMENT C.D.P.(O.D.P.)                    MOS67840
98C0  4036 0000          2785           STH   R3,0(R6)          STORE O.D.P. AT LOC                          MOS67850
98C4  6110 8A56          2786           AHM   R1,ERRNO          ERRNO = C'0C'                                MOS67860
98C8  4846 0000          2787           LH    R4,0(R6)          GET DATA FROM LOC                            MOS67870
98CC  0543               2788           CLAR  R4,R3             DATA EQUAL ?                                 MOS67880
98CE  2137               2789           BNES  KHKCOLEF         NO, BRANCH                                   MOS67890
98D0  C060 986E          2790  KHKCOLE  BXH   R6,KHKCOL9        CONTINUE UNTIL DONE(DECREMENTING)            MOS67900
98D4  030E               2791           BR    R14               RETURN                                       MOS67910
                         2792  *--------------------------------                                            MOS67920
98D6  41F0 9BAE          2793  KHKCOLDF BAL   LINK,ERROR        ERROR ROUTINE                                MOS67930
98DA  220F               2794           BS    KHKCOLD           RETURN                                       MOS67940
                         2795  *                                                                            MOS67950
98DC  41F0 9BAE          2796  KHKCOLEF BAL   LINK,ERROR        ERROR ROUTINE                                MOS67960
98E0  2208               2797           BS    KHKCOLE           RETURN                                       MOS67970
                         2798  *                                                                            MOS67980
98E2  41F0 9BAE          2799  KHKCOL5F BAL   LINK,ERROR        ERROR ROUTINE                                MOS67990
98E6  4300 9808          2800           B     KHKCOL5           RETURN                                       MOS68000
                         2801  *                                                                            MOS68010
98EA  41F0 9BAE          2802  KHKCOL6F BAL   LINK,ERROR        ERROR ROUTINE                                MOS68020
98EE  4300 981E          2803           B     KHKCOL6           RETURN                                       MOS68030
                         2804  *                                                                            MOS68040
98F2  41F0 9BAE          2805  KHKCOL7F BAL   LINK,ERROR        ERROR ROUTINE                                MOS68050
98F6  4300 9838          2806           B     KHKCOL7           RETURN                                       MOS68060
                         2807  *                                                                            MOS68070
98FA  41F0 9BAE          2808  KHKCOL8F BAL   LINK,ERROR        ERROR ROUTINE                                MOS68080
98FE  4300 9852          2809           B     KHKCOL8           RETURN                                       MOS68090
                         2810  *                                                                            MOS68100
9902  41F0 9BAE          2811  KHKCOLBF BAL   LINK,ERROR        ERROR ROUTINE                                MOS68110
9906  4300 988E          2812           B     KHKCOLB           RETURN                                       MOS68120
                         2813  *                                                                            MOS68130
990A  41F0 9BAE          2814  KHKCOLCF BAL   LINK,ERROR        ERROR ROUTINE                                MOS68140
990E  4300 98A4          2815           B     KHKCOLC           RETURN                                       MOS68150
                         2816  * ********************************************************************       MOS68160
                         2817  *        END   TEST 9-2                                                      MOS68170
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                    2819  *       TEST A-1                MARCHING PATTERN TEST                   MOS68190
                    2820  *                                                                       MOS68200
                    2821  *       PURPOSE:                                                        MOS68210
                    2822  *            THIS TEST CHECKS THAT THREE DIFFERENT BASE PATTERNS         MOS68220
                    2823  *            CAN BE WRITTEN, COMPLEMENTED, AND MARCHED THROUGH THE      MOS68230
                    2824  *            AVAILABLE MEMORY WITHOUT ERROR.                            MOS68240
                    2825  *                                                                       MOS68250
                    2826  *       ASSUMPTIONS:                                                    MOS68260
                    2827  *            MINIMUM 64KB MOS MEMORY                                    MOS68270
                    2828  *                                                                       MOS68280
                    2829  *       DESIGN SPECIFICATIONS:                                          MOS68290
                    2830  *            1. (IN ASCENDING ORDER) WRITE AND READ THE BASE PATTERN.   MOS68300
                    2831  *            2. (IN DESCENDING ORDER) WRITE AND READ THE                MOS68310
                    2832  *               COMPLEMENT PATTERN.                                     MOS68320
                    2833  *                                                                       MOS68330
                    2834  *       OPTIONS:                                                        MOS68340
                    2835  *            SCOPE - ERROR OPTION MODE                                  MOS68350
                    2836  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST             MOS68360
                    2837  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST     MOS68370
                    2838  *                2 - PRINT ERROR DATA AND CONTINUE TEST                 MOS68380
                    2839  *                3 - PRINT ERROR DATA AND HALT                          MOS68390
                    2840  *                4 - IGNORE ERROR                                       MOS68400
                    2841  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST         MOS68410
                    2842  *                                                                       MOS68420
                    2843  *       HOW TO RUN THE TEST:                                            MOS68430
                    2844  *            1. ENTER THE "SCOPE" OPTION VIA THE CONSOLE DEVICE.        MOS68440
                    2845  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                  MOS68450

9912  2411          2847  TESTA   LIS   R1,1             LOAD DISPLAY ADDRESS                    MOS68470
9914  C840 893E     2848          LDAI  R4,MM0                                                  MOS68480
9918  4040 003E     2849          STH   R4,X'3E'          SET NEW MM POINTER                    MOS68490
991C  24A0          2850          LIS   R10,0                                                   MOS68500
991E  24B1          2851          LIS   R11,1                                                   MOS68510
9920  24D0          2852          LIS   R13,0             W/BACKGROUND = 0'S                    MOS68520
9922  41E0 9950     2853          BAL   R14,CLKLOC        DO A SINGLE DISTURB TEST (MIN-MAX)    MOS68530
                    2854  *                                                                       MOS68540
9926  24A1          2855          LIS   R10,1                                                   MOS68550
9928  24E0          2856          LIS   R11,0             W/BACKGROUND = F'S                    MOS68560
992A  41E0 9950     2857          BAL   R14,CLKLOC        DO A SINGLE DISTURB TEST (MIN-MAX)    MOS68570
                    2858  *                                                                       MOS68580
992E  24D2          2859          LIS   R13,2             W/BACKGROUND = A'S                    MOS68590
9930  41E0 9950     2860          BAL   R14,CLKLOC        DO A SINGLE DISTURB TEST (MIN-MAX)    MOS68600
                    2861  *                                                                       MOS68610
9934  24A0          2862          LIS   R10,0                                                   MOS68620
9936  24B1          2863          LIS   R11,1             W/BACKGROUND = 5'S                    MOS68630
9938  41E0 9950     2864          BAL   R14,CLKLOC        DO A SINGLE DISTURB TEST (MIN-MAX)    MOS68640
                    2865  *                                                                       MOS68650
993C  C8D0 0100     2866          LDAI  R13,X'100'        W/BACKGROUND =128-0'S,128-F'S,..      MOS68660
9940  41E0 9950     2867          BAL   R14,CLKLOC        DO A SINGLE DISTURB TEST (MIN-MAX)    MOS68670
                    2868  *                                                                       MOS68680
9944  24A1          2869          LIS   R10,1                                                   MOS68690
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TEST A PARITY DISTURB TEST

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9946  24P0           2870          LIS   R11,0              W/BACKGROUND =128-F'S,128-0'S, ETC    MOS68700
9948  41E0 9950      2871          BAL   R14,CLKLOC          DO A SINGLE DISTURB TEST (MIN-MAX)    MOS68710
                     2872  *                                                                      MOS68720
994C  4300 9A24      2873          B     TESTAB             END OF TEST (GOTO NEXT TEST SECTION)  MOS68730
                     2874  *                                                                      MOS68740
                     2875  * ********************************************************************  MOS68750
                     2876  *                                                                      MOS68760
9950  4860 8B1A      2877  CLKLOC  LH    R6,LOLIM+6         INITIALIZE MEMORY LIMITS              MOS68770
9954  4880 8B26      2878          LH    R8,HILIM+6                                               MOS68780
9958  2472           2879          LIS   R7,2                                                     MOS68790
995A  C360 7FC0      2880          TAI   R6,X'7FC0'                                               MOS68800
995E  2133           2881          BNZS  CLKLOC1                                                  MOS68810
9960  C860 0040      2882          LDAI  R6,X'40'           FORCE LOLIM                           MOS68820
                     2883  *                                                                      MOS68830
9964  083A           2884  CLKLOC1 LDAR  R3,R10             STORE APPROPRIATE BACKGROUND PATTERN  MOS68840
9966  C36D 0000      2885          TAI   R6,0(R13)                                                MOS68850
996A  2332           2886          BZS   CLKLOC2                                                  MOS68860
996C  083B           2887          LDAR  R3,R11                                                   MOS68870
996E  4036 0000      2888  CLKLOC2 STH   R3,0(R6)           IN MEMORY                             MOS68880
9972  C160 9964      2889  CLKLOC25 BXLE R6,CLKLOC1         FROM LOLIM TO HILIM                   MOS68890
9976  4860 8B1A      2890          LH    R6,LOLIM+6                                               MOS68900
997A  C360 7FC0      2891          TAI   R6,X'7FC0'                                               MOS68910
997E  2133           2892          BNZS  CLKLOC3                                                  MOS68920
9980  C860 0040      2893          LDAI  R6,X'40'           FORCE LOLIM                           MOS68930
                     2894  *                                                                      MOS68940
9984  C840 3033      2895  CLKLOC3 LDAI  R4,C'03'                                                 MOS68950
9988  4040 8A56      2896          STH   R4,ERRNO           ERRNO = C'03'                         MOS68960
998C  41F0 87C2      2897          BAL   LINK,TSTBRKX       IF "BREAK" GO TO TSTEND ELSE RETURN   MOS68970
9990  083A           2898          LDAR  R3,R10             GET APPROPRIATE BACKGROUND PATTERN    MOS68980
9992  C36D 0000      2899          TAI   R6,0(R13)                                                MOS68990
9996  2332           2900          BZS   CLKLOC4                                                  MOS69000
9998  083B           2901          LDAR  R3,R11                                                   MOS69010
999A  4846 0000      2902  CLKLOC4 LH    R4,0(R6)           GET DATA FROM LOC UNDER TEST          MOS69020
999E  0543           2903          CLAR  R4,R3              EQUAL ?                               MOS69030
99A0  213E           2904          BNES  CLKLOC5F           NO, BRANCH                            MOS69040
99A2  C730 0001      2905  CLKLOC5 XAI   R3,1               COMPLEMENT DATA PATTERN               MOS69050
99A5  4036 0000      2906          STH   R3,0(R6)           STORE C.D.P. AT LOC                   MOS69060
99AA  6110 8A56      2907          AHM   R1,ERRNO           ERRNO = C'04'                         MOS69070
99AE  4846 0000      2908          LH    R4,0(R6)           GET DATA FROM LOC UNDER TEST          MOS69080
99B2  0543           2909          CLAR  R4,R3              DATA = C.D.P. ?                       MOS69090
99B4  2137           2910          BNES  CLKLOC6F           NO, BRANCH                            MOS69100
99B6  C160 9984      2911  CLKLOC6 BXLE  R6,CLKLOC3         CONTINUE UNTIL DONE(INCREMENTING)     MOS69110
99BA  23C7           2912          BS    CLKLOC6A           BRANCH                                MOS69120
                     2913  *---------------------------------                                    MOS69130
99BC  41F0 9BAE      2914  CLKLOC5F BAL  LINK,ERROR         ERROR ROUTINE                         MOS69140
99C0  220F           2915          BS    CLKLOC5            RETURN                                MOS69150
                     2916  *                                                                      MOS69160
99C2  41F0 9BAE      2917  CLKLOC6F BAL  LINK,ERROR         ERROR ROUTINE                         MOS69170
99C6  22C8           2918          BS    CLKLOC6                                                  MOS69180
                     2919  *---------------------------------                                    MOS69190
99C8  4860 8B26      2920  CLKLOC6A LH   R6,HILIM+6                                              MOS69200
99CC  C460 7FFE      2921          NAI   R6,X'7FFE'                                               MOS69210
99D0  4880 8B1A      2922          LH    R8,LOLIM+6         ESTABLISH MEMORY LIMITS               MOS69220
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TEST A PARITY DISTURB TEST

