```
.TITLE  CVMJAAO MSV11-J MEMORY DIAG.
.NLIST TOC
 REM
```

IDENTIFICATION

PRODUCT CODE: AC-U135A-MC

PRODUCT NAME: CVMJAA MSV11 J MEMORY DIAGNOSTIC

PRODUCT DATE: MARCH 1985

MAINTAINER: E.S.D. METHODS

```
42
43                                  OPERATIONAL SWITCH SETTINGS
44                                  SWITCH REGISTER DEFINITIONS
45                                  *
46                                  *       SWITCH                  USE
47                                  *       -----                   --------------- --
48                                  *         15            HALT ON ERROR
49                                  *         14            LOOP ON TEST
50                                  *         13            INHIBIT ERROR TYPEOUTS
51                                  *         12            INHIBIT RELOCATION
52                                  *         11            QUICK VERIFY
53                                  *         10            BELL ON ERROR
54                                  *          9            LOOP ON ERROR
55                                  *          8            HALT PROGRAM (UNRELOCATED  RESTORE LOADERS)
56                                  *          7            DETAILED ERROR REPORTS
57                                  *          6            INHIBIT CONFIGURATION MAP
58                                  *          5            LIMIT MAX ERRORS PER BANK
59                                  *          4            FAT TERMINAL (132 COLUMNS OR BETTER)
60                                  *          3            TEST MODE   SEE DOCUMENT
61                                  *          2            TEST MODE - SEE DOCUMENT
62                                  *          1            TEST MODE   SEE DOCUMENT
63                                  *          0            DETECT SINGLE BIT ERRORS
```

TABLE OF CONTENTS

1.0 GENERAL PROGRAM INFORMATION

1.1 Program Purpose (Abstract)

a. Intended for use on all PDP-11/23/23B/73's which meet the conditions in 1.2.1.

b. This program will be used by system managers and operators to determine the correct operation of main memory and also it will be primarily used by field service and manufacturing to isolate failures to the memory and to isolate failures within the memory to the correct card.

c. The object of this software is to functionally test and verify all main memory functions as fast as possible.

d. There is the capability of testing mixed configurations (MSV11-L, and MSV11-P) on the system.

e. It has a special maintenance mode (Field Service Mode) to provide specific functional capabilities.

1.2 System Requirements

1.2.1 Hardware Requirements -

PDP-11/23/23B/44/83/84 CPU with 18/22 bit addressing and at least 64K (16 Bit Words) of Memory and Memory Management.

****** NOTE ******

1. Like memory types must be on 16K word boundaries starting at physical address 0.

2. REFERENCE KTJ11 document for proper configuration of unibus memory for 11/84

1.2.2 Software Requirements

This program is designed to run stand alone or under any of the following monitors:

XXDP+
ACT
APT

1.3 Related Documents And Standards

1. Microcomputers and Memories (EB-20912-20)
2. PDP-11/23 User's Guide
3. MSV11-J Users guide
4. MSV11-L Users Guide
5. MSV11-P Technical Manual

1.4 Diagnostic Hierarchy Prerequisites

If the program in any way misbehaves, then:

1. Try it again with Cache off (reference Section 2.4.3.1)
2. Inhibit relocation (reference section 2.4.1)
3. Try CPU Diagnostics
4. Try Memory Management Diagnostics
5. Try Cache Diagnostics (where applicable)
6. Try QBUS Map Diagnostics (where applicable)

1.5 Assumptions

This program assumes the correct operation of the CPU, Memory Management, Cache, and the QBUS Map. This program occupies (initially) Bank 0 (0 16K). The XXDP+ loaders are in bank 1.

2.0 OPERATING INSTRUCTIONS

2.1 Loading Starting Procedures

2.1.1 Quick Starting -

1. Load address 200
2. Set switch register for options (normally 0)
3. Start

NOTE

BE SURE that the peripheral page jumper (where applicable) is in place; failure to do so sends the diagnostic to Never-Never Land.

2.1.2 Stopping -

1. Set SW8, and/or
2. Type control "C" (Reference section 2.4.4.1).

2.1.3 Restarting (Preserve Configuration Table) -

1. Load address 202
2. Set switch register for options (Normally 0)
3. Start

2.1.4 Switch Register Options -

SWITCH	USE
15	HALT ON ERROR
14	LOOP ON TEST
13	INHIBIT ERROR TYPEOUTS
12	INHIBIT RELOCATION
11	QUICK VERIFY
10	BELL ON ERROR
9	LOOP ON ERROR
8	HALT PROGRAM (UNRELOCATE RESTORE LOADERS)
7	DETAILED ERROR REPORTS
6	INHIBIT CONFIGURATION MAP
5	LIMIT MAX ERRORS PER BANK
4	FAT TERMINAL (132 COLUMNS OR BETTER)
3	TEST MODE - SEE DOCUMENT
2	TEST MODE - SEE DOCUMENT
1	TEST MODE SEE DOCUMENT
0	DETECT SINGLE BIT ERRORS

2.2 Default Test Sequence

The following two lists give the test protocol for parity and ECC Memory. Tests marked with a "*" are not normally run except under ACT or APT, or through a Field Service Command (Reference Section 2.4.4.8).

2.2.1 Test Protocol For MSV11-L/P Parity Memory -

Test	Test Name	Time (sec/16K)
34	Soft Error Test	<1
6	Initial Data Test	<1
17	Holding 1's and 0's Test	<1
7	Address Bit Test	<1
1	Address Test	<1
2	Complement Address Test	<1
3	3 XOR 9 Test	1
4	Rotating 0's Test	1
5	Rotating 1's Test	1
21	Marching 1's and 0's Test	1
35	Worst Case Noise Parity Test	n/a
* 22	Refresh Test	10
* 23	Shifting Diagonal Test	10
26	Random Data Test	<1
* 24	Fast Galloping Pattern Test	20
* 31	Sob-a-long Test	3
* 32	Write Recovery Test	<1
* 33	Branch Gobble Test	35
34	Soft Error Test	<1

2.2.2 Test Protocol for MSV11-J ECC Memeory

Pattern	Pattern Name	Time (sec/16K)
5	Rotating 1's Test	1
34	Soft Error Test	<1
6	Initial Data Test	<1
44	Shifting check bits thru the CSR	5
14	Basic Double Bit Error test	<1
45	Syndromes in CSR on DBE test	<1
36	Correction code test	1
20	Syndromes in CSR on SBE test	1
37	Check ECC Disable Test	<1
41	Address to CSR on DBE test	1
42	Extended address to CSR test	<1
43	Byte write test	<1
46	Check SBE with ECC Disable test	<1
47	No CSR update on SBE with DBE test	<1
10	Byte Address Test	<1
17	Holding 1's and 0's Test	<1
7	Address Bit Test	<1
1	Address Test	<1
2	Complement Address Test	<1
4	Rotating 0's Test	1
5	Rotating 1's Test	1
21	Marching 0's and 1's Test	1
* 22	Refresh Test	10
26	Random Data Test	<1
* 24	Fast Galloping Pattern Test	20
* 31	Sob-a-long Test	3
* 32	Write Recovery Test	<1
* 33	Branch Gobble Test	35
34	Soft Error Test	<1

@ - Run only on the first Pass when under ACT or APT

At the end of each Pass the program will run cleanup Patterns #30, and #27 for all banks.

2.3 Special Environments

2.3.1 XXDP+

The first pass will be a quick verify pass if and only if it is in chain mode.

2.3.2 ACT APT Automatic Mode -

The program will not create double bit errors (DBE's) after the 1st pass.

2.3.2.1 APT Execution Times -

Here are some measured execution times for an 11/23B under APT

	1st QV Pass	2nd Pass onward
1024K MSV11-J	30 min	30 min
256K MSV11-L	20 min	20 min
128K MSV11-P	20 min	20 min

The first pass will be a quick verify pass

NOTE

Even though the first pass is a QV pass it takes longer than the subsequent non-QV passes due to the fact that it is running more patterns, some of which (patterns #24 and #33 for example) can be extrememly time consuming.

2.3.2.2 APT Environment Table

The following table gives some of the standard settings for the APT E-Table. They may be modified as noted as the user sees fit.

FIRST PASS RUN TIME:
This parameter should be set according to the amount and type of memory to be tested. The above table (APT Execution Times) gives some measured times. For any patterns deleted (through use of the Device Descriptor Words) reference section 2.2 for individual pattern times.

NOTE

The times given in section 2.2 are for 16K chunks of memory, not 128K boards!

LONGEST TEST TIME:
This parameter should be set to the execution time of the longest pattern being run. for the default case this is 35 seconds for Pattern #33.

ADDITIONAL RUN TIME:
Not Used By Program.

SOFTWARE ENVIRONMENT:
For APT auto mode this parameter should be set to a "1". For dump mode set this to a "0".

ENVIRONMENT MODE:
When this parameter is set to a "0" the program does it's own sizing. If the users sets bit #7 however, he must specify the types and amounts of memory to be tested.

SWITCH 1:
The default setting of this switch is "101". APT uses this as the switch register for the program. Reference section 2.4.1 for more information on switch settings.

SWITCH 2:
This switch, if set to any non-zero number, is used to limit the amount of passes APT will make. The program will hang after this count has been reached.

CPU OPTIONS:
Not Used By Program.

MEMORY TYPE n (n=1 to 4)
If bit #7 of ENVIRONMENT MODE is set these four words are used to log the different types of memory to be tested. If bit #7 is not set these location are not used.

MAXIMUM ADDRESS n (n=1 to 4)

These four words are used in conjuntion with the corresponding

MEMORY TYPE words to indicate the highest address that memory type occupies.

NOTE

The above two parameters do not actually have to represent an accurate configuration of memory. All the program looks for is an accurate tally of memory amount!

INTERRUPT VECTOR n (n=1 to 2)
Not Used By Program.

BUS PRIORITY n (n=1 to 2)
Not Used By Program.

BASE ADDRESS:
Not Used By Program.

DEVICE MAP:
Not Used By Program.

CONTROLLER DESCRIPTOR CODE n (n-1 to 2)
Not Used By Program.

DEVICE DESCRIPTOR CODES:
The Device Descriptor codes are used by the program to determine which patterns it will run. The default values of these words are all "1"'s, indicating that all of the patterns shown in section 2.2 are executed (save for exceptions as noted there). Each set of words controls a table in the program as follows:

DD WORDS	PROGRAM TABLE (Symbolic location)
Words 0-1	MKCSRT
Words 2-3	MKPAT
Words 4-5	MJPAT

Bit #0 set in the first word indicates that the first pattern in the table will be executed, bit #1 the second, bit #2 the third,... bit #0 of the second word indicates that the 17th entry in the table will be executed, and so on.

2.3.3 No SBE Free Banks -

If the program cannot find any SBE (Single Bit Error) free locations (in non-protected ECC memory) it will print out an error message and continue testing by-passing the ECC logic tests.

2.3.4 Mixed Parity ECC Configurations -

The program will function normally in mixed environments. The sequence of testing may seem strange due to the recursive test mode algorithm (reference sections 2.4.1.1, 2.4.1.2, 2.4.1.3).

2.4 Program Options

2.4.1 Switch Register Details -

If a hardware switch register is not available then the software switch register is in location 176. IF under APT if BIT7 is set in the E-TABLE symbolic location "$ENVM" the APT software switch register will be used (location $SWREG).

To change the software switch register contents: Type "control G". This will cause display the current value of the SWR and prompt for the octal input of the new SWR value from the terminal. This routine will ignore you (not respond to control "G") if you have a hardware switch register.

SW15 = HALT ON ERROR
(100000)

Continuing from this halt will first check for a change in the software switch register ("Control G" in the TTY input buffer) then it will continue testing.

SW14 = LOOP ON TEST
(40000)

This will cause looping on the present test or pattern (back to last scope trap). If in a pattern then the looping will be for an entire bank of 16K addresses.

SW13 = INHIBIT ERROR TYPEOUTS
(20000)

This will cause returns from the error routine without the typed messages. Other on error functions are not affected.

SW12 = INHIBIT RELOCATION
(10000)

This prevents the program from moving and consequently prevents the program from testing at least 32K of memory.

SW11 = QUICK VERIFY
(4000)

If this switch is selected approximately one 64th of the possible combinations of SBE's DBE's are tested.

Each pass complete typeout will indicate this mode by preceding the pass number with "QV'.

SW10 = BELL ON ERROR
(2000)

This causes a bell (or beep or click) on each error trap

SW9 = LOOP ON ERROR
(1000)

This will cause looping from failure point back to the last co rectly initialized area of the current test.

SW8 = HALT PROGRAM
(400)

This initiates the following sequence:

1. If program is relocated it moves back to bank zero.
2. Flush out all possible DBE's.
3. Turns off Memory Management.
4. Restore loaders.
5. Unmap the Unibus Map (if there is one).
6. Halt if under APT or ACT branch sel.

SW7 = DETAILED ERROR REPORTS
(200)

After any normal error report is typed this option causes the contents of the following registers to be typed:
R0, R1, R2, R3, R4, R5, SP, "CONTROL", "CPUERR

SW6 = INHIBIT CONFIGURATION MAP
(100)

This inhibits the printing of a map showing the memory configuration - reference section 7.3

SW5 = LIMIT MAX ERRORS PER BANK
(40)

This will limit the number of error typeouts per bank. The default is 10. DECIMAL, however this can be changed by changing location "ERRMAX" manually.

SW4 = FAT TERMINAL
(20)

This informs the program that the console terminal has a width of at least 132 columns (LA36 with wide paper).

SW3-1 = TEST MODE

Test modes determine the recursion algorithm to be used during pattern tests.

		MODE NAME	DESCRIPTION
(0)	0	BAFPAF	Banks forward, patterns forward
(2)	1	BAFPAR	Banks forward, patterns reverse
(4)	2	BAWPAF	Banks worst first, patterns forward.
(6)	3	BAWPAR	Banks worst first, patterns reverse.
(10)	4	PAFBAF	Patterns forward, banks forward
(12)	5	PAFBAW	Patterns forward, banks worst first
(14)	6	PARBAF	Patterns reverse, banks forward
(16)	7	PARBAW	Patterns reverse, banks worst first.

For more details reference section 2.4.1.1, 2.4.1.2 and 2.4.1.3.

SW0 = DETECT SINGLE BIT ERRORS (SBE's)
(1)

For manufacturing purposes this switch should always be on. For field service purposes this switch should always be off.

This switch will allow all ECC Single Bit errors to be reported by disabling error correction.

Error printouts of SBE's are not distinguishable from DBE's.

NOTE

If Double Bit Errors are found in the memory, this switch should be set to make sure that new data can be written to the DBE locations.

2.4.1.1 Test Mode Example -

Example analysis of mode 5 "PAFBAW". Assume Banks 0 1 are MSV11-J and Banks 2,3,4, 5 are MSV11-L.

```
711                     Assume also that Bank 3 is known bad by the  program  v a  the  s'zing
712                     routine or previous runs The testing sequence would be as follows:
713
714                     ;TEST MSV11-J MEMORY TYPES FIRST
715                     ;TEST KNOWN BAD MEMORY (BANK 3)
716
717                     TEST 17,     BANK 3
718                     TEST  7,     BANK 3
719                     TEST  1,     BANK 3
720                     TEST  2,     BANK 3
721                     TEST  4,     BANK 3
722                     TEST  5,     BANK 3
723                     TEST 21,     BANK 3
724                     TEST 20,     BANK 3
725                     TEST 22,     BANK 3
726                     TEST 26,     BANK 3
727
728                     ;TEST PRESUMED GOOD MEMORY (BANKS 2,4,5)
729
730                     TEST 17,     BANK 2
731                     TEST  7,     BANK 2
732                     TEST  1,     BANK 2
733                     TEST  2,     BANK 2
734                     TEST  4,     BANK 2
735                     TEST  5,     BANK 2
736                     TEST 21,     BANK 2
737                     TEST 20,     BANK 2
738                     TEST 22,     BANK 2
739                     TEST 26,     BANK 2
740                     TEST 17,     BANK 4
741                     TEST  7,     BANK 4
742                     TEST  1,     BANK 4
743                     TEST  2,     BANK 4
744                     TEST  4,     BANK 4
745                     TEST  5,     BANK 4
746                     TEST 21,     BANK 4
747                     TEST 20,     BANK 4
748                     TEST 22,     BANK 4
749                     TEST 26,     BANK 4
750                     TEST 17,     BANK 5
751                     TEST  7,     BANK 5
752                     TEST  1,     BANK 5
753                     TEST  2,     BANK 5
754                     TEST  4,     BANK 5
755                     TEST  5,     BANK 5
756                     TEST 21,     BANK 5
757                     TEST 20,     BANK 5
758                     TEST 22,     BANK 5
759                     TEST 26,     BANK 5
760
761
762
```

```
764
765                     ;RELOCATE  TEST PROGRAM SPACE (BANK 0 & 1)
766
767                     TEST  1,     BANK 0
768                     TEST  2,     BANK 0
769                     TEST  3,     BANK 0
770                     TEST  4,     BANK 0
771                     TEST  5,     BANK 0
772                     TEST 26,     BANK 0
773                     TEST  1,     BANK 1
774                     TEST  2,     BANK 1
775                     TEST  3,     BANK 1
776                     TEST  4,     BANK 1
777                     TEST  5,     BANK 1
778                     TEST 26,     BANK 1
779
780
781                                        NOTE
782
783                                  This is an example  not an actual
784                                  sequence.
785
786
787                     The test sequence was forward (the simple patterns first, complex
788                     tests last) sequence of patterns (MSV11-L = 17, 7, 1, 2, 4, 5, 21,
789                     20, 22, 26)(MSV11-J = 1, 2, 3, 4, 5, 26).
790
791                     If the bank selection is forward the banks will be tested in the
792                     following order:
793
794                          1.  ECC banks that are not protected or program space (from 0 to
795                              167).
796
797                          2.  Parity banks that are not program space (from 0 to 167).
798
799                          3.  The program now relocates tests:
800
801                          4.  ECC banks that were protected or program space (from 0 to
802                              167).
803
804                          5.  Parity banks that were program space (from 0 to 167).
805
806                     If bank selection is worst first the configuration table will be
807                     consulted and banks will be tested in the following order.
808
809                          1.  ECC banks that are known bad and are not protected or program
810                              space (from 0 to 167).
811
812                          2.  Parity banks that are known bad and are not program space
813                              (from 0 to 167).
814
815                          3.  ECC banks that are presumed good and are not protected or
```

program space (from 0 to 167).