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99D4  2572           2923           LCS   R7,2                                          MOS69230
99D6  C380 7FC0      2924           TAI   R8,X'7FC0'                                    MOS69240
99DA  2133           2925           BNZS  CLKLOC7                                       MOS69250
99DC  C880 0040      2926           LDAI  R8,X'40'          FORCE LOLIM                 MOS69260
                     2927  *                                                            MOS69270
99E0  083B           2928  CLKLOC7  LDAR  R3,R11            GET C.D.P. FOR LOC UNDER TEST MOS69280
99E2  C36D 0000      2929           TAI   R6,0(R13)                                     MOS69290
99E6  2332           2930           BZS   CLKLOC8                                       MOS69300
99E8  083A           2931           LDAR  R3,R10                                        MOS69310
99EA  C840 3035      2932  CLKLOC8  LDAI  R4,C'05'                                      MOS69320
99EE  4040 8A56      2933           STH   R4,ERRNO            ERRNO = C'05'             MOS69330
99F2  41F0 87C2      2934           BAL   LINK,TSTBRKX        IF "BREAK" GO TO TSTEND ELSE RETURN MOS69340
99F6  4846 0000      2935           LH    R4,0(R6)            GET DATA FROM LOC UNDER TEST MOS69350
99FA  0543           2936           CLAR  R4,R3               DATA = C.D.P. ?           MOS69360
99FC  213E           2937           BNES  CLKLOC9F            NO, BRANCH                MOS69370
99FE  C730 0001      2938  CLKLOC9  XAI   R3,1               COMPLEMENT C.D.P. (O.D.P.) MOS69380
9A02  4036 0000      2939           STH   R3,0(R6)            STORE PATTERN AT LOC      MOS69390
9A06  6110 8A56      2940           AHM   R1,ERRNO            ERRNO = C'05'             MOS69400
9A0A  4846 0000      2941           LH    R4,0(R6)            GET DATA FROM LOC UNDER TEST MOS69410
9A0E  0543           2942           CLAR  R4,R3               DATA = O.D.P. ?           MOS69420
9A10  2137           2943           BNES  CLKLOC1F            NO, BRANCH                MOS69430
9A12  C060 99E0      2944  CLKLOC10 BXH   R6,CLKLOC7          CONTINUE UNTIL DONE(DECREMENTING) MOS69440
                     2945  *                                                            MOS69450
9A16  03CE           2946           BR    R14                 RETURN                    MOS69460
                     2947  *---------------------------------                          MOS69470
9A18  41E0 9BAE      2948  CLKLOC9F BAL   LINK,ERROR          ERROR ROUTINE             MOS69480
9A1C  220F           2949           BS    CLKLOC9             RETURN                    MOS69490
                     2950  *                                                            MOS69500
9A1E  41E0 9BAE      2951  CLKLOC1F BAL   LINK,ERROR          ERROR ROUTINE             MOS69510
9A22  2208           2952           BS    CLKLOC10            RETURN                    MOS69520
                     2953  *                                                            MOS69530
                     2954  * ************************************************************ MOS69540
                     2955  *        END   TEST A-1                                       MOS69550
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TEST A PARITY DISTURB TEST

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                                2957  *       TEST A-2                DOUBLE OPERATION COLUMN DISTURB TEST    MOS69570
                                2958  *                                                                       MOS69580
                                2959  *       PURPOSE:                                                        MOS69590
                                2960  *            THIS TEST CHECKS THAT A DOUBLE OPERATION ON AN ADJACENT    MOS69600
                                2961  *            COLUMN DOES NOT DISTURB THE TEST COLUMN.                  MOS69610
                                2962  *                                                                       MOS69620
                                2963  *       ASSUMPTIONS:                                                    MOS69630
                                2964  *            MINIMUM 64 KB MOS MEMORY                                  MOS69640
                                2965  *                                                                       MOS69650
                                2966  *       DESIGN SPECIFICATIONS:                                          MOS69660
                                2967  *            1. WITH 6 DIFFERENT BACKROUND PATTERSN, A W-R-WC-          MOS69670
                                2968  *               RC-W-R-WC-RC SERIES IS EXECUTED AT EACH LOCATION.       MOS69680
                                2969  *            2. A COMPARE IS DONE UPON EACH READ OPERATION.             MOS69690
                                2970  *            3. A TEST (COMPARISON) OF THE REST OF MEMORY IS DONE       MOS69700
                                2971  *               AFTER EACH SERIES OF OPERATIONS.                        MOS69710
                                2972  *                                                                       MOS69720
                                2973  *       OPTIONS:                                                        MOS69730
                                2974  *            SCOPE - ERROR OPTION MODE                                  MOS69740
                                2975  *                0 - PRINT ERROR DATA AND SKIP TO NEXT TEST             MOS69750
                                2976  *                1 - PRINT BAD CHIP NUMBER(S) AND SKIP TO NEXT TEST     MOS69760
                                2977  *                2 - PRINT ERROR DATA AND CONTINUE TEST                 MOS69770
                                2978  *                3 - PRINT ERROR DATA AND HALT                          MOS69780
                                2979  *                4 - IGNORE ERROR                                       MOS69790
                                2980  *                5 - PRINT BAD CHIP NUMBER(S) AND CONTINUE TEST         MOS69800
                                2981  *                                                                       MOS69810
                                2982  *       HOW TO RUN THE TEST                                             MOS69820
                                2983  *            1. ENTER THE "SCOPE" OPTION VIA THE CONSOLE DEVICE.        MOS69830
                                2984  *            2. ENTER "RUN" AND THE TEST WILL EXECUTE.                  MOS69840

9A24  2411          2986  TESTAB  LIS   R1,1              LOAD DISPLAY ADDRESS                    MOS69860
9A26  24A0          2987          LIS   R10,0                                                     MOS69870
9A28  24B1          2988          LIS   R11,1                                                     MOS69880
9A2A  24D0          2989          LIS   R13,0             W/BACKGROUND = 0'S                      MOS69890
9A2C  41E0 9A42     2990          BAL   R14,CLKCOL        DO A DOUBLE OPERATION COLUMN            MOS69900
                    2991  *                               DISTURB AND COMPLEMENT TEST             MOS69910
9A30  24D2          2992          LIS   R13,2             W/BACKGROUND = 5'S                      MOS69920
9A32  41E0 9A42     2993          BAL   R14,CLKCOL        DO A DOUBLE OPERATION COLUMN            MOS69930
                    2994  *                               DISTURB AND COMPLEMENT TEST             MOS69940
9A36  C8D0 0100     2995          LDAI  R13,X'100'        W/BACKGROUND =128-0'S,128-F'S,..        MOS69950
9A3A  41E0 9A42     2996          BAL   R14,CLKCOL        DO A DOUBLE OPERATION COLUMN            MOS69960
                    2997  *                               DISTURB AND COMPLEMENT TEST             MOS69970
9A3E  43C0 83A8     2998          B     TSTEND            END OF TEST (RETURN TO EXEC)            MOS69980
                    2999  * ************************************************************************* MOS69990
9A42  4860 8B1A     3000  CLKCOL  LH    R6,LOLIM+6        INITIALIZE MEMORY LIMITS                MOS70000
9A46  4880 8B26     3001          LH    R8,HILIM+6                                                MOS70010
9A4A  2472          3002          LIS   R7,2                                                      MOS70020
9A4C  C360 7FC0     3003          TAI   R6,X'7FC0'                                                MOS70030
9A50  2133          3004          BNZS  CLKCOL1                                                   MOS70040
9A52  C860 0040     3005          LDAI  R6,X'40'          FORCE LOLIM                             MOS70050
9A56  083A          3006  CLKCOL1 LDAR  R3,R10            GET PROPER BACKGROUND PATTERN           MOS70060
9A58  C36D 0000     3007          TAI   R6,0(R13)                                                 MOS70070
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TEST A PARITY DISTURB TEST