4. Parity banks that are presumed good and are not program space (from 0 to 167).

5. The program now relocates tests:

6. ECC banks that are known bad and were protected or program space (from 0 to 167).

7. Parity banks that are known bad and were program space (from 0 to 167).

8. ECC banks that are presumed good and were protected or program space (from 0 to 167).

9. Parity banks that are presumed good and were program space (from 0 to 167).

2.4.1.2 Test Mode Details -

MODE 0 = "BAFPAF" banks forward, patterns fo ward

This is the default and simplest mode.

This mode tests each bank completely from 0 to 167 except those requiring relocation*.

While testing each bank the patterns are run with the simple ones first building to the more complex.

MODE 1 = "BAFPAR" = banks forward, patterns reverse

This mode tests each bank completely from 0 to 167 except those requiring relocation*.

While testing each bank the patterns are run with the most complex ones first, working to the simple ones.

MODE 2 = "BAWPAF" = Banks worst first, patterns forward

This mode first tests each known bad bank completely from 0 to 167 except those requiring relocation*, then presumed good banks are tested from 0 to 167 except those requiring relocation*.

While testing each bank the patterns are run with the simple ones first, building to the more complex.

MODE 3 = "BAWPAR" = Banks worst first, patterns reverse

This mode first tests each known bad bank completely

```
                        from  0 to 167 except those requiring relocation*, then
                        presumed good banks are tested from  0  to  167  except
                        those requiring relocation*.

                        While testing each bank the patterns are run  with  the
                        most complex ones first, working to the simple ones.

MODE 4      = "PAFBAF" = Patterns forward, banks forward

                        This mode tests each pattern completely with the simple
                        ones first, building to the more complex.

                        While testing each pattern the banks are run from 0  to
                        167 except those requiring relocation*.


MODE 5      = "PAFBAW" = Patterns forward, banks worst first

                        This mode tests each pattern completely with the simple
                        ones first, building to the more complex.

                        While testing each pattern first each  known  bad  bank
                        from  0  to  167  except those requiring relocation* is
                        run, then presumed good banks are run  from  0  to  167
                        except those requiring relocation*.

MODE 6      = "PARBAF" = Patterns Reverse, Banks Forward

                        This mode tests each pattern completely with  the  most
                        complex ones first, working to the simple ones.

                        While testing each pattern the banks are run from 0  to
                        167 except those requiring relocation*.

MODE 7      = "PARBAW" = Patterns Reverse, Banks Worst First

                        This mode tests each pattern completely with  the  most
                        complex ones first, working to the simple ones.

                        While testing each pattern first each  known  bad  bank
                        from  0 to 167 except those that require relocation* is
                        run, then presumed good banks are run  from  0  to  167
                        except those requiring relocation*.


                                        NOTE

                        * Relocation is  required  to  test  the
                        bank(s)  in  program  space  and also to
                        test  any   ECC   banks   protected   by
                        diagnostic  checkmode  with  the inhibit
                        mode pointer off (zero)!
```

2.4.1.3 Test Mode Applications -

1. To verify correct operation of the memory system use Mode 0 "BAFPAF".

   Advantages: Easy to understand.

   Disadvantages: In case of a failing Bank, it may take a long time to find the failure.

2. To get detailed error information on known bad Banks (found by sizing routine) use Mode 2 "BAWPAF".

   Advantages: Seeks Bad Banks. Easy to understand.

   Disadvantages: Failures other than zeros ones may take a long time to find.

3. To get good error info on any memory problem fast use Mode 4 "PAFBAF".

   Advantages: Covers all banks fast. Easy to understand.

   Disadvantages: Failures from only complex patterns may take a long time to find.

4. To find any problem fast use Mode 7 "PARBAW".

   Advantages: Covers all Banks fast.

   Disadvantages: Difficult to understand failures reported are not necessarily the most basic failure modes.

2.4.2 Software Switch register

A software switch register exists in location 174.

2.4.3 Special Memory Locations -

2.4.3.1 CACHE Constant -

The CACHE constant is located at symbolic location "CACHK" and is used to enable CACHE.

NOTE

Bit 0 in the CACHE constant has no effect since it is unconditionally set by the program whenever it tries to enable CACHE.

2.4.3.2 Configuration Table

The configuration table is located at symbolic location "CONFIG" and has the following format:

```
CONFIG:  First 16K Configuration words (2 each)
         2nd   16K Configuration words (2 each)
         ..........................
         200th 16K configuration words (2 each)
```

Configuration Words:

LOW:	BIT 0	ERRORS PRESENT
	BIT 1	MEMORY EXISTS
	BIT 2-4	RESERVED
	BIT 5	SKIP ECC LOGIC TESTS FLAG (1=SKIP)
	BIT 6	PROTECTED REGION OF AN ECC MEMORY
	BIT 7	PROTECTED (PROGRAM SPACE)
	BIT 8-11	CSR CODE
	BIT 12-15	RESERVED
MED:	BIT 0-7	NUMBER OF ERRORS
	BIT 8-10	MEMORY TYPE
	BIT 11	CSR TESTED OK
	BIT 12	RESERVED
	BIT 13	"BACKGROUND PATTERN VALID" FLAG
	BIT 14	BANK SELECTED FOR TEST BY FIELD SERVICE MODE
	BIT 15	LOADERS HOME BANK

This table is used as the source for the configuration Map (reference. section 7.3).

2.4.4 Terminal Commands

2.4.4.1 Control "C"

This command will:

1. If Switch 8 (Halt Program) in the switch register is set halt the program.
2. If Switch 8 is not set, unrelocate if program was relocated.
3. Flush out any DBE's.
4. Turn off Memory Management.
5. HALT

This command will only be recognized at the completion of the current test or pattern, or at the end of a line of an error message.

2.4.4.2 Control "K" (Kill error printout and skip pattern)

This command will allow you to stop an error printout and skip to the next pattern. This is handy, for example, when you have a whole bank full of errors, have gotten enough information, and wish to skip to the next pattern.

2.4.4.3 Control "T" (Tell me what's happening)

This command will print out the information encoded in the display register. This is mainly intended for CPU's without a hardware display register.

Example:

```
BANK = 17 TEST = 46
RELOCATED BANK= 0  PAT= 26
```

By use of Field Service Command 17 "Trace" can be set so that it will automatically type out the bank and pattern numbers as each pattern is run. (Reference section 2.4.4.8.18).

2.4.4.4 Control "S" (Stop)

This command will stop typeout (soon) and will wait for a Control "Q".

2.4.4.5 Control "Q" (Quintinue)

This command will continue typing that has been stopped by Control "S". If there has been no Control "S" typed then this command 's ignored.

2.4.4.6 Control "F" (Field Service mode)

This command will cause you to enter a mode which looks for sub commands.

When the program is looking for a sub command any number that is not a legal command will cause a mini help message to be typed. Therefore when in doubt type 99 (CR) and you will get help.

NOTE

Typing just carriage return is a default command 0.

2.4.4.7.1 Field Service Command 0 (Exit)

This command will exit Field Services Mode and return to whatever task it was in prior to typing control "F". Note typing just carriage return is a default Command 0.

2.4.4.7.2 Field Service Command 1 (Read CSR)

This command will typeout the contents of the CSR.

If there is more than one CSR on the CPU (or if the program has not determined the CSR status yet), it will Ask you "WHICH CSR(0-F)" to which you must respond with an Hexidecimal number from 0 to F. Note typing just carriage return is a default 0.

If the CSR you select causes a trap to 4 the program will type "THIS CSR DOES NOT EXIST".

NOTE

CSR references are done in accordance with section 5.0.

2.4.4.7.3 Field Service Command 2 (Load CSR)

This command will enable you to load the CSR.

If there is more than one CSR on the CPU (or if the program has not yet determined the CSR status yet) it will ask you "WHICH CSR(0-F)" to which you must respond with an Hexidecimal number from 0 to F. Note typing just carriage return is a default 0.

If the CSR you select causes a trap to 4 the program will type "THIS CSR DOES NOT EXIST".

The CSR will be read and displayed as in command 1.

The program will then ask you for the "CSR?" to which you must respond with an Octal number. Note typing just carriage return is a default 0.

The program will then load the CSR and Read it again displaying its new contents.