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9A5C  2332           3008            BZS   CLKCOL2                                    MOS70080
9A5E  083B           3009            LDAR  R3,R11                                     MOS70090
9A60  4036 0000      3010  CLKCOL2   STH   R3,0(R6)      STORE BACKGROUND PATTERN     MOS70100
9A64  C160 9A56      3011  CLKCOL25  BXLE  R6,CLKCOL1     TO ALL OF MEMORY UNDER TEST  MOS70110
9A68  4860 8B1A      3012            LH    R6,LOLIM+6                                 MOS70120
9A6C  C360 7FC0      3013            TAI   R6,X'7FC0'                                 MOS70130
9A70  2133           3014            BNZS  CLKCOL3                                    MOS70140
9A72  C860 0040      3015            LDAI  R6,X'40'     FORCE LOLIM                  MOS70150
                     3016  *                                                          MOS70160
9A76  C840 3033      3017  CLKCOL3   LDAI  R4,C'03'                                   MOS70170
9A7A  4040 8A56      3018            STH   R4,ERRNO     ERRNO = C'03'                MOS70180
9A7E  41F0 87C2      3019            BAL   LINK,TSTBRKX IF "BREAK" GO TO TSTEND ELSE RETURN MOS70190
9A82  083A           3020            LDAR  R3,R10       GET ORIGINAL DATA PATTERN (O.D.P.) MOS70200
9A84  C36D 0000      3021            TAI   R6,0(R13)                                  MOS70210
9A88  2332           3022            BZS   CLKCOL4                                    MOS70220
9A8A  083B           3023            LDAR  R3,R11                                     MOS70230
9A8C  4846 0000      3024  CLKCOL4   LH    R4,0(R6)     GET DATA FROM LOC            MOS70240
9A90  0543           3025            CLAR  R4,R3        DATA EQUAL ?                 MOS70250
9A92  4230 9B70      3026            BNE   CLKCOL5F    NO, BRANCH                   MOS70260
9A96  C730 0001      3027  CLKCOL5   XAI   R3,1         COMPLEMENT DATA PATTERN (C.D.P.) MOS70270
9A9A  4036 0000      3028            STH   R3,0(R6)     STORE C.D.P. AT LOC          MOS70280
9A9E  6110 8A56      3029            AHM   R1,ERRNO     ERRNO = C'04'                MOS70290
9AA2  4846 0000      3030            LH    R4,0(R6)     GET DATA FROM LOC            MOS70300
9AA6  0543           3031            CLAR  R4,R3        DATA EQUAL ?                 MOS70310
9AA8  4230 9B78      3032            BNE   CLKCOL6F     NO,  BRANCH                  MOS70320
9AAC  C730 0001      3033  CLKCOL6   XAI   R3,1         COMPLEMENT C.D.P. (O.D.P.)   MOS70330
9AB0  4036 0000      3034            STH   R3,0(R6)     STORE O.D.P. AT LOC          MOS70340
9AB4  C840 3039      3035            LDAI  R4,C'09'                                   MOS70350
9AB8  4040 8A56      3036            STH   R4,ERRNO     ERRNO = C'09'                MOS70360
9ABC  4846 0000      3037            LH    R4,0(R6)     GET DATA FROM LOC            MOS70370
9AC0  0543           3038            CLAR  R4,R3        DATA EQUAL ?                 MOS70380
9AC2  4230 9B80      3039            BNE   CLKCOL7F     NO, BRANCH                   MOS70390
9AC6  C730 0001      3040  CLKCOL7   XAI   R3,1         COMPLEMENT O.D.P.(C.D.P.)    MOS70400
9ACA  4036 0000      3041            STH   R3,0(R6)     STORE C.D.P. AT LOC          MOS70410
9ACE  C840 3041      3042            LDAI  R4,C'0A'                                   MOS70420
9AD2  4040 8A56      3043            STH   R4,ERRNO     ERRNO = C'0A'                MOS70430
9AD6  4846 0000      3044            LH    R4,0(R6)     GET DATA FROM LOC            MOS70440
9ADA  0543           3045            CLAR  R4,R3        DATA EQUAL ?                 MOS70450
9ADC  4230 9B88      3046            BNE   CLKCOL8F     NO, BRANCH                   MOS70460
9AE0  C160 9A76      3047  CLKCOL8   BXLE  R6,CLKCOL3    CONTINUE UNTIL DONE(INCREMENTING MOS70470
9AE4  4860 8B26      3048            LH    R6,HILIM+6   INITIALIZE MEMORY LIMITS     MOS70480
9AE8  C460 FFFE      3049            NAI   R6,-2         (HILIM MUST BE EVEN)         MOS70490
9AEC  4880 8B1A      3050            LH    R8,LCLIM+6                                 MOS70500
9AF0  2572           3051            LCS   R7,2                                       MOS70510
9AF2  C380 7FC0      3052            TAI   R8,X'7FC0'                                 MOS70520
9AF6  2133           3053            BNZS  CLKCOL9                                    MOS70530
9AF8  C880 0040      3054            LDAI  R8,X'40'     FORCE LOLIM                  MOS70540
                     3055  *                                                          MOS70550
9AFC  083B           3056  CLKCOL9   LDAR  R3,R11       GET COMPLEMENT DATA PATTERN(C.D.P.) MOS70560
9AFE  C36D 0000      3057            TAI   R6,0(R13)                                  MOS70570
9B02  2332           3058            BZS   CLKCOLA                                    MOS70580
9B04  083A           3059            LDAR  R3,R10                                     MOS70590
9B06  C840 3035      3060  CLKCOLA   LDAI  R4,C'05'                                   MOS70600
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TEST A PARITY DISTURB TEST

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9B0A  4040 8A56          3061           STH   R4,ERRNO          ERRNO = C'05'                                  MOS70610
9B0E  41F0 87C2          3062           BAL   LINK,TSTBRKX      IF "BREAK" GO TO TSTEND ELSE RETURN            MOS70620
9B12  4846 0000          3063           LH    R4,0(R6)          GET DATA FROM LOC                              MOS70630
9B16  0543               3064           CLAR  R4,R3             DATA EQUAL ?                                   MOS70640
9B18  4230 9B90          3065           BNE   CLKCOLBF          NO, BRANCH                                     MOS70650
9B1C  C730 0001          3066 CLKCOLB   XAI   R3,1              COMPLEMENT C.D.P.(O.D.P.)                      MOS70660
9B20  4036 0000          3067           STH   R3,0(R6)          STORE C.D.P. AT LOC                            MOS70670
9B24  6110 8A56          3068           AHM   R1,ERRNO          ERRNO = C'06'                                  MOS70680
9B28  4846 0000          3069           LH    R4,0(R6)          GET DATA FROM LOC                              MOS70690
9B2C  0543               3070           CLAR  R4,R3             DATA EQUAL ?                                   MOS70700
9B2E  4230 9B98          3071           BNE   CLKCOLCF          NO, BRANCH                                     MOS70710
9B32  C730 0001          3072 CLKCOLC   XAI   R3,1              COMPLEMENT O.D.P. (C.D.P.)                     MOS70720
9B36  4036 0000          3073           STH   R3,0(R6)          STORE C.D.P. AT LOC                            MOS70730
9B3A  C840 3042          3074           LDAI  R4,C'0B'                                                       MOS70740
9B3E  4040 8A56          3075           STH   R4,ERRNO          ERRNO = C'0B'                                  MOS70750
9B42  4846 0000          3076           LH    R4,0(R6)          GET DATA FROM LOC                              MOS70760
9B46  0543               3077           CLAR  R4,R3             DATA EQUAL ?                                   MOS70770
9B48  213E               3078           BNES  CLKCOLDF          NO, BRANCH                                     MOS70780
9B4A  C730 0001          3079 CLKCOLD   XAI   R3,1              COMPLEMENT C.D.P.(O.D.P.)                      MOS70790
9B4E  4036 0000          3080           STH   R3,0(R6)          STORE C.D.P. AT LOC                            MOS70800
9B52  6110 8A56          3081           AHM   R1,ERRNO          ERRNO = C'0C'                                  MOS70810
9B56  4846 0000          3082           LH    R4,0(R6)          GET DATA FROM LOC                              MOS70820
9B5A  0543               3083           CLAR  R4,R3             DATA EQUAL ?                                   MOS70830
9B5C  2137               3084           BNES  CLKCOLEF          NO, BRANCH                                     MOS70840
9B5E  C060 9AFC          3085 CLKCOLE   BXH   R6,CLKCOL9         CONTINUE UNTIL DONE(DECREMENTING)              MOS70850
9B62  03CE               3086           BR    R14               RETURN                                         MOS70860
                         3087 *---------------------------------                                              MOS70870
9B64  41F0 9BAE          3088 CLKCOLDF  BAL   LINK,ERROR        ERROR ROUTINE                                  MOS70880
9B68  22CF               3089           BS    CLKCOLD           RETURN                                         MOS70890
                         3090 *                                                                               MOS70900
9B6A  41F0 9BAE          3091 CLKCOLEF  BAL   LINK,ERROR        ERROR ROUTINE                                  MOS70910
9B6E  2208               3092           BS    CLKCOLE           RETURN                                         MOS70920
                         3093 *                                                                               MOS70930
9B70  41F0 9BAE          3094 CLKCOL5F  BAL   LINK,ERROR        ERROR ROUTINE                                  MOS70940
9B74  4300 9A96          3095           B     CLKCOL5           RETURN                                         MOS70950
                         3096 *                                                                               MOS70960
9B78  41F0 9BAE          3097 CLKCOL6F  BAL   LINK,ERROR        ERROR ROUTINE                                  MOS70970
9B7C  4300 9AAC          3098           B     CLKCOL6           RETURN                                         MOS70980
                         3099 *                                                                               MOS70990
9B80  41F0 9BAE          3100 CLKCOL7F  BAL   LINK,ERROR        ERROR ROUTINE                                  MOS71000
9B84  4300 9AC6          3101           B     CLKCOL7           RETURN                                         MOS71010
                         3102 *                                                                               MOS71020
9B88  41F0 9BAE          3103 CLKCOL8F  BAL   LINK,ERROR        ERROR ROUTINE                                  MOS71030
9B8C  4300 9AE0          3104           B     CLKCOL8           RETURN                                         MOS71040
                         3105 *                                                                               MOS71050
9B90  41F0 9BAE          3106 CLKCOLBF  BAL   LINK,ERROR        ERROR ROUTINE                                  MOS71060
9B94  4300 9B1C          3107           B     CLKCOLB           RETURN                                         MOS71070
                         3108 *                                                                               MOS71080
9B98  41F0 9BAE          3109 CLKCOLCF  BAL   LINK,ERROR        ERROR ROUTINE                                  MOS71090
9B9C  4300 9B32          3110           B     CLKCOLC           RETURN                                         MOS71100
                         3111 * ************************************************************************      MOS71110
                         3112 *         END   TEST A-2                                                       MOS71120
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COMMON ERROR ROUTINE

```
9BA0  D000 9DD0  3114 PARERR  STM   R0,MOSSAVE        SAVE CALLING REGISTERS                MOS71140
9BA4  C8F0 3132  3115         LDAI  R15,C'12'                                              MOS71150
9BA8  40F0 8A56  3116         STH   R15,ERRNO          SET ERRNO = C'12'                   MOS71160
9BAC  2308       3117         BS    ERROR3             BRANCH                              MOS71170
                 3118 *                                                                    MOS71180
                 3119 *  COMMON ERROR ROUTINE          CALL:  BAL   LINK,ERROR             MOS71190
                 3120 *                                                                    MOS71200
                 3121 *   R6= LOCATION OF ERROR     R3= DATA EXPECTED     R4= DATA READ    MOS71210
                 3122 *                                                                    MOS71220
9BAE  D000 9DD0  3123 ERROR   STM   R0,MOSSAVE        SAVE CALLING REGISTERS                MOS71230
9BB2  95EE       3124         EPSR  R14,R14            GET CONCURRENT PSW                  MOS71240
9BB4  C4E0 FFF0  3125         NAI   R14,X'FFF0'        MASK OFF ALL BUT CC                 MOS71250
9BB8  C6E0 0004  3126         CAI   R14,4              ADD MEMORY MALFUNCTION CC           MOS71260
                 3127 *                                                                    MOS71270
9BBC  41F0 8502  3128 ERROR3  BAL   LINK,ERR           PRINT THE ERROR NUMBER              MOS71280
9BC0  25F1       3129         LCS   LINK,1                                                 MOS71290
9BC2  40F0 8A0E  3130         STH   LINK,NOERR         SET ERROR FLAG FOR EXEC.            MOS71300
9BC6  48F0 8AEA  3131         LH    LINK,SCOPE+6                                          MOS71310
9BCA  27F1       3132         SIS   LINK,1             IS SCOPE = 1 ?                      MOS71320
9BCC  4330 9C5A  3133         BZ    PARTNO             YES, PRINT PART NUMBER.             MOS71330
9BD0  27F3       3134         SIS   LINK,3             IS SCOPE = 4 ?                      MOS71340
9BD2  4330 9C46  3135         BZ    ERORTN2            YES, RETURN                         MOS71350
9BD6  27F1       3136         SIS   LINK,1             IS SCOPE = 5 ?                      MOS71360
9BD8  4330 9C5A  3137         BZ    PARTNO             YES, PRINT PART NO. & CONTINUE      MOS71370
9BDC  2404       3138 ERROR1  LIS   R0,4                                                   MOS71380
9BDE  0816       3139         LDAR  R1,R6                                                  MOS71390
9BE0  C820 9D1F  3140         LDAI  R2,ADRMSG+1                                            MOS71400
9BE4  41F0 85F6  3141         BAL   LINK,HEXASC        STORE LOCATION UNDER TEST           MOS71410
9BE8  0813       3142         LDAR  R1,R3                                                  MOS71420
9BEA  C820 9D2E  3143         LDAI  R2,DTAEXP                                              MOS71430
9BEE  41F0 85F6  3144         BAL   LINK,HEXASC        STORE DATA EXPECTED                 MOS71440
9BF2  0814       3145         LDAR  R1,R4                                                  MOS71450
9BF4  C820 9D3E  3146         LDAI  R2,DTARED                                              MOS71460
9BF8  41F0 85F6  3147         BAL   LINK,HEXASC        STORE DATA READ                     MOS71470
9BFC  081E       3148         LDAR  R1,R14                                                 MOS71480
9BFE  C820 9D4A  3149         LDAI  R2,DTAPSW                                              MOS71490
9C02  41F0 85F6  3150         BAL   LINK,HEXASC        STORE CONCURRENT PSW                MOS71500
9C06  2401       3151         LIS   R0,1                                                   MOS71510
9C08  9014       3152         SRHLS R1,4                                                   MOS71520
9C0A  C410 0007  3153         NAI   R1,7                                                   MOS71530
9C0E  C820 9D1E  3154         LDAI  R2,ADRMSG                                              MOS71540
9C12  41F0 85F6  3155         BAL   LINK,HEXASC                                            MOS71550
9C16  9456       3156         EXBR  R5,R6                                                  MOS71560
9C18  9805       3157         WHR   R0,R5              DISPLAY ERROR LOCATION              MOS71570
9C1A  C850 9D1A  3158 ERROR2  LDAI  R5,ERRORMSG                                           MOS71580
9C1E  4050 8A0C  3159         STH   R5,ISITERR         SET ISITERR                         MOS71590
9C22  41F0 8656  3160         BAL   LINK,PRINT         PRINT THE ERROR DATA                MOS71600
9C26  2450       3161         LIS   R5,0                                                   MOS71610
9C28  4050 8A0C  3162         STH   R5,ISITERR         RESET ISITERR                       MOS71620
                 3163 *                                                                    MOS71630
9C2C  48F0 8AEA  3164 ERORTN  LH    LINK,SCOPE+6                                          MOS71640
9C30  4330 83A8  3165         BZ    TSTEND             IF SCOPE = 0                        MOS71650
9C34  27F1       3166         SIS   LINK,1             OR SCOPE = 1,                       MOS71660
```