2.4.4.7 4 Field Service Command 3 (Examine Memory)

This command will allow you to examine any physical address and does the necessary memory management mapping for you.

The program will ask you for the "PHYSICAL ADDRESS (0-17757776)" to which you must respond with an Octal number.

If the address access causes a trap to 4 the program will type "TIMEOUT TRAP". If the address access causes a trap to 114 the program will type "PARITY ABORT".

The contents of your physical address will be typed.

2.4.4.7 5 Field Service Command 4 (Modify Memory)

This command allows you to modify any physical address and does the necessary memory management mapping for you.

The program will ask you for the "PHYSICAL ADDRESS (0-17757776)" to which you must respond with an Octal number.

If the address access causes a trap to 4 the program will type "TIMEOUT TRAP". If the address access causes a trap to 114 the program will type "PARITY ABORT".

The program will type "OLD DATA WAS" and the contents of your physical address.

The program will then type "INPUT NEW DATA" to which you must respond with an Octal number. Note typing just carriage return is a default 0.

The program will attempt to write this new data into your physical address after which it will read it again and type "DATA IS NOW" and the new contents of your physical address.

NOTE

If you can't change the data, that would indicate that you have a Double Bit Error in that double word pair.

2.4.4.7.6 Field Service Command 5 (Select Bank Test)

This command allows you to run any bank with any pattern forever.

The program will ask you "BANK(0-177)" to which you must respond with an Octal number. If the bank is not accessible. The program will type "BANK NOT ACCESSIBLE" and ask question over.

The program will then ask "TEST (0-47)" to which you must respond with an Octal number.

NOTE

Any pattern can be run including those that are not part of the APT E-TABLE defaults (reference section 6.2.1). If you select Pattern 0, the program will ask "TEST 0 DATA IS?" to which you must respond with an Octal number.

If the Bank you selected requires relocation the program will type "BANK REQUIRES RELOCATION" and exit this command. Note normally this is true for Bank 0.

The program will then arm the console keyboard for interrupts and type "TO ESCAPE TYPE ANY KEY!".

The test pattern will be entered and run until a console key is depressed to escape this loop.

2.4.4.7.7 Field Service Command 6 (Type Configuration Map)

This command types the configuration map.

This is useful after a long run (overnight) to see all the banks that are marked as bad. (Especially if your console is a video terminal).

For a detailed explanation of the map reference section 7.3.

1280
1281
1282
1283
1284
1285
1286 2.4.4.7.8 Field Service Command 7 (SOB-A-LONG TEST)
1287
1288 This command allows execution of the SOB-A-LONG Test on all
1289 non-protected Banks reference Section 6.2.2.26. Operation is
1290 identical to command 5 except that no Pattern or Bank is entered and
1291 each pass causes a Bell.
1292
1293
1294 2.4.4.7.9 Field Service Command 8 (Error Summary)
1295
1296 This command types out the number of passes and the total number of
1297 errors. If there were any errors it will type out the Banks and the
1298 number of errors per bank up to 255 DECIMAL.
1299
1300 This becomes useful after long runs (all night) on systems with a
1301 video console terminal.
1302
1303
1304
1305
1306 2.4.4.7.10 Field Service Command 9 (Refresh TEST)
1307
1308 This command allows execution of the Refresh Test on all non-protected
1309 Banks reference Section 6.2.2.19. Operation is identical to command 5
1310 except that no Pattern or Bank is entered and each pass causes a Bell.
1311
1312
1313
1314 2.4.4.7.11 Field Service Command 10 (Set Fill Count)
1315
1316 This command allows setting of the terminal fill count (necessary for
1317 LA30's, ASR33's, and VT05's). It is normally set to zero for LA36's,
1318 VT52's, VT100's, etc.
1319
1320
1321
1322
1323 2.4.4.7.12 Field Service Command 11 (Enter Kamikaze Mode)
1324
1325 This command allows you to run patterns that are normally not executed
1326 unless under APT or ACT. They are usually very time consuming and can
1327 result in failures that are fatal to the program. In effect you are
1328 trying to find a hardware failure regardless of the consequences.
1329 Note that most crashes do not wipe out the display information which
1330 's telling you what the program was doing just prior to failure.
1331 There are two ways to die here Impatience and Crashes.
1332

2.4.4.7.13 Field Service Command 12 (Exit Kamikaze Mode)

Return to the default mode of testing (undo Command 12).

2.4.4.7.14 Field Service Command 13 (Turn Cache Off)

This changes the Cache constant to bypass cache (reference section 2.4.3.1).

2.4.4.8.15 Field Service Command 14 (Turn Cache On)

This changes the Cache constant to use cache (reference section 2.4.3.1).

2.4.4.7.16 Field Service Command 15 (Test Only Selected Banks)

This command allows you to center the test effort on only those banks that you are troubleshooting. You may also test banks that require relocation and were inaccessable via command 5.

2.4.4.7.17 Field Service Command 16 (Resume Testing All Banks)

Return to the default mode of testing (undo Command 15).

2.4.4.7.18 Field Service Command 17 (Resume Testing All Banks)

Enable "Trace". After exiting field service mode, the program will type out the bank and pattern numbers as each pattern is run.

2.4.4.7.19 Field Service Command 18 (Resume Testing All Banks)

Disable "Trace". (undo Command 17).

2.5 Execution Times

2.5.1 Typical (System) -

Execution time depends on many variables; however here are some measured times on an 11/23B:

K words of MSV11-J Memory		
Normal Pass	Min	Sec
Quick Verify	Min	Sec
Kamikaze Mode	Min	Sec
Kamikaze QV	Min	Sec

K words of MSV11-L Memory		
Normal Pass	Min	Sec
Quick Verify	Min	Sec
Kamikaze Mode	Min	Sec
Kamikaze QV	Min	Sec

K words of MSV11-P Memory		
Normal Pass	Min	Sec
Quick Verify	Min	Sec
Kamikaze Mode	Min	Sec
Kamikaze QV	Min	Sec

2.5.2 Calculations (System)

Normal Pass

```
        Add         Sec per 16K BANK of MSV11-P
        Add         Sec per 16K BANK of MSV11-L
        Add         Sec per 64K BANK of MSV11-J
```

Quick Verify Pass

```
        Add         Sec per 16K BANK of MSV11 P
        Add         Sec per 16K BANK of MSV11-L
        Add         Sec per 64K BANK of MSV11-J
```

Kamikaze Mode

Add 10 min. per 128K words for approximate pass times.

2.5.3 Typical (Tests)

Test	Time	Description
MT0000	;<1 SEC	DATA PATTERN TEST
MT0001	;<1 SEC	ADDRESS TEST
MT0002	;<1 SEC	COMPLEMENT ADDRESS TEST
MT0003	; 1 SEC	3 XOR 9 WORST CASE NOISE TEST
MT0004	; 1 SEC	ROTATING ZEROS TEST
MT0005	; 1 SEC	ROTATING ONES TEST
MT0006	;<1 SEC	INITIAL DATA TEST
MT0007	;<1 SEC	ADDRESS BIT TEST
MT0010	;<1 SEC	BYTE ADDRESSING TEST
MT0014	; 1 SEC	BASIC DOUBLE BIT ERROR TEST
MT0017	;<1 SEC	HOLDING 1'S 0'S TEST
MT0020	; 1 SEC	SYNDROMES TO CSR ON SINGLE BIT ERROR TEST
MT0021	; 1 SEC	MARCHING 0'S 1'S TEST
MT0022	;10 SEC	REFRESH TEST
MT0023	;10 SEC	SHIFTING DIAGONAL TEST
MT0024	;20 SEC	FAST GALLOPING PATTERN TEST
MT0026	;<1 SEC	RANDOM DATA TEST
MT0027	; 1 SEC	UNIQUE BANK TEST
MT0030	; 1 SEC	FLUSH OUT DBE'S TEST
MT0031	; 3 SEC	SOB-A-LONG TEST
MT0032	;<1 SEC	WRITE RECOVERY TEST
MT0033	;35 SEC	BRANCH GOBBLE TEST
MT0034	;<1 SEC	SOFT ERROR TEST
MT0035	;<1 SEC	WORST CASE PARITY TEST
MT0036	; 1 SEC	CORRECTION CODE TEST
MT0037	;<1 SEC	CHECK ECC DISABLE TEST
MT0041	; 1 SEC	ADDRESS TO CSR ON DBC TEST
MT0042	;<1 SEC	EXTENDED ADDRESS TO CSR ON ERROR TEST
MT0043	;<1 SEC	WRITE BYTE TEST
MT0044	; 5 SEC	SHIFTING CHECKBITS THROUGH CSR TEST
MT0045	;<1 SEC	SYNDROME BITS TO THE CSR ON A DBE TEST
MT0046	; 1 SEC	CHECK SINGLE BIT ERRORS WITH ECC DISABLED TEST
MT0047	;<1 SEC	NO CSR UPDATE WITH EXISTING DBE TEST

3.0 ERROR INFORMATION

3.1 Error Reporting

Most errors are reported using the EMT trap and handler provided by SYSMAC.SML. Most errors will be of the "MEMORY DATA ERROR" type which will be described here. MEMORY DATA ERRORS will also cause the bank to be marked as Bad in the configuration table.

Other errors are best explained by referencing the specific typeout and if necessary the program listing.

Example 1:

MEMORY DATA ERROR

PC	BANK	VADD	PADD	GOOD	BAD	XOR	CSR	MTYP	PAT
022132	37	060006	03700006	000000	000100	000100	0	E	06
022132	37	060006	03700006	000000	000100	000100	0	E	06
022132	37	060006	03700006	000000	000100	000100	0	E	06
022132	37	060006	03700006	000000	000100	000100	0	E	06

While testing Bank 37 at virtual address 60006 (virtual addresses are always between 60000 and 157776 for mapping purposes), physical address 3700006 (that's Bank 37 physical 6 within the Bank) with Pattern 6 (Initial Data Test), the good data expected was 0 but the data actually read (BAD) was 100, the exclusive OR at Good Bad yields 100 which indicates only failing bit(s) (Bit 6). It is an MSV11-J (ECC) Memory. The CSR is located at 172000.

Example 2:

MEMORY DATA ERROR

PC	BANK	VADD	PADD	GOOD	BAD	XOR	CSR	MTYP	PAT
022132	35	060000	03500000	000000	000001	000001	0	E	06
022132	35	060002	03500002	000000	000100	000100	0	E	06
022132	35	060006	03500006	000000	000100	000100	0	E	06

While testing Bank 35, virtual address 60000, physical address 3500000 with Pattern 6 (Initial Data Test), the good data expected was 0 but the data actually read (BAD) was 1, the exclusive OR at Good Bad yields 1 which indicates only failing bit(s) (Bit 0). It is an MSV11-J (ECC) Memory and the CSR is located at 172000.

NOTE

Subsequent errors of the same test do not type a new heading.

3.2 Error Abbreviations

The following is a list of all abbreviations used in error reports.

# OF ERRORS	Number of Errors that were detected.
1ST ADD	First Address that failed.
ARRAY	The array number that was locked up in the MS11-M CSR.
APT#	The # of CPU's APT expects on the system.
APTCORE	APT Core size.
APTMOS	APT MOS size.
BAD	Bad data.
BAD-WD1	Bad Word #1 of a double word data value.
BAD-WD2	Bad Word #2 of a double word data value.
BAD-CHK	Bad Check Code Bits.
BANK	The Bank number. Banks are 16K words long.
BD-CC	Bad Check Code Bits.
CHKBITS	The 7 bit value of the Check Code Bits.
CONTRL	The CACHE Control register.
CPUERR	CPU Error register.
CSR	Control and Status Register.
CSRNO	CSR NUMBER (0-F Hexidecimal).
DATARG	The CACHE Data Register.
DBE	Double Bit Error (uncorrectable error).
DEV ADD	Device Address.
ECC	Error Correctable Code.
GD-CC	Good Check Code Bits.
GD-CHK	Good Check Code Bits.
GD-WD1	Good Word #1 of a double word data value.
GD WD2	Good Word #2 of a double word data value.
GOOD	Good data.
LSIZE	MSV11-J Size.
MEMERR	Memory Error register.
MMR0	Memory Management Register #0.
MMR1	Memory Management Register #1.
MMR2	Memory Management Register #2.
MMR3	Memory Management Register #3.
MTYP	Memory Type (MSV11-J,MSV11-L, or MSV11-P).
PADD	Physical Address (asserted by the program after mapping).
PAT	Pattern number.
PC	Program Counter at the time the error occurred.
SBE	Single Bit Error (correctable error).
VADD	Virtual Address (asserted by the program before mapping).
WROTE1	The data that was written into the 1st half of a double word.
WROTE2	The data that was written into the 2nd half of a double word.
XOR	Exclusive OR of the good and bad data. Shows the bad bits.
AUT	Address under test

3.3 Error Halts

There are several Halts in the program.

All unused trap vectors contain a trap catcher (.WORD .+2,HALT).

An undefined TRAP instruction halts at symbolic location "$HALT2".

The APT down load sequence will halt at symbolic location "APTHLT".

Halt on Error option (SW15 Set) at symbolic location "$HALT".

Halt program (SW8 Set) at symbolic location "$EXHALT".

Power Fail will normally halt at the end of the shut down sequence (symbolic location "$DOWN").

Power Fail has a fatal Halt at symbolic location "$ILLUP" which can be caused by power up occurring before power down sequence completed or by power down before a power up sequence is completed.

4.0 PROGRESS REPORTS

Pass complete typeouts as follows:

```
END PASS        #       0
END PASS        #       1
END PASS        #QV     2
```

NOTE

Pass 2 was flagged as a Quick Verify Pass. (Because of a change in SW5)

To obtain progress reports while executing, typing a Control "T" will print out the information encoded in the display register.

Example:

```
BANK= 2 TEST= 34
```

Reference Section 2.4.4.7.18 for more information on Tracing.

5.0 CSR INFORMATION TABLES

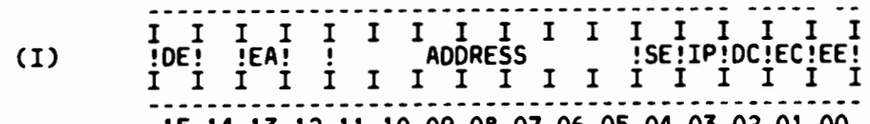
The following is a picture view of the current control status registers which can be tested by this program. It shows bit assignments and definitions to provide a handy reference, and shows the similarities and differences between each one:

NOTE

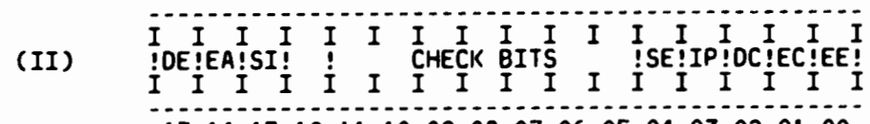
All unused bits in each CSR are equal to zero.

5.1 MSV11-J CSR

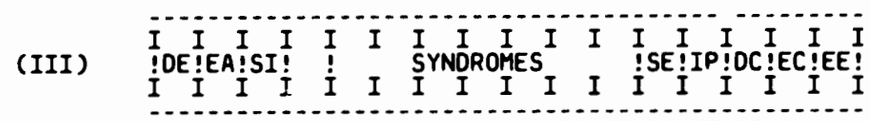
(I)



(II)



(III)



Bit assignments are defined as follows:

BIT15 UNCORRECTABLE ERROR
On a read to memory (ECC Disable Bit = 0), this bit is set if a double error occurs. The error address is stored in the CSR. Setting this bit also turns on a red LED at the rear of the card for a visual indication. This bit is also set in ECC Disable Mode if a SERR or DERR occurs.

BIT14 EUB ERROR ADDRESS
With Bit 14 = 1, a read to the CSR will fetch address A21 through A18. When Bit 14 = 1, diagnostic data may not be loaded into the syndrome register.

```
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1748
1749
1750
1751
1752
1753
1754
1755
1756
1757
1758
1759
1760
1761
1762
1763
1764
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1766
1767
1768
1769
1770
```

BIT13 SET INHIBIT MODE
When this bit is set to
a "1", it enables the inhibit
mode pointer to inhibit
either the first or second
16K from ever going into the
Diag Check or ECC Disable
Mode.

BITS05-10 CHECK BIT STORAGE (CSR II)
Check Bit Storage (Diag CK
Bit 2 = 1)
When in the diagnostic check
mode these bits are used to store
the check bits to be written
into memory or the check bits
read from memory. If a double
error or single error occurs
when in the diagnostic check
mode and ECC disable Bit 1 = 0,
then the check bits are stored
in the CSR together with
the double or single error
bit. These bits are writeable
in diagnostic mode. A "1"
is stored in Bit 11 if CSR
02, CSR 13, and CSR 14 are
set to indicate that the
memory under test is a MSV11-J.

BITS05 11 QBUS ADDRESS STORAGE (CSR I)
(Diag Ck Bits 2 - 0, ECC
Disable Bit 1 = 0)

If a double or single error
occurs on a Read cycle, then
address Bits A11 through
A17 are stored in these bits
These bits are read only on
the condition that SERR (CSR 4)
or DERR (CSR 15) is set but
CSR 14 is not set.

EQB Address Storage (Diag Ck
Bit 2 = 0), ECC Disable Bit
1 = 0 or 1).

If a double or single error
occurs on a Read cycle,
address Bits A17 through
A11 are stored in CSR Bits
11 through 5 and address
Bits A21 through A18 are

```
1772
1773
1774
1775
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1777
1778
1779
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1781
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1788
1789
1790
1791
1792
1793
1794
1795
1796
1797
1798
1799
1800
1801
1802
1803
1804
1805
1806
1807
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1809
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1811
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1816
1817
1818
1819
1820
1821
1822
1823
1824
1825
```

stored in a backup register.
The EQB Error Address
Retrieval Bit (CSR 14) is
used to obtain the total
error address as follows:

With CSR Bit 14 = 0 a read to
the CSR will obtain A17
through A11 from CSR Bits 11
through 5.