COMMON ERROR ROUTINE

```
9C36  4330 83A8      3167           BZ    TSTEND          GO TO NEXT TEST                          MOS71670
9C3A  27F2           3168           SIS   LINK,2          IS SCOPE = 3 ?                           MOS71680
9C3C  4330 842A      3169           BZ    ABORT1          YES, ABORT TESTING SEQUENCE              MOS71690
9C40  D1C0 9DD0      3170  ERORTN1  LM    R0,MOSSAVE      NO, RESTORE CALLING REGISTERS AND        MOS71700
9C44  030F           3171           BR    LINK            RETURN                                   MOS71710
                     3172  *                                                                       MOS71720
9C46  48F0 8A18      3173  ERORTN2  LH    LINK,TOTERR     IF SCOPE = 4                             MOS71730
9C4A  26F1           3174           AIS   LINK,1          INDEX THE ERROR COUNTER                  MOS71740
9C4C  40F0 8A18      3175           STH   LINK,TOTERR                                              MOS71750
9C50  C5F0 7FFF      3176           CLAI  LINK,X'7FFF'    TOTERR = MAXIMUM ?                       MOS71760
9C54  203A           3177           BNES  ERORTN1         NO, RETURN                               MOS71770
9C56  43C0 8494      3178           B     HALT9           YES, WAIT FOR PRINTOUT                   MOS71780


9C5A  C8E0 2041      3180  PARTNO   LDAI  R5,C' A'        LOAD AND                                 MOS71800
9C5E  D2E0 9D14      3181           STB   R5,CHIPNO       STORE DRIVE & CHIP ROW NUMBER            MOS71810
9C62  C8E0 2030      3182           LDAI  R5,C' 0'                                                 MOS71820
9C66  D2E0 9D15      3183           STB   R5,CHIPNO+1                                              MOS71830
9C6A  0734           3184           XAR   R3,R4           DETERMINE BIT(S) THAT FAILED             MOS71840
9C6C  2410           3185           LIS   R1,0            INITIALIZE CHIP NUMBER                   MOS71850
9C6E  C530 FFFF      3186           CLAI  R3,-1           DID ALL BITS FAIL ?                      MOS71860
9C72  2137           3187           BNES  CO3             NO, BRANCH                               MOS71870
9C74  C840 4646      3188           LDAI  R4,C'FF'                                                 MOS71880
9C78  4040 9D16      3189           STH   R4,CHIPNO+2     YES, STORE 8KB ROW IDENTIFIER            MOS71890
9C7C  2430           3190           LIS   R3,0                                                     MOS71900
9C7E  23CC           3191           BS    CO5             CONTINUE                                 MOS71910
9C80  0A33           3192  CO3      AAR   R3,R3          DECIPHER FAILING BIT NUMBER(S)           MOS71920
                     3193  *                             (00-09,10-16)   (SLHLS  R3,1)   ****     MOS71930
9C82  2185           3194           BCS   CO4                                                      MOS71940
9C84  2611           3195           AIS   R1,1                                                     MOS71950
9C86  C510 0010      3196           CLAI  R1,16           CHIP NUMBER = 16 ?                       MOS71960
9C8A  2085           3197           BLS   CO3             NO, BRANCH                               MOS71970
9C8C  2402           3198  CO4      LIS   R0,2                                                     MOS71980
9C8E  C820 9D16      3199           LDAI  R2,CHIPNO+2     CONVERT TO DECIMAL AND                   MOS71990
9C92  41F0 861E      3200           BAL   LINK,DECASC     STORE IN ERROR MESSAGE                   MOS72000
9C96  C8E0 9CFA      3201  CO5      LDAI  R5,CHIPMSG                                               MOS72010
9C9A  40E0 8A0C      3202           STH   R5,ISITERR      SET ISITERR                              MOS72020
9C9E  41F0 8656      3203           BAL   LINK,PRINT      PRINT SUSPECTED CHIP NUMBER              MOS72030
9CA2  2450           3204           LIS   R5,0                                                     MOS72040
9CA4  40E0 8A0C      3205           STH   R5,ISITERR      RESET ISITERR                            MOS72050
9CA8  0833           3206           LDAR  R3,R3           HAVE ALL SUSPECT CHIPS BEEN PRINTED?     MOS72060
9CAA  4230 9C80      3207           BNZ   CO3             NO, BRANCH                               MOS72070
9CAE  D1C0 9DD0      3208           LM    R0,MOSSAVE      YES, RESTORE REGISTERS AND               MOS72080
9CB2  4300 9BDC      3209           B     ERROR1          GO PRINT ERROR DATA                      MOS72090
                     3210  *                                                                       MOS72100
                     3211  * ************************************************************************ MOS72110
                     3212  *        END   COMMON ERROR ROUTINE                                      MOS72120
```

CHKSUM FILE

```
                                3214  *                                                                    MOS72140
                                3215  *        TEST MESSAGES                                               MOS72150
                                3216  *                                                                    MOS72160
9CB6   4153 5349 474E 4544      3217  ASMEMMSG DC    C'ASSIGNED MEMORY ',X'0D0A'                          MOS72170
9CBE   204D 454D 4F52 5920
9CC6   0D0A
9CC8   4C4F 4C49 4D20 3E20      3218  HILOMSG  DC    C'LOLIM > HILIM IS ILLEGAL',X'0D0A'                  MOS72180
9CD0   4849 4C49 4D20 4953
9CD8   2049 4C4C 4547 414C
9CE0   0D0A
9CE2   494C 4C45 4741 4C20      3219  TSTREJ   DC    C'ILLEGAL TEST SEQUENCE ',X'0D0A'                    MOS72190
9CEA   5345 5154 2053 4551
9CF2   5545 4E43 4520
9CF8   0D0A
9CFA   5355 5350 4543 5445      3220  CHIPMSG  DC    C'SUSPECTED BAD CHIP NUMBER '                        MOS72200
9D02   4420 4241 4420 4348
9D0A   4950 204E 554D 4245
9D12   5220
9D14   4130 2A2A                3221  CHIPNO   DC    C'A0**',X'0D0A'                                      MOS72210
9D18   0D0A
9D1A   4C4F 4320                3222  ERRORMSG DC    C'LOC '                                              MOS72220
                                3223  *                                                                    MOS72230
9D1E   2A2A 2A2A 2A20 2044      3224  ADRMSG   DC    C'*****  DATA EXP '                                  MOS72240
9D26   4154 4120 4558 5020
9D2E   2A2A 2A2A 2020 4441      3225  DTAEXP   DC    C'****  DATA READ '                                  MOS72250
9D36   5441 2052 4541 4420
9D3E   2A2A 2A2A 2020 5053      3226  DTARED   DC    C'****  PSW = '                                      MOS72260
9D46   5720 3D20
9D4A   2A2A 2A2A                3227  DTAPSW   DC    C'****',X'0D0A'                                      MOS72270
9D4E   0D0A
9D50   4D45 4D4F 5259 2055      3228  T6MSG    DC    C'MEMORY UNDER GALPAT TEST',X'0D0A'                  MOS72280
9D58   4E44 4552 2047 414C
9D60   5041 5420 5445 5354
9D68   0D0A
9D6A   3030 3030 302D 3037      3229  LOMSG    DC    C'00000-07FFF ',X'0D0A'                              MOS72290
9D72   4646 4620
9D76   0D0A
       0000 9D70                3230  HIMSG    EQU   LOMSG+6                                               MOS72300
                                3231  *                                                                    MOS72310
9D78   504F 5745 5220 444F      3232  T7MSG    DC    C'POWER DOWN PROCESSOR FOR 30 SECONDS ',X'0D0A'      MOS72320
9D80   574E 2050 524F 4345
9D88   5353 4F52 2046 4F52
9D90   2033 3020 5345 434F
9D98   4E44 5320
9D9C   0D0A
9D9E   4849 4C49 4D20 2D20      3233  T8LOMSG  DC    C'HILIM - LOLIM IS < REQUIRED ',X'0D0A'              MOS72330
9DA6   4C4F 4C49 4D20 4953
9DAE   203C 2052 4551 5549
9DB6   5245 4420
9DBA   0D0A
                                3234  * ********************************************************************** MOS72340
                                3235  *        END   TEST MESSAGE FILE                                     MOS72350
       0000 9DBB                3236  LNZB     EQU   *-1                                                   MOS72360
```

CHKSUM FILE

```
                        3238  *                                                                    MOS72380
                        3239  *        TEST PROGRAM STORAGE AREA                                   MOS72390
                        3240  *                                                                    MOS72400
                        3241  * ********************************************************************MOS72410
                        3242  *                                                                    MOS72420
9DBC                    3243  OPTBUF   DS    6                 OPTION INPUT BUFFER               MOS72430
9DC2                    3244  VLOLIM   DS    2                 VIRTUAL LOW LIMIT                 MOS72440
9DC4                    3245  VHILIM   DS    2                 VIRTUAL HIGH LIMIT                MOS72450
                        3246  *                                                                    MOS72460
                        3247  * ********************************************************************MOS72470
                        3248  *                                                                    MOS72480
9DC8                    3249          ALIGN 8                                                      MOS72490
                        3250  *                                                                    MOS72500
9DC8                    3251  PSWSAVE  DS    8                 PPF REGISTER SAVE AREA            MOS72510
9DD0                    3252  MOSSAVE  DS    64                S16MMT REGISTER SAVE AREA         MOS72520
9E10                    3253  ERRSAVE  DS    32                REG STORAGE FOR ERROR ROUTINES    MOS72530
9E30                    3254  MMSAVE   DS    32                T7 MM REGISTER SAVE AREA          MOS72540
9E50                    3255  RSAVE    DS    160               REGISTER SAVE AREA                MOS72550
9EF0                    3256          DB    *                                                    MOS72560
                        3257  * ********************************************************************MOS72570
                        3258  *        END   TEST PROGRAM 06-214F02R00 PART 2 SECTION 2      ***   MOS72580
```