CSR Bit 14 can then be set
to a "1" and a read to the
CSR will then read A21
through A18 from CSR Bits 8
through 5 and 0's from CSR
Bits 11 through 9.

Address Bits A21 through
A11 are obtained
to locate the double
error to a 1K segment of
memory.

The EQB address A21
through A18 is read only
whenever CSR 14 = 1.

BIT05-10 SYNDROME STORAGE (CSR III)
If a double or single error
occurs on a read or write
byte cycle, and if CSR bit
2 is set to a "0" syndrome
Bits X, 0, 1, 2, 4 and 8
and stored in CSR bits 5
through 10. To read the
syndrome bits from CSR, Bit
you must read the error
address, then set 2 of
the CSR must be st to
a "1" (diagnostic mode) and
the CSR read again. This operation
will allow syndrome bits
for a single or double
failure to be read instead
of the address bits normally
read when CSR 02 is set to "0".

BIT04 SINGLE ERROR
If on a read to memory a
SBE occurs, the error
address A21-A11 and
the error syrdromes will

```
1827
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1833
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1836
1837
1838
1839
1840
1841
1842
1843
1844
1845
1846
1847
1848
1849
1850
1851
1852
1853
1854
1855
1856
1857
1858
1859
1860
1861
1862
1863
1864
1865
1866
1867
1868
1869
1870
1871
1872
1873
1874
1875
1876
1877
1878
1879
```

be logged in CSR Bits 5 11 unless the uncorrectable error CSR 15 is set. The error address will be logged unconditionally in the ECC Disable Mode. This bit is not set if Inhibit Mode (Bit 13 = 1) is set and Diagnostic Mode (Bit 02 = 1) is set.

BIT03 INHIBIT MODE POINTER
This bit works in conjunction with the Set Inhibit Mode (Bit 13). When Bit 13 is set to a 1, a 16K portion of memory is inhibited from operating in the ECC Disable Mode or Diagnostic Check Mode.

The Inhibit Mode Pointer indicates which 16K is being inhibited, i.e., Bit 3 = 0 the first 16K of memory is inhibited, Bit 3 = 1, the second 16K of memory is inhibited.

With Bit 13 set to a 0, Bit 3 becomes inoperative.

Bit03, in conjunction with Bit 13, therefore allows a 16K chunk of memory to always have ECC coverage. The systems diagnostic can therefore reside in this protected portion of memory and can disable ECC and/or run the Diagnostic Check Mode in the rest of memory without itself becoming vulnerable to single errors. This bit is a Read/Write bit reset by power up and BUS INIT.

BIT02 Diagnostic Check Mode
This mode allows a means of forcing a single or double error in a desired location. It also provides a means of examining the check bits and the syndrome in a given location.

The check bits desired for a given data pattern are written into Bits 5 through 11 of the CSR. A word or write byte memory will write the check bits from the CSR to the MOS array (CSR 2 = 1) instead of the check bits generated on the data to be written. Single errors on the read portion of the DATOB cycle are corrected.

A read to the memory will read the check bits stored in memory and clock them into the CSR.

If a double error or single error occurs the DERR or SERR bit in the CSR is set and the error syndrome bits read from ECC are stored in CSR Bits 10-5 as well as the address bits. In Diagnostic Check Mode the error syndrome bits will be read when CSR Bits 10-5 are read.

This bit is a Read/Write bit and is reset on power up and BUS INIT

BIT01 DISABLE CORRECTION MODE
If this bit is set, no single errors will be corrected. A single error will set CSR 4 and CSR 15 or a double error will set CSR 15 and assert BUS PBL if CSR 00 is asserted. The 1K block of address where the error occurs will also be stored in the CSR. The priority of a SERR and DERR will be the same, i.e., the last error information will always be stored unless a DERR precedes a SERR. If a double error occurs during a write byte cycle, the write portion of the cycle will not be aborted. The check bits written will

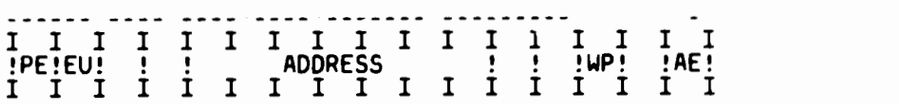
```
1935
1936
1937
1938
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953
1954
1955
1956
1957
1958
```

have been generated on the
data written. This means that
if a single or double error
existed in the location accessed,
it would be cleared (unless the
errors were hard).

This bit is a diagnostic aid
to allow writing and reading
data from memory without
interference from the error
correction logic.

BIT00 UNCORRECTABLE ERROR
INDICATION ENABLE
If a double error occurs with
ECC enabled or a single error
or double error with ECC
disabled, on a Read cycle to the
memory and this bit is set,
then BUS PBL will be asserted.

5.2 MSV11-L/P CSR



Bit assignments are defined as follows:

BIT15 PARITY ERROR

BIT14 EQB ERROR RETRIEVAL If the memory is on an Extended QBUS, when BIT14 is zero, the low order failing addresses are available (Bits 11-17); when BIT14 is one, the high order failing addresses are available (Bits 18 21 of address). If the memory is on a QBUS, a jumper disables this bit so that it is read only, and equal to zero.

BITS 11-5 ERROR ADDRESS With BIT14 set, they contain the high order parity error address (Bits 21-18 of address); with BIT14 cleared, they contain the low order parity error address (Bits 17-11 of address).

BIT02 WRITE WRONG PARITY Normal parity (odd) when clear; other parity (even) when set.

BIT00 ACTION ENABLE No action when clear; trap to vector 114 when set.

6.0 SUB-TEST SUMMARIES

6.1 Tests

TEST 1

BIT TEST OF ALL CSR'S/MATCH ALL CSR'S WITH MEMORY
(CSR Access may cause wrong Type of Traps)

TEST 2

TEST BANK 0 ACCESSES
Failures are fatal.

TEST 3

TEST BANKS 1-177 (OCTAL) FOR ZEROS AND ONES
Errors are not typed here - only logged in
the configuration table

TEST 4

ECC INHIBIT MODE POINTER TEST

TEST 5

DIAGNOSTIC MODE DISPATCH ROUTINE
This test runs all the patterns in the
mode selected.

TEST 6

UNIQUE BANK TEST
Pattern 27 is run

6.2 Tests

6.2.1 General Test Information

Actual Tests are identified by symbolic locations "MTPXYY" where X may be any sub program indicator (A,B,C,etc) or 0 and YY will be the number of the test.

Setup procedures for each test are identified by symbolic locations "MT00YY" where YY will be the number of the test.

Tests reside in 4 scripts that are scanned for execution. Symbolic location "MKCSRT" is a table of tests that can run once for each ECC bank. Symbolic location "MKPAT" is a table of tests that can run on each Bank of ECC memory.
Symbolic location "MJPAT" is a table of tests that can run on each Bank of Parity memory. Symbolic location "FSPAT" is a table of tests that can be run in Field Service Mode (command 5).

The 1st 3 scripts are completely controlled by the APT E-table (even if not running under APT). Modifications to this table can be made (1) with APT, or (2) manually.

Example E-table Segment:

```
;THE FOLLOWING LOCATIONS SPECIFY WHICH TESTS
;ARE TO BE RUN FOR PARTICULAR MEMORIES
;
;REFERENCE THE TABLE LISTED BELOW TO RELATE BITS TO TESTS.
;BIT0 SET WILL RUN THE FIRST ENTRY IN THE TABLE, BIT0 SET
;IN THE SECOND WORD WILL RUN THE 17TH ENTRY IN THE TABLE...
;
;NOTE**NULL TESTS DO NOT TAKE ANY TIME
;                                                    RECOMMENDED VALUE
$DDW0:   .WORD       177777                 ;ECC CSR TESTS       177777 TABLE = MKCSRT:
$DDW1:   .WORD       177777                 ;ECC CSR TESTS       177777 TABLE = MKCSRT:
$DDW2:   .WORD       177777                 ;ECC TESTS           103777 TABLE = MKPAT:
$DDW3:   .WORD       177777                 ;ECC TESTS           177777 TABLE = MKPAT:
$DDW4:   .WORD       177777                 ;PARITY TESTS        003777 TABLE = MJPAT:
$DDW5:   .WORD       177777                 ;PARITY TESTS        177774 TABLE = MJPAT:
```

6.2.2 Specific Tests

6.2.2.1 Test 0 Basic Data Test

Writes Reads R2 into a 16K Bank.

This is used for Zeros and Ones testing and in Field Service Mode for any console selected Test.

It can execute out of the USER Instruction PAR's.

NOTE

It is frequently modified dynamically such that (1) it returns after writing only (the 1st NOP is replaced with a RETURN) or (2) it only counts Errors (the code PERR02 and NOP are replaced with INC @#PATERR).

2141
2142
2143
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2147
2148
2149
2150
2151
2152
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2154
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2156
2157
2158

6.2.2.2 Test 1 Address Test

Writes Reads an incrementing pattern equivalent to physical addressed into a 16K Bank.

It can execute out of the USER Instruction PAR's.

2160
2161
2162
2163
2164
2165 6.2.2.3 Test 2 Complement Address Test
2166
2167 Writes the complement of the physical address from high addresses to
2168 low (write down) and reads from low addresses to high (read up).
2169
2170 This provides the complement of the coverage of Test 1 in both data
2171 pattern and addressing sequence.
2172
2173 It can execute out of the USER Instruction PAR's.

2175
2176
2177
2178
2179
2180
2181 6.2.2.4 Test 3 3 XOR 9
2182
2183 Writes Reads a Test that complements as address bits 3 and 9
2184 change.
2185
2186 This test is run 4 times (1) with Zeros Ones, (2) with Ones
2187 Zeros, (3) with 401 Ones, and (4) with Ones 401. The test of
2188 the 401 is to force a the parity bits to become involved.
2189
2190 It can execute out of the USER Data PDR's, the User Instruction PAR's,
2191 the Kernel Data PAR's and the Supervisor Data PAR's.
2192

6.2.2.5 Test 4 Rotating Zeros Test

Writes a background pattern of Ones. Rotates a Zero Carry Bit left thru each par of bytes (18 times) and then checks that the carry is Zero and the word (2 bytes) is still all Ones.

It can execute out of the User Data PAR's and the Kernel Data PAR's.

NOTE

It is not uncommon to observe the good data equal to the bad data. This indicates that the carry was not clear after 18 ROLB's.

6.2.2.6 Test 5 Rotating Ones Test

Writes a background pattern of Zeros. Rotates a One carry bit left thru each pair of bytes (18 times) and then checks that the Carry is a One and the Word (2 Bytes) is still all Zeros.

This provides the complement of the coverage of Test 4 in data.

It can execute out of the User Data PAR's and the Kernel Data PAR's.

NOTE

It is not uncommon to observe the good data equal the bad data. This indicates that the Carry was not set after 18 ROLB's.

2245
2246
2247
2248
2249
2250
2251
2252
2253
2254
2255
2256
2257
2258

6.2.2.7 Test 6 Initial Data Test

Writes Reads a double word first with all bits 0 except 1 (for every bit position), Second with all bits 1 except 1 (for every bit position)

This is a very quick check of the data paths.

```
2260
2261
2262
2263
2264
2265
2266
2267                    6.2.2.8  Test 7    Address Bit Test
2268
2269                    Writes a background of all Zeros.
2270                    Read Address 1 for a 0 Byte.
2271                    Complement Address 1.
2272                    Read Address 1 for a non 0 Byte.
2273                    For each Address Bit position from Bit 1:
2274                    Virtual (2, 4, 10, 20, 40, 100, 200, 400,  1000,  2000,  4000,  10000,
2275                    60000, 20000)
2276                    Physical (60002, 60004, 60010,  60020,  60040,  60100,  60200,  60400,
2277                    61000, 62000, 64000, 70000, 140000, 100000)
2278                      Read Address for a 0 word.
2279                      Complement Address contents.
2280                      Read Address for a non-zero word.
2281
2282                    This is a very quick check of the address bit uniqueness.
2283
2284
```

```
2286
2287
2288
2289
2290
2291
2292                    6.2.2.9  Test 10   Byte Addressing Test
2293
2294                    With ECC Disabled.
2295                    Writes all ones to a double word.
2296                    For each of the 4 Bytes in the Double Word.
2297                      Clears one byte.
2298                      Reads all 4 bytes from double word.
2299                      Checks for only proper byte clear.
2300                      All other bytes set to all ones.
2301
2302                    This is only done on one double word address.
2303
2304
2305                                                NOTE
2306
2307                                This is run for ECC memory only
2308
2309
```

6.2.2.10 Test 14 Basic Double Bit Error Test

1. Write the CSR to enable diag mode with a double bit error check bits of 110011 and Uncorrectable Error Indication enabled.

2. Write first AUT in a 16k bank with data of all zero's. This will write the check bits in (1)

3. Read address, this should cause a double bit error. BUS PBL is asserted and we check for a parity trap to occur.

4. Read the CSR for check bits in (1) and Uncorrectable Error Indicator.

5. Write ones to the high byte of the address under test. Since a DBE exsists at this address the write should be aborted.

6. Read address and check for a Parity trap to occur as a result of (5)

7. Repeat 5 and 6 for data of ones in the low byte and check for write abort and parity trap.

This test checks to see if a double bit error will be aborted and a byte write of a double bit error will be aborted.

NOTE

This test is only run for the MSV11-J

6.2.2.11 Test 17 Holding 1's 0's Test

1. Write a 16K Bank with alternating Bytes of Zeros Ones writing a Byte at a time.
2. Read each Word for correct Test.
3. Do (1-2) again for a complement Test.

This checks the memory for the capability of holding 0's 1's.

6.2.2.12 Test 20 Syndrome Bits to the CSR on a SBE Test

1. Write CSR with check bits to correct bit 0 of the first AUT 16k bank from a 0 to a 1 with diag mode.
2. Write AUT with data of 0's creating a SBE.
3. Clear CSR.
4. Read the AUT to clock the address and syndromes into the CSR.
5. Read the CSR for the SBE indicator, bit 4.
6. Write the CSR to diag mode to clock the syndrome bits into CSR bits 5-11.
7. Read the CSR for the proper syndrome bits.
8. Repeat 1-7 for all 16 data bits.
9. Repeat 1-8 for data of ones so that a correction will occur from a 1 to a zero.

This test checks to see that the EDC chip can detect Single Bit errors for all 16 data bits by checking for CSR bit#4 and that the proper syndrome bits are placed in the CSR.

NOTE

This test is only run for the MSV11-J

6.2.2.13 Test 21 Marching 0's 1's Test

1. Write a Background of alternating Bytes of Zeros Ones

2. For the 16K Bank addressing Down
   (a) Read check a word
   (b) Byte Swap a word
   (c) Read check a word

3. For the 16K Bank addressing Up
   (a) Read check a word
   (b) Byte Swap a word
   (c) Read check a word

4. For the 16K Bank addressing Up
   (a) Read check a word
   (b) Byte Swap a word
   (c) Read check a word

5. For the 16K Bank addressing Down
   (a) Read check a word
   (b) Byte Swap a word
   (c) Read check a word

This checks the integrity of the 32 Bit Double Words.

It can execute out of the User Data PAR's.

NOTE

It is not uncommon to see a misleading error typeout because the second test in each case is based upon a byteswap of the first test which may or may not have failed. If the error report indicates errors in pairs with the bad bit in the second report being the same bit position relative to a byte then you should ignore the second error report.

6.2.2.14 Test 22 Refresh Test

1. Write a diagonal Test of ones on every KDIAG(TH) stripe write zeros elsewhere.

   This Test is on addresses not bit positions.

   Example:

Address	MSB's
LSB's	! 0 0 0 1 0 0 0 1
	! 0 0 1 0 0 0 1 0
	! 0 1 0 0 0 1 0 0
	! 1 0 0 0 1 0 0 0
	! 0 0 0 1 0 0 0 1
	! 0 0 1 0 0 0 1 0
	! 0 1 0 0 0 1 0 0
	! 1 0 0 0 1 0 0 0

NOTE

Example uses KDIAG of value 4 more typical is a value of 8. Consult the symbolic definition of "KDIAG" in the program listing to be sure.

2. Disturb each row for > 3.2ms

3. Read check diagonal pattern

4. Do (1-3) KDIAG times moving the placement of the diagonal stripe to cover all address positions.

5. Do (1-4) for a complement pattern (zeros in a background of ones)

NOTE

This test is not normally executed except under APT or ACT. It may be invoked VIA Field Service Command 13 (Kamikaze Mode).

6.2.2.15 Test 23 Shifting Diagonal Test

Similar in overall operation to test 22 except it does not delay for refresh and disturb rows.

NOTE

This test is not normally executed except under APT or ACT. It may be invoked VIA Field Service Command 13 (Kamikaze Mode).

6.2.2 16 Test 24 Fast Galloping Pattern Test

This does a classical galloping pattern except that addressing is incremented by 400 Octal (every 64th double word)

NOTE

This test is not normally executed except under APT or ACT. It may be invoked VIA Field Service Command 13 (Kamikaze Mode).

6.2.2.17 Test 26 Random Data Test

Write Random Data in a 16K Bank while incrementing the Addresses.

Read check Random Data.

This routine regenerates the same random numbers by using the same seed as the write sequence. After the read check the seed is updated so that the next use of this pattern will not invoke the same sequence of random numbers.

If you wish to change the random sequence so that it is different than any other run in the same configuration then there are 2 ways of doing so.