CHKSUM/M17 PUNCHER

```
9EF0  2400           3260  SCHKSUM  LIS   R0,0              PUNCH M17 TAPE WITH CHECKSUM          MOS72600
9EF2  9510           3261        EPSR  R1,R0               SELECT REG. SET 0 & CLEAR PSW         MOS72610
                     3262  *                                                                       MOS72620
9EF4  C810 8000      3263        LDAI  R1,ORIGIN1          LOAD START ADDRESS                    MOS72630
9EF8  2421           3264        LIS   R2,1                LOAD INCREMENT VALUE                  MOS72640
9EFA  C830 9DBB      3265        LDAI  R3,LNZB             LOAD FINAL ADDRESS                    MOS72650
9EFE  2440           3266        LIS   R4,0                INITIALIZE CHKSUM BYTE                MOS72660
                     3267  *                                                                       MOS72670
9F00  D351 0000      3268  SGEN     LB    R5,0(R1)                                               MOS72680
9F04  0745           3269        XAR   R4,R5               CALCULATE CHKSUM BYTE                 MOS72690
9F06  C110 9F00      3270        BXLE  R1,SGEN                                                    MOS72700
9F0A  D240 0099      3271        STB   R4,MN+3             CHECKSUM BYTE TO BOOT LOADER          MOS72710
                     3272  *                                                                       MOS72720
9F0E  C810 0080      3273  STAPE    LDAI  R1,X'0080'                                             MOS72730
9F12  9E21           3274        OCR   R2,R1               DISPLAY IN NORMAL MODE                MOS72740
9F14  9444           3275        EXBR  R4,R4                                                      MOS72750
9F16  9824           3276        WHR   R2,R4               DISPLAY CHKSUM BYTE (TO D1)           MOS72760
9F18  9411           3277        EXBR  R1,R1                                                      MOS72770
9F1A  95C1           3278        EPSR  R0,R1               HALT PROCESSOR                        MOS72780
                     3279  *                                                                       MOS72790
                     3280  *---------------------------------                                     MOS72800
                     3281  *                                                                       MOS72810
9F1C  D360 007A      3282  SPUNCH   LB    R6,X'7A'          GET BOUTDV (PUNCH) ADDRESS.           MOS72820
9F20  DE60 007B      3283        OC    R6,X'7B'            START TAPE PUNCH                      MOS72830
9F24  9D60           3284        SSR   R6,R0                                                      MOS72840
9F26  2081           3285        BTBS  8,1                                                        MOS72850
9F28  41F0 9F6A      3286        BAL   R15,STAPL           PUNCH LEADER                          MOS72860
9F2C  9411           3287        EXBR  R1,R1               (R1) = X'0080'                        MOS72870
9F2E  C830 00CF      3288        LDAI  R3,X'CF'                                                   MOS72880
                     3289  *                                                                       MOS72890
9F32  DA61 0000      3290  SPNCH1   WD    R6,0(R1)          PUNCH BOOT LOADER                     MOS72900
9F36  9D60           3291        SSR   R6,R0                                                      MOS72910
9F38  2081           3292        BTBS  8,1                                                        MOS72920
9F3A  C110 9F32      3293        BXLE  R1,SPNCH1                                                  MOS72930
9F3E  41F0 9F70      3294        BAL   R15,STAPL1          PUNCH ONE-FOLD GAP.                   MOS72940
                     3295  *                                                                       MOS72950
9F42  D340 0099      3296        LB    R4,MN+3             GET CHECKSUM BYTE                     MOS72960
9F46  C810 8000      3297        LDAI  R1,ORIGIN1          (NORMALLY X'A00')                     MOS72970
9F4A  C830 9DBB      3298        LDAI  R3,LNZB                                                    MOS72980
                     3299  *                                                                       MOS72990
9F4E  D351 0000      3300  SPNCH2   LB    R5,0(R1)          PUNCH PROGRAM                         MOS73000
9F52  0745           3301        XAR   R4,R5                                                      MOS73010
9F54  9A65           3302        WDR   R6,R5                                                      MOS73020
9F56  9401           3303        EXBR  R0,R1                                                      MOS73030
9F58  9820           3304        WHR   R2,R0               DATA ADDRESS TO DISPLAY.              MOS73040
9F5A  9D60           3305        SSR   R6,R0                                                      MOS73050
9F5C  2081           3306        BTBS  8,1                                                        MOS73060
9F5E  C110 9F4E      3307        BXLE  R1,SPNCH2                                                  MOS73070
9F62  41F0 9F6A      3308        BAL   R15,STAPL           PUNCH TRAILER.                        MOS73080
9F66  4300 9F0E      3309        B     STAPE               DISPLAY CHECKSUM, HALT PROCESSOR.     MOS73090
```

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                        3311  * SCHKSUM/M17 PUNCHER (CONTINUED)                                    MOS73110
                        3312  *                                                                    MOS73120
                        3313  *                                                                    MOS73130
9F6A   C800 0100        3314  STAPL    LDAI  R0,256            TO PUNCH BLANK LEADER             MOS73140
9F6E   2303             3315           BS    STAPLP                                               MOS73150
                        3316  *                                                                    MOS73160
9F70   C800 0080        3317  STAPL1   LDAI  R0,128            TO PUNCH 1-FOLD GAP               MOS73170
                        3318  *                                                                    MOS73180
9F74   2701             3319  STAPLP   SIS   R0,1                                                 MOS73190
9F76   032F             3320           BNPR  R15                RETURN                            MOS73200
9F78   2430             3321           LIS   R3,0                                                 MOS73210
9F7A   9A63             3322           WDR   R6,R3              PUNCH BLANK FRAME                 MOS73220
9F7C   9D68             3323           SSR   R6,R8                                                MOS73230
9F7E   2081             3324           BTBS  8,1                                                  MOS73240
9F80   2206             3325           BS    STAPLP             CONTINUE.                         MOS73250
                        3326  *                                                                    MOS73260
                        3327  * ********************************************************************MOS73270
9F82                    3328           END                                                        MOS73280
```

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

START OPTIONS: T=16,CROSS,ERLST,

NO CAL ERRORS
NO CAL WARNINGS
2 PASSES

```
CHKCOL    0000 8F14    1688   1691   1694   1698*
CHKCOL1   0000 8F28    1702   1704*  1709
CHKCOL2   0000 8F32    1706   1708*
CHKCOL25  0000 8F36    1709*
CHKCOL3   0000 8F48    1712   1715*  1745
CHKCOL4   0000 8F5E    1720   1722*
CHKCOL5   0000 8F68    1725*  1793
CHKCOL5F  0000 9042    1724   1792*
CHKCOL6   0000 8F7E    1731*  1796
CHKCOL6F  0000 904A    1730   1795*
CHKCOL7   0000 8F98    1738*  1799
CHKCOL7F  0000 9052    1737   1798*
CHKCOL8   0000 8FB2    1745*  1802
CHKCOL8F  0000 905A    1744   1801*
CHKCOL9   0000 8FCE    1751   1754*  1783
CHKCOLA   0000 8FD8    1756   1758*
CHKCOLB   0000 8FEE    1764*  1805
CHKCOLBF  0000 9062    1763   1804*
CHKCOLC   0000 9004    1770*  1808
CHKCOLCF  0000 906A    1769   1807*
CHKCOLD   0000 901C    1777*  1787
CHKCOLDF  0000 9036    1776   1786*
CHKCOLE   0000 9030    1783*  1790
CHKCOLEF  0000 903C    1782   1789*
CHKLOC    0000 8D58    1448   1452   1455   1459   1462   1466   1472*
CHKLOC1   0000 8D62    1476*
CHKLOC10  0000 8E22    1531   1541*  1549
CHKLOC1F  0000 8E2E    1540   1548*
CHKLOC2   0000 8D76    1481   1483*
CHKLOC25  0000 8D7A    1484*
CHKLOC3   0000 8D82    1487*
CHKLOC4   0000 8DA2    1495   1497*
CHKLOC5   0000 8DAA    1500*  1510
CHKLOC5F  0000 8DC4    1499   1509*
CHKLOC6   0000 8DBE    1506*  1513
CHKLOC6A  0000 8DD0    1507   1515*
CHKLOC6F  0000 8DCA    1505   1512*
CHKLOC7   0000 8DE8    1520   1523*  1541
CHKLOC8   0000 8DF2    1525   1527*
CHKLOC9   0000 8E0E    1535*  1546
CHKLOC9F  0000 8E28    1534   1545*
CKBG60    0000 9324    2146*
CKBG61    0000 933A    2153*  2160
CKBG62    0000 9344    2155   2157*
CKBG63    0000 934C    2160*  2164
CKBG64    0000 9352    2159   2163*
CKBG65    0000 9358    2161   2166*
CLIF2ND   0000 89FC    1110*
CLIFADR   0000 8014     139*
CLIFRD    0000 89F0    1101*
CLKCOL    0000 9A42    2990   2993   2996   3000*
CLKCOL1   0000 9A56    3004   3006*  3011
CLKCOL2   0000 9A60    3008   3010*
CLKCOL25  0000 9A64    3011*
CLKCOL3   0000 9A76    3014   3017*  3047
```

```
CLKCOL4    0000 9A8C      3022   3024*
CLKCOL5    0000 9A96      3027*  3095
CLKCOL5F   0000 9B70      3026   3094*
CLKCOL6    0000 9AAC      3033*  3098
CLKCOL6F   0000 9B78      3032   3097*
CLKCOL7    0000 9AC6      3040*  3101
CLKCOL7F   0000 9B80      3039   3100*
CLKCOL8    0000 9AE0      3047*  3104
CLKCOL8F   0000 9B88      3046   3103*
CLKCOL9    0000 9AFC      3053   3056*  3085
CLKCOLA    0000 9B06      3058   3060*
CLKCOLB    0000 9B1C      3066*  3107
CLKCOLBF   0000 9B90      3065   3106*
CLKCOLC    0000 9B32      3072*  3110
CLKCOLCF   0000 9B98      3071   3109*
CLKCOLD    0000 9B4A      3079*  3089
CLKCOLDF   0000 9B64      3078   3088*
CLKCOLE    0000 9B5E      3085*  3092
CLKCOLEF   0000 9B6A      3084   3091*
CLKLOC     0000 9950      2853   2857   2860   2864   2867   2871   2877*
CLKLOC1    0000 9964      2881   2884*  2889
CLKLOC10   0000 9A12      2944*  2952
CLKLOC1F   0000 9A1E      2943   2951*
CLKLOC2    0000 996E      2886   2888*
CLKLOC25   0000 9972      2889*
CLKLOC3    0000 9984      2892   2895*  2911
CLKLOC4    0000 999A      2900   2902*
CLKLOC5    0000 99A2      2905*  2915
CLKLOC5F   0000 99BC      2904   2914*
CLKLOC6    0000 99B6      2911*  2918
CLKLOC6A   0000 99C8      2912   2920*
CLKLOC6F   0000 99C2      2910   2917*
CLKLOC7    0000 99E0      2925   2928*  2944
CLKLOC8    0000 99EA      2930   2932*
CLKLOC9    0000 99FE      2938*  2949
CLKLOC9F   0000 9A18      2937   2948*
CO3        0000 9C80      3187   3192*  3197   3207
CO4        0000 9C8C      3194   3198*
CO5        0000 9C96      3191   3201*
COMM       0000 8904      1005*  1022
COMM1      0000 890C      1007*  1080
COMRET     0000 8A22       610    617   1136*
CON        0000 8B46      1175   1190*
CON2ND     0000 89F8       177    186    187   1062   1106*  1107   1108   2273
CONADR     0000 89EA       183    862    891    961   1096*
CONENRD    0000 89F9      1108*
CONRD      0000 89EC       184    185    197    859    962   1063   1097*  1098   2274
CONRQ2S    0000 8A04       171    189    190    967   1115*
CONSOLE    0000 8B08      1175*
CONTIN     0000 8ACC       512    919   1170*
CONWRT     0000 89ED       976   1098*  1099
COUNT      0000 8A1C       469    484    486   1132*
CRLF       0000 86DE       204    212    287    329    355    408    425    565    797*   871
CRT2ND     0000 89FA      1109*
CRTRD      0000 89EE      1100*
```

```
HILOPRT1  0000 8BEA   1245  1249*  1256  2519
HIMSG     0000 9D70   1319  1323   2039  3230*
II        0000 8922    990  1016*
II32      0000 893A   1022*
ILTSPRT   0000 8BE0   1201  1244*
IMPTOP    0000 0000R
INCR      0000 800F    132*  584
INCRRC    0000 92F0   2096  2098   2122*
INCRTC    0000 9300   2125  2130*
INCRTC1   0000 930C   2133  2135*
INCRTC2   0000 9310   2094  2136*
INCRXO    0000 9320   2139  2144*
INIT      0000 8B4C    426  1195*
INIT1     0000 8BB8   1216  1218   1220  1222  1228*
INIT2     0000 8BC0   1231* 1232
INIT3     0000 8BCA   1234* 1240
INIT4     0000 8BDA   1238  1240*
INIT6     0000 8B66   1199  1203*
INITRET   0000 831C    428*
IO        0000 8010    137*  160   161   169   170   176   182   343   423   841   898   938   953
                       975  1054  1059  1061  1066  1071  1072  1076  2265  2270  2272  2277  2282
                      2283  2286
IO.OK1    0000 8042    164   166*
IO.OK2    0000 8048    167   169*
IO.OK3    0000 8066    174   179*
IO.OK4    0000 809E    194   197*
IOSAVE    0000 800A    129*  281   424   781   804   839   936   956   973
ISITERR   0000 8A0C    226   429   527   530   567   602   615   771   872   876  1010  1124*  1249
                      2237  2240  3159  3162  3202  3205
KBREAD    0000 889C    851   961*
KBXIT     0000 88B6    966   968*
KEEP10    0000 84A0    563*  768
KEEP101   0000 84C6    574*  576
KEEP2     0000 82FE    414*  417
KEEP3     0000 8342    441*  515   554
KEEP4     0000 834C    447*  497   553
KEEP41    0000 8350    448*  454
KEEP42    0000 8358    451*
KEEP43    0000 835E    453*
KEEP5     0000 8362    452   455*
KEEP6     0000 8396    470*  490
KEEP7     0000 83CE    489   491*  1328
KEEP71    0000 83DC    492   495*
KEEP9     0000 8464    508   541*
KEEP91    0000 8472    546*  624
KEEP92    0000 849A    510   533   536   561*
KHKCOL    0000 97B4   2695  2698  2701  2705*
KHKCOL1   0000 97C8   2709  2711*  2716
KHKCOL2   0000 97D2   2713  2715*
KHKCOL25  0000 97D6   2716*
KHKCOL3   0000 97E8   2719  2722*  2752
KHKCOL4   0000 97FE   2727  2729*
KHKCOL5   0000 9808   2732* 2800
KHKCOL5F  0000 98E2   2731  2799*
KHKCOL6   0000 981E   2738* 2803
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LOAD        0000 00AC    106*   114
LOCMSG      0000 8A7E   1157*
LOLIM       0000 8B14   1181*  1204  1311  1360  1373  1383  1396  1472  1485  1517  1585  1597  1617
                        1629  1698  1710  1748  1849  1865  1873  1881  2212  2301  2371  2388  2582
                        2595  2627  2705  2717  2755  2877  2890  2922  3000  3012  3050
LOMSG       0000 9D6A   1316  1322  1326  2035  2043  3229*  3230
LOOK1       0000 814E    255*   262
LOOK2       0000 8152    257*   266
LOOK3       0000 8162    260    263*
LOOK4       0000 828A    271    362*
LOOK5       0000 82A6    373    376*
LOOKUP      0000 814A    243    245   254*
LOOP        0000 8AC0    488   1169*
LOPRTN1     0000 91A8   1962*
LOPRTN2     0000 91B4   1965*
LOPRTN3     0000 91C2   1969*
LOPRTN4     0000 91D0   1973*
LOPRTN5     0000 91D6   1975*
LPADR       0000 8016    140*
LPWRT       0000 89F2   1102*
LST2ND      0000 89F8   1077  1107*  2287
LSTWRT      0000 89ED   1078  1099*  2288
MAXTST      0000 8C2E    394  1265*
MICROBUS    0000 801A    142*   857
MM          0000 895A    210   480   501   520   992  1016  1027  1036*
MM0         0000 893E   1026*  1443  1588  2292  2408  2553  2848
MM1         0000 8960   1032  1034  1038*
MM16        0000 8982   1047*  1048
MM32        0000 8970   1042*
MMCOM       0000 898C   1054*
MMCOM1      0000 89B0   1058  1066*
MMCOM1A     0000 89BE   1068  1071*
MMCOM2      0000 89D8   1070  1074  1080*
MMCOMA      0000 899A   1056  1059*
MMSAVE      0000 9E30   2231  3254*
MM          0000 0096     98*  3271  3296
MOSSAVE     0000 9DD0   1895  1906  1912  1952  2146  2166  2393  2407  2417  2434  3114  3123  3170
                        3208  3252*
MOVPRG      0000 95DC   2377  2382  2395  2397  2399  2401  2403  2405  2445*
MOVPRG1     0000 95E0   2448*  2453
MOVPRG15    0000 9602   2464*  2469
MOVPRG2     0000 95EC   2452*  2457
MOVPRG22    0000 95F8   2454  2459*
MOVPRG25    0000 960E   2468*  2474
MOVPRG28    0000 961C   2462  2471  2476*
MOVPRG29    0000 9636   2483  2485*
MOVPRG2F    0000 95F2   2451  2456*
MOVPRG3     0000 963A   2487*  2492
MOVPRG4     0000 9642   2490*  2496
MOVPRG4F    0000 964A   2489  2495*
MOVPRG5     0000 9650   2486  2493  2498*
MOVPRG6     0000 9656   2501*  2507
MOVPRG7     0000 9662   2506*  2510
MOVPRG7F    0000 9666   2505  2509*
MOVPRG8     0000 966C   2502  2512*
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MOVPRG9F  0000 9616   2467  2473*
MREADC    0000 89F6   1104*
MTESTNO   0000 8A4A    434   460   462  1149*
NEXTST    0000 8A1E    443   447   458  1133*
NOERMSG   0000 8A6A    493  1154*
NOERR     0000 8A0E    468   491   616  1125*  3130
NOMSG     0000 8AD8    532   769  1171*
NORM      0000 800E    131*  593  1213
CLOC      0000 89E2    642  1006  1045  1087*
OPSW      0000 89E0    639  1005  1044  1086*
OPT       0000 8AB4    254   289   331  1167*
OPTBUF    0000 9DBC    222   223   224   240   248   259  3243*
OPTCMD    0000 81AA    289*
OPTCMD1   0000 81AC    289*  293
OPTCMD10  0000 8234    333*  337
OPTCMD11  0000 8266    350*  354
OPTCMD12  0000 8274    345   348   355*
OPTCMD2   0000 81CE    299*  325
OPTCMD3   0000 81D4    301*  320
OPTCMD4   0000 81DA    303*
OPTCMD5   0000 81EC    305   308*
OPTCMD6   0000 81FC    310   313*
OPTCMD7   0000 8208    302   316*
OPTCMD71  0000 821A    321*
OPTCMD8   0000 8228    286   329*
OPTCMD9   0000 8232    332*  359
OPTEND    0000 8E14   1177*
OPTEND2   0000 8B14    358  1176*  1177
OPTEXX    0000 8198    275   278   282*
OPTIN     0000 80BE    210*  232   352   377   392   405   537   580  1191  1251
OPTIN1    0000 80CA    213*  360   877  1012
OPTIN2    0000 8BF6    920   922  1255*
OPTION    0000 8B2C    270   282  1185*
OPTRTN    0000 819E    285*
OPTVAL    0000 8582    276   369   397   651*
OPTVAL0   0000 8588    653*  671
OPTVAL1   0000 858A    654*  657
OPTVAL2   0000 8596    655   659*
OPTVAL3   0000 859A    661*  667
OPTVAL4   0000 85AE    665   668*
OPTVAL5   0000 85AA    663   666*
ORIGIN1   0000 8000     94   123*  3263  3297
OTC.0     0000 86FE    808*  813   822   824
OTC.1     0000 8714    811   815*
OTC.3     0000 8726    818   821*
OTC.4     0000 8744    830*  835
OTC.5     0000 875A    837*  843
OUT.SAV   0000 8A24    803   846  1137*
OUT0      0000 8770    809   828   831   833   838   845*
OUT1      0000 8774    844   846*
OUTCHR    0000 86EC    217   219   280   290   295   307   312   315   334   339   574   695   765
                       775   784   788   799   803*
OUTCHR2   0000 8734    805   814   820   826*
P1        0000 866C    747   751*
P2        0000 8692    765*  767
```

P3	0000	869E	752	769*										
P4	0000	8678	754*	758										
P5	0000	867C	755*	756										
PARERR	0000	9BA0	1033	3114*										
PARTNO	0000	9C5A	3133	3137	3180*									
PASFLG	0000	89E6	191	906	933	964	1057	1091*	2268					
PASFLG2	0000	89E8	172	1069	1092*	2280								
PASLADR	0000	8012	138*											
PAUSE	0000	8A20	807	812	819	823	826	1134*						
POUND	0000	8AFC	1174*	1893										
PRINT	0000	8656	206	466	494	528	568	632	646	745*	874	1250	1325	1327	2042
			2044	2238	3160	3203								
PRINT2	0000	86AC	770	774*	779									
PRINT3	0000	86BC	777	780*	800									
PRINT3A	0000	86CE	783	787*										
PRINT3B	0000	86D0	786	788*										
PRINT5	0000	86D4	750	772	789*									
PSW	0000	8006	127*	470	603									
PSW2	0000	8008	128*	153	213	482	503	523	611	1007	2290			
PSWMSG	0000	8A74	645	1155*	1156	1157	1158							
PSWSAVE	0000	9DC8	92	3251*										
PURETOP	0000	0000R												
QMSG	0000	8A96	873	1160*										
QUESTN	0000	87A8	220	871*										
R0	0000	0000	56*	176	177	180	201	202	203	221	222	223	224	239	240
			304	341	343	344	390	391	412	416	419	423	424	428	429
			430	431	432	441	442	443	448	449	450	451	459	467	468
			469	471	483	484	485	486	488	491	504	524	551	552	563
			564	569	577	583	584	588	592	593	598	601	602	604	605
			612	638	686	687	698	703	704	715	721	722	740	745	754
			755	769	771	790	797	804	805	807	810	815	830	836	841
			842	852	853	855	857	875	876	882	889	891	892	901	902
			910	911	916	924	925	926	932	935	941	947	953	954	955
			961	962	963	967	975	976	985	987	1007	1008	1049	1050	1314
			1851	1895	1906	1912	1919	1952	2034	2090	2091	2092	2146	2166	2167
			2168	2171	2291	2393	2407	2417	2434	3114	3123	3138	3151	3157	3170
			3198	3208	3260	3261	3278	3284	3291	3303	3304	3305	3314	3317	3319
R1	0000	0001	57*	94	106	107	109	114	153	155	160	163	165	169	180
			181	181	182	184	186	188	189	214	225	226	237	240	246
			248	249	254	256	261	268	270	362	372	376	381	413	414
			433	434	435	436	456	470	471	474	475	482	483	495	496
			503	504	509	512	514	516	517	523	524	541	543	544	545
			548	549	556	557	585	586	586	587	587	588	589	590	590
			591	591	592	611	612	620	621	622	623	639	642	707	727
			729	748	749	753	757	781	782	810	812	815	816	817	819
			821	826	829	830	832	834	839	840	840	841	842	845	892
			894	896	902	903	908	911	916	917	933	936	937	937	938
			938	939	940	940	941	942	944	946	948	954	955	956	972
			973	974	974	975	976	977	978	982	987	988	1046	1047	1059
			1060	1060	1061	1062	1066	1067	1069	1071	1073	1075	1075	1076	1077
			1078	1212	1213	1235	1315	1318	1321	1322	1323	1363	1395	1442	1502
			1537	1584	1630	1684	1727	1766	1779	1854	1896	1898	1900	1902	1904
			2032	2033	2037	2038	2045	2112	2216	2302	2379	2394	2396	2398	2400
			2402	2404	2406	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427
			2428	2429	2430	2431	2446	2552	2612	2645	2691	2734	2773	2786	2847

		2907	2940	2986	3029	3068	3081	3139	3142	3145	3148	3152	3153	3185
		3195	3196	3261	3263	3268	3270	3273	3274	3277	3277	3278	3287	3287
		3290	3293	3297	3300	3303	3307							
R10	0000 000A	66*	1029	1030	1031	1036	1036	1037	1043	1445	1450	1457	1464	1479
		1493	1526	1685	1704	1718	1757	1855	1959	1960	1966	1967	1980	2049
		2054	2061	2068	2083	2103	2113	2131	2153	2217	2224	2307	2373	2481
		2555	2560	2567	2574	2589	2603	2636	2692	2711	2725	2764	2850	2855
		2852	2869	2884	2898	2931	2987	3006	3020	3059				
R11	0000 000B	67*	1446	1451	1458	1465	1482	1496	1523	1686	1707	1721	1754	1856
		1962	1963	1969	1970	1983	2050	2055	2062	2069	2086	2100	2116	2134
		2156	2218	2225	2312	2374	2405	2406	2419	2420	2437	2459	2501	2556
		2561	2568	2575	2592	2606	2633	2693	2714	2728	2761	2851	2856	2863
		2870	2887	2901	2928	2988	3009	3023	3056					
R12	0000 000C	68*	220	238	247	258	368	371	382	399	418	658	1214	1224
		1606	1608	1613	1893	1917	1934	1973	2048	2127	2141	2219	2226	2318
		2477	2512											
R13	0000 000D	69*	1216	1218	1220	1222	1241	1447	1454	1461	1480	1494	1524	1604
		1614	1635	1644	1687	1690	1693	1705	1719	1755	1908	1975	1990	1992
		2051	2058	2065	2084	2101	2114	2132	2154	2220	2227	2324	2557	2564
		2571	2590	2604	2634	2694	2697	2700	2712	2726	2762	2852	2859	2866
		2885	2899	2929	2989	2992	2995	3007	3021	3057				
R14	0000 000E	70*	276	286	322	369	372	374	397	400	669	672	678	1005
		1020	1026	1026	1029	1040	1042	1043	1044	1195	1196	1197	1198	1200
		1203	1225	1448	1452	1455	1459	1462	1466	1543	1688	1691	1694	1784
		1871	1883	1901	1902	1955	2052	2056	2059	2063	2066	2070	2173	2241
		2249	2255	2256	2257	2257	2258	2259	2260	2265	2266	2268	2270	2271
		2271	2272	2273	2277	2278	2280	2282	2284	2286	2287	2288	2290	2291
		2296	2334	2415	2513	2558	2562	2565	2569	2572	2576	2651	2695	2698
		2701	2791	2853	2857	2860	2864	2867	2871	2946	2990	2993	2996	3086
		3124	3124	3125	3126	3148								
R15	0000 000F	72*	198	206	227	374	383	409	410	411	529	530	652	653
		654	656	660	661	695	803	921	923	1006	1021	1041	1045	3115
		3116	3286	3294	3308	3320								
R2	0000 0002	58*	90	110	116	154	156	161	166	168	170	171	175	175
		176	177	184	185	186	187	195	195	196	213	214	282	283
		288	289	291	292	298	301	301	323	331	333	335	340	357
		358	447	450	453	455	456	457	458	460	462	463	472	473
		474	557	599	603	604	610	615	616	617	618	640	643	687
		688	690	692	696	711	712	736	737	751	898	899	901	906
		910	913	913	983	1008	1016	1017	1018	1019	1027	1028	1038	1039
		1050	1054	1055	1057	1061	1062	1063	1064	1072	1073	1076	1077	1078
		1234	1235	1316	1319	1858	1863	1875	1879	1897	1898	1899	1900	1915
		1953	2035	2039	2046	2126	2140	2242	2244	2382	2395	2396	2397	2398
		2399	2400	2401	2402	2403	2404	2410	2421	2422	2423	2424	2425	2426
		2427	2428	2429	2430	2438	2461	2463	2470	2499	3140	3143	3146	3149
		3154	3199	3264	3274	3276	3304							
R3	0000 0003	59*	95	96	97	162	163	166	182	183	192	192	196	197
		198	255	259	263	265	285	298	323	332	336	401	572	575
		676	679	679	704	705	706	708	713	722	723	724	726	738
		764	766	984	990	991	1215	1217	1219	1221	1231	1237	1364	1369
		1380	1384	1393	1479	1482	1483	1493	1496	1498	1500	1501	1504	1523
		1526	1533	1535	1536	1539	1590	1595	1607	1608	1609	1611	1618	1627
		1637	1639	1641	1643	1704	1707	1708	1718	1721	1723	1725	1726	1729
		1731	1732	1736	1738	1739	1743	1754	1757	1762	1764	1765	1768	1770
		1771	1775	1777	1778	1781	1915	1926	1944	1980	1983	2083	2086	2087

			2100	2103	2104	2108	2110	2113	2116	2118	2120	2131	2134	2135	2153
			2156	2158	2307	2309	2312	2315	2318	2321	2324	2327	2445	2448	2450
			2452	2464	2466	2468	2478	2488	2504	2589	2592	2593	2603	2606	2608
			2610	2611	2614	2633	2636	2641	2643	2644	2647	2711	2714	2715	2725
			2728	2730	2732	2733	2736	2738	2739	2743	2745	2746	2750	2761	2764
			2769	2771	2772	2775	2777	2778	2782	2784	2785	2788	2884	2887	2888
			2898	2901	2903	2905	2906	2909	2928	2931	2936	2938	2939	2942	3006
			3009	3010	3020	3023	3025	3027	3028	3031	3033	3034	3038	3040	3041
			3045	3056	3059	3064	3066	3067	3070	3072	3073	3077	3079	3080	3083
			3142	3184	3186	3190	3192	3192	3206	3206	3265	3288	3298	3321	3322
R4	0000	0004	60*	99	100	101	103	111	113	189	190	191	193	193	216
			218	228	230	231	233	235	242	244	248	274	279	289	294
			299	300	303	306	311	313	314	314	316	317	318	319	333
			338	351	353	367	370	388	402	573	654	662	664	668	670
			691	692	693	694	694	707	708	709	710	710	711	725	730
			731	733	735	735	736	760	761	762	763	774	776	780	785
			787	798	836	851	853	855	865	866	968	986	989	992	993
			994	998	1236	1237	1371	1372	1379	1380	1402	1443	1444	1490	1491
			1497	1498	1503	1504	1527	1528	1532	1533	1538	1539	1588	1589	1598
			1599	1610	1611	1640	1641	1715	1716	1722	1723	1728	1729	1733	1734
			1735	1736	1740	1741	1742	1743	1758	1759	1761	1762	1767	1768	1772
			1773	1774	1775	1780	1781	1903	1905	1913	1914	1925	1926	1943	1944
			1985	1986	1987	2105	2106	2107	2108	2117	2118	2150	2151	2157	2158
			2260	2272	2273	2274	2275	2283	2284	2286	2287	2288	2292	2293	2294
			2295	2297	2298	2308	2309	2314	2315	2320	2321	2326	2327	2408	2409
			2413	2414	2432	2433	2446	2449	2450	2459	2460	2461	2465	2466	2479
			2480	2487	2488	2503	2504	2553	2554	2600	2601	2607	2608	2613	2614
			2637	2638	2640	2641	2646	2647	2722	2723	2729	2730	2735	2736	2740
			2741	2742	2743	2747	2748	2749	2750	2765	2766	2768	2769	2774	2775
			2779	2780	2781	2782	2787	2788	2848	2849	2895	2896	2902	2903	2908
			2909	2932	2933	2935	2936	2941	2942	3017	3018	3024	3025	3030	3031
			3035	3036	3037	3038	3042	3043	3044	3045	3060	3061	3063	3064	3069
			3070	3074	3075	3076	3077	3082	3083	3145	3184	3188	3189	3266	3269
			3271	3275	3275	3276	3296	3301							
R5	0000	0005	61*	101	103	104	104	106	107	108	111	113	119	205	257
			259	296	297	309	309	321	321	324	340	394	398	465	493
			526	527	566	567	570	578	631	645	691	726	727	729	774
			778	873	1244	1247	1249	1255	1324	1326	1857	1866	1868	1918	1935
			1965	1972	1991	2041	2043	2229	2230	2231	2232	2233	2233	2234	2235
			2236	2237	2239	2240	2380	2386	2436	2478	2518	3156	3157	3158	3159
			3161	3162	3180	3181	3182	3183	3201	3202	3204	3205	3268	3269	3300
			3301	3302											
R5HEX	0000	85CC	342	571	579	686*									
R5X	0000	85DA	691*	697											
R5XA	0000	85E8	695*												
R5XB	0000	85F0	689	698*											
R6	0000	0006	62*	98	108	115	171	172	173	173	256	257	264	277	281
			330	346	347	349	376	381	398	651	659	660	666	677	680
			1228	1231	1232	1233	1234	1236	1240	1310	1311	1315	1360	1366	1368
			1369	1370	1373	1375	1377	1379	1382	1383	1390	1392	1393	1394	1396
			1398	1400	1402	1404	1472	1476	1478	1480	1483	1484	1485	1487	1489
			1494	1497	1501	1503	1506	1515	1516	1524	1530	1532	1536	1538	1541
			1585	1592	1594	1595	1596	1597	1601	1603	1609	1610	1616	1617	1624
			1626	1627	1628	1629	1632	1634	1639	1640	1646	1698	1701	1703	1705
			1708	1709	1710	1711	1713	1719	1722	1726	1728	1732	1735	1739	1742

			1745	1746	1747	1755	1761	1765	1767	1771	1774	1778	1780	1783	1849
			1851	1860	1862	1863	1864	1865	1873	1876	1878	1879	1880	1881	1889
			1891	1896	1904	1905	1907	1908	1916	1917	1919	1920	1922	1924	1925
			1928	1934	1935	1936	1938	1940	1942	1943	1946	1953	1954	1959	1960
			1962	1963	1965	1966	1967	1969	1970	1972	1974	1987	1989	1991	2076
			2080	2082	2084	2087	2088	2099	2101	2104	2107	2110	2111	2114	2117
			2120	2122	2123	2124	2130	2132	2135	2136	2137	2138	2147	2154	2157
			2160	2212	2221	2223	2224	2225	2226	2227	2228	2301	2303	2305	2308
			2313	2314	2319	2320	2325	2326	2330	2371	2373	2376	2383	2385	2386
			2387	2388	2389	2391	2394	2415	2418	2431	2433	2436	2439	2448	2449
			2460	2463	2464	2465	2470	2476	2477	2481	2482	2484	2485	2487	2490
			2491	2498	2499	2500	2501	2503	2506	2512	2582	2585	2587	2590	2593
			2594	2595	2596	2598	2604	2607	2611	2613	2616	2625	2626	2634	2640
			2644	2646	2649	2705	2708	2710	2712	2715	2716	2717	2718	2720	2726
			2729	2733	2735	2739	2742	2746	2749	2752	2753	2754	2762	2768	2772
			2774	2778	2781	2785	2787	2790	2877	2880	2882	2885	2888	2889	2890
			2891	2893	2899	2902	2906	2908	2911	2920	2921	2929	2935	2939	2941
			2944	3000	3003	3005	3007	3010	3011	3012	3013	3015	3021	3024	3028
			3030	3034	3037	3041	3044	3047	3048	3049	3057	3063	3067	3069	3073
			3076	3080	3082	3085	3139	3156	3282	3283	3284	3290	3291	3302	3305
			3322	3323											
R7	0000	0007	63*	117	118	119	395	401	404	1229	1362	1474	1518	1587	1700
			1749	1853	2078	2092	2095	2097	2111	2122	2126	2127	2149	2169	2170
			2215	2299	2375	2376	2377	2381	2584	2628	2707	2756	2879	2923	3002
			3051												
R8	0000	0008	54*	109	110	115	116	396	1230	1312	1313	1318	1361	1473	1517
			1519	1521	1586	1699	1748	1750	1752	1850	1852	1866	1868	1870	1874
			1882	1916	1918	1920	1937	1938	2077	2091	2093	2097	2099	2130	2136
			2140	2141	2148	2168	2170	2213	2214	2372	2374	2375	2410	2437	2438
			2439	2476	2485	2491	2498	2583	2627	2629	2631	2706	2755	2757	2759
			2878	2922	2924	2926	3001	3050	3052	3054	3323				
R9	0000	0009	65*	852	859	860	862	863	865	964	1852	1874	1937	2047	2123
			2124	2137	2138										
RDCHAR0	0000	810A	229	231*											
RDCHAR1	0000	811E	234	237*											
RDCHR	0000	80FC	227*	241	250										
RDCHR1	0000	812E	236	242*											
READ10	0000	8CF8	1398*												
READ11	0000	8CB6	1375*												
RET	0000	000E	71*	600	634	647	1011								
RSAVE	0000	9F50	93	686	698	703	715	721	740	745	790	797	882	889	926
			994	2294	3255*										
RTN10	0000	8D0C	1404*	1409											
RTN10F	0000	8D14	1403	1408*											
RTN11	0000	8CCC	1382*	1388											
RTN11F	0000	8CD8	1381	1387*											
RUN	0000	8238	268	1186*											
RUNIT	0000	82EA	269	408*											
SCOPE	0000	8AE4	534	1172*	3131	3164									
SELTST	0000	8A10	419	496	552	1126*									
SET.RTN	0000	8A28	972	977	1139*										
SETKB	0000	888E	179	215	525	953*									
SETUP	0000	88B8	829	972*											
SFTSET	0000	90E6	1871	1883	1889*										
SFTSET1	0000	90F0	1890	1893*	1954										

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SINK      0000 89E4   863   939   947   963  1064  1089*  2275
ST        0000 8022   154*
START     0000 8032   154   160*
START2    0000 801E   123   153*
STLOOP    0000 919C  1857  1897  1899  1901  1959*
STORE10   0000 8CDE  1385  1390*
STORE11   0000 8C98  1366*
STORE30   0000 8FA6  1619  1624*
STORE31   0000 8E4A  1592*
T1.1      0000 8CA2  1367  1369*  1370
T1.11     0000 8CC0  1376  1378*  1382
T1.2      0000 8CE8  1391  1393*  1394
T1.21     0000 8D02  1399  1401*  1404
T2.1      0000 8D6C  1477  1479*  1484
T2.2      0000 8D9C  1488  1490*  1506
T3.1      0000 8E54  1593  1595*  1596
T3.2      0000 8EB0  1625  1627*  1628
T3.3      0000 8ECA  1633  1635*  1646
T3S0      0000 8E58  1596*
T3S1      0000 8E72  1602  1604*  1616
T3S2      0000 8E7E  1607*  1615
T3S3      0000 8E8E  1613*  1622
T3S3.4    0000 8E94  1616*
T3S3.6    0000 8EB4  1628*
T3S3F     0000 8EA0  1612  1621*
T3S4      0000 8EC0  1632*
T3S5      0000 8ED6  1639*  1645
T3S6      0000 8EE2  1643*  1651
T3S6F     0000 8EF0  1642  1650*
T3S7      0000 8EE8  1646*
T5S1      0000 909A  1861  1863*  1864
T5S1.5    0000 909E  1864*
T5S2      0000 90CE  1877  1879*  1880
T5S2.5    0000 90D2  1880*
T6ER10    0000 9370  2109  2175*
T6ER11    0000 9378  2119  2178*
T6MSG     0000 9D50  2041  3228*
T6S1      0000 927E  2081  2083*  2088
T6S10     0000 92EC  2120*  2179
T6S2      0000 9288  2085  2087*
T6S2.5    0000 928C  2088*
T6S3      0000 9290  2090*
T6S4      0000 9292  2091*  2172
T6S5      0000 9294  2092*  2142
T6S6      0000 9296  2093*  2128
T6S7      0000 92B8  2102  2104*
T6S8      0000 92CE  2110*  2176
T6S9      0000 92E2  2115  2117*
T7END     0000 94EA  2246  2331  2336*
T7MM1     0000 9402  2229  2255*  2261
T7MM2     0000 9418  2255  2265*
T7MM2A    0000 9426  2267  2270*
T7MM3     0000 943C  2269  2277*
T7MM3A    0000 944A  2279  2282*
T7MMCOM   0000 9462  2281  2285  2290*
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T7MSG      0000 9D78    2236   3232*
T7OUTMSG   0000 93D2    2236*  2251
T7S1       0000 93A4    2222   2224*  2228
T7S1.5     0000 93B4    2228*
T7S2       0000 93E6    2242*  2250
T7S3       0000 93EA    2244*  2245
T7S4       0000 9484    2301*  2335
T7S5       0000 9496    2304   2307*  2330
T7S6       0000 94A4    2310   2312*
T7S7       0000 94B4    2316   2318*
T7S8       0000 94C4    2322   2324*
T7S9       0000 94D4    2328   2330*
T8LOMSG    0000 9D9E    2518   3233*
T8LOPRT    0000 9672    1867   1869   2378   2518*
T8SW       0000 9520    2384   2386*  2387
T8SW1      0000 9524    2387*
T8SW2      0000 952C    2389*
T8SW3      0000 9536    2390   2393*
T8SX       0000 957A    2412*  2440
TEMP       0000 800C     130*   300    303    313    316    318
TEST       0000 8AB4     285    362    391    404    413    451   1168*  1195   1197
TEST0      0000 8C46    1272   1310*
TEST1      0000 8C8A    1273   1360*
TEST2      0000 8D1A    1274   1442*
TEST3      0000 8E34    1275   1584*
TEST4      0000 8EF6    1276   1684*
TEST5      0000 9072    1277   1849*
TEST6      0000 91F8    1279   2032*
TEST6ALL   0000 926A    2052   2056   2059   2063   2066   2070   2076*
TEST7      0000 9380    1280   2212*
TEST8      0000 94F2    1281   2371*
TEST9      0000 967A    1283   2552*
TEST9B     0000 9794    2578   2691*
TESTA      0000 9912    1284   2847*
TESTAB     0000 9A24    2873   2986*
TESTOP     0000 82B6     363    388*
TESTS      0000 8C30     474   1272*
TITLE      0000 8BFC     205   1259*
TOTAL      0000 8A16     430    506    514    517    543    545    547    548    570   1129*
TOTERR     0000 8A18     431    506    547    578    620    622   1130*  3173   3175
TOTMSG     0000 9A5A     566   1153*
TSTBRK     0000 87D4     356    464    487    511    789    889*  2248   2333
TSTBRK1    0000 882C     907    916*   918
TSTBRK2    0000 8834     905    915    919*
TSTBRK3    0000 8848     893    895    897    909    914    924*
TSTBRK4    0000 8810     900    906*
TSTBRK5    0000 8800     901*   904
TSTBRK6    0000 87DC     886    891*
TSTBRKX    0000 87C2     882*  1378   1401   1492   1529   1605   1636   1717   1760   1894   2144   2412   2602
                        2639   2724   2767   2897   2934   3019   3062
TSTDU      0000 8858     507    561    613    746    808    827    837    932*
TSTEND     0000 83A8     480*   884   1406   1468   1648   1696   1885   2072   2337   2441   2703   2998   3165
                        3167
TSTMSG     0000 8A44     465   1148*  1149
TSTOP1     0000 82C6     389    394*
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TSTOP2	0000	82CE	397*	403								
TSTOP4	0000	82DC	402*									
TSTREJ	0000	9CE2	1244	3219*								
TTYGET	0000	88B0	966*									
UNARY	0000	85BE	400	676*								
UNARY1	0000	85C0	677*	681								
VHILIM	0000	9DC4	1870	1882	2038	2077	3245*					
VLOLIM	0000	9DC2	1907	1989	2033	2076	3244*					
WASDU	0000	8A12	202	410	432	541	564	748	751	761	845	1127*
WASDU1	0000	8A14	203	411	509	749	763	1128*				
ZERO1	0000	88DE	987*	988								