1. Modify symbolic locations "SEEDHI" and "SEEDLO" to any number you like.

2. Enter Field Service Mode and execute this Test (command 5) on some (any good) bank for a short time (30 sec or so).

This can execute out of the User Data PAR's, the Kernel Data PAR's, and the Supervisor Data PAR's.

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2598
2599
2600
2601
2602
2603
2604
2605

6.2.2.18 Test 27 Unique Bank Test

This Test uses Test 0 to write read the Bank number in each bank.

It does not test Banks that require relocation to test.

It does not run as part of any script but rather is always run after normal pattern tests are complete.

6.2.2.19 Test 30 Flush Out DBE's Test

This Reads each location then moves the old value back in. This is done with ECC Disabled and therefore corrects any DBE's or SBE's (if possible).

It does not run as part of any script but rather is always run just prior to the End of Pass Code, as part of a Control "C" (Boot) command, as part of End of Pass shutdown for ACT or XXDP Chain Mode, as part of hanging sequence after an error if under ACT or APT, and as part of a shutdown sequence directed by Switch 8 (Halt Program).

6.2.2.20 Test 31 SOB-A-LONG Test

Rationalization

In order to concentrate the memory cycles of a test into a particular address, we must cut the overhead cycles to a minimum. Frequently, the instruction itself may provide adequate data or set up a background in which any complemented bit may find it hard to survive.

The SOB instruction is the only PDP-11 instruction that is (1) a single operand, (2) can be repeatedly executed at the same PC and, (3) can escape this repetitious loop.

Hence, it can be possible to SOB a MOS cell to death (or at least brain wash him), and to SOB a core into over-heating (or at least warm discomfort).

The SOB Routine will be loaded and called with R0 set equal to the SOB constant "SOBK", R1 set equal to the complement of a "SOB R0,." Instruction "100776".

Simplified SOB Example:

```
1$:     SOB         R0,1$                   ;SOB till R0 underflows
        MOV         R1,1$                   ;Write complement of SOB
        CMP         R1,1$                   ;Read check not SOB
        BEQ            2$                   ;Skip if OK
        SOBFAIL                             ;Trap report error
2$:     SOBMOV1                             ;Code to get self moved
        SOBMOV2                             ;Forward 1 word and run again
        SOBMOV3
        SOBMOV4
        SOBMOV...
```

The value of the SOB constant can be found at symbolic location "SOBK" (typical 25 decimal).

This test is not in the normal script of execution but may be added via the APT E-TABLE, reference symbolic locations "MKPAT", "MJPAT", "$DDW2-5". Field Service Mode command 8 is the normal method of running this pattern.

NOTE

This test is not normally executed except under APT or ACT. It may be invoked VIA Field Service Command 13 (Kamikaze Mode).

6.2.2.21 Test 32 Write Recovery Test

This test causes a WRITE, READ, WRITE, READ, ... to occur in memory and if the 1st, 3rd, 5th, ...READ is bad the program may bomb or if the 2nd, 4th, 6th, ... READ is bad the program will gracefully type out the error.

Write Recovery Test
This test differs from other tests in that it consists of a small test program actually running in the bank under test.
The program is self modifying and may be difficult to debug. To aid in the debug, remember that the bank and margin are being displayed. This will allow the user to at least see which memory bank failed.
The test consists of 1/2 of the bank stored with "MOV R2,-(PC)" and the other 1/2 containing "177667". "177667" is the complement of "JMP (R0)" instruction. R2 contains "COM -(R1)" instruction on entry to the bank and R1 contains the highest test address in that bank.
If you understand this so far the rest is easy.
The test execution is as follows:

1. The "MOV R2,-(PC)" instruction executes storing the contents of R2 in the address it vacated (due to -(PC).
2. Since R2 contains a "COM -(R1)" instruction it complements the highest address under test, this address contained "177667" so after the COM -(R1) it equals 110 cleverly this is the "JMP (R0)" instruction.
3. This sequence continues until the "MOV R2,-(PC)" instructions reach the middle of the test bank. then the "JMP (R0)" instruction is met and executed. R0 contained the return address back to test 13.
4. These steps are repeated for each bank under test.

NOTE

This test is not normally executed except under APT or ACT. It may be invoked VIA Field Service Command 13 (Kamikaze Mode).

6.2.2.22 Test 33 Branch Gobble Test

This test loads a small routine into the memory under test. The routine moves itself along in memory one word after each pass so that when it reaches the end every instruction has executed from every location with the exception of the beginning and end of each test area.

The Branch Gobble's general format after you eliminate setup code and code to move the program along is as follows.

```
BGTEST:  0                                      ;TEST WORD
BRGOBB:  SEC
         ADCB        BGTEST                     ;INC LOW BYTE
         BMI         1$                         ;END LOOP AFTER 128 TIMES
         INCB        BGTEST+1                  ;INC HIGH BYTE
         BR          BRGOBB                     ;LOOP 128 TIMES
1$:      BVS         2$                         ;BRANCH IF V-BIT SET (SHOULD BE)
         ERROR                                  ;ERROR TRAP
2$:      CLV                                    ;CLEAR V-BIT
         INCB        BGTEST                     ;INC HIGH BYTE ONE LAST TIME
         BCS         3$                         ;BRANCH IF C-BIT SET (SHOULD NOT BE)
         BVC         3$                         ;BRANCH IF V-BIT CLEAR (SHOULD NOT BE)
         BMI         4$                         ;BRANCH IF N-BIT SET (SHOULD BE)
3$:      ERROR                                  ;ERROR TRAP
4$:      RETURN
```

This code origionally came from the PDP-11 Family Instruction Exerciser DZQKA-A. The first MOS memorys fell succeptable to this section of that diagnostic and it has been an important memory exerciser ever since.

NOTE

This test is not normally executed except under APT or ACT. It may be invoked VIA Field Service Command 13 (Kamikaze Mode).

6.2.2.23 Test 34 Soft Error Test

Rationalization

MOS chips have a failure mode in which they can randomly pick or drop bits. This is caused by Alpha particles bombarding the cell. If the cell is very small (and they are) then the electrons displaced by the Alpha particle are sufficient to cause the cell to change from a one to a zero or from a zero to a one.

This test is controlled by the main program so that it is used to create a Test of 125252 and 52525 on alternate passes of the program. The configuration table is used to flag banks that have the Test invalidated because another Test was written over this background.

This Test is nothing more than a clever use of Test 0.

6.2.2.24 Test 35 Worst Case Parity Test

1. Force Write Wrong Parity in each 1K word block of the Memory Under Test.
2. Read with Parity Trapping enabled, making sure that a trap occurrs.
3. Make sure error address bits are set correctly.
4. Write good parity without trapping, and make sure no trap occurrs when read.

NOTE

This test is run for parity memory which is not controlled by the same CSR as the program.

6.2.2.25 Test 36 Correction Code Test

1. Write CSR with check bits to correct bit 0 of the first address in a 16k bank from a 0 to a 1 with diag mode.
2. Write AUT with data of 0's.
3. Read AUT for correction of bit 0 from a 0 to a 1.
4. Repeat 1 3 for all 16 data bits.
5. Repeat 1-4 for data of ones so that a correction will cccur from a 1 to a zero.

This test checks to see that the EDC chip can correct Single Bit Errors for all 16k data bits from a 1 to a 0 and visa versa.

NOTE

This test is only run for the MSV11-J

6.2.2.26 Test 37 Check ECC Disable Test

1. Write CSR with ECC disable, Diag mode, and SBE check bits of 000010.

2. Write AUT with data of zero's. This should write check bits to memory.

3. Read AUT for data of zeros insuring no correction was made.

NOTE

This test is run on the MSV11-J only.

6.2.2.27 Test 41 Address to CSR on DBE Test

1. Write CSR with ECC disable, Diag mode, and Double Bit error check bits of 010011
2. Write AUT with data of zeros creating a DBE.
3. Read AUT to detect DBE and to clock address into CSR
4. Read CSR for correct address in bits 5-11.
5. Increment address by 1k and repeat 1-4 until 16k is done.

This test insures that the correct address appears in CSR bits 5-11 on a DBE

NOTE

This test is run on a MSV11-J only.

6.2.2.28 Test 42 Extended Address to CSR on Error Test

1. Write CSR with SBE check bits of 000010 with Diagnostic Mode.
2. Write low address in a 16k bank with data of zeros creating a SBE.
3. Clear the CSR.
4. Read address to detect SBE.
5. Read CSR for correct address and the SBE indicator bit #4.
6. Enable CSR bit 14 to check the Extended address bits.
7. Read CSR for correct address bits
8. Repeat 1-7 with a test address that is the highest in a 16k bank.

This test checks to see that the correct address bits apppear in the CSR. This is also repeated for the Extended Address function in the CSR.

NOTE

This test is only run for the MSV11 J

6.2.2.29 Test 43 Write Byte Test

1. Write CSR to Diag mode with check bits of 001100. These correspond to data of zeros.
2. Write first AUT with data of one in bit zero. The write effectively creates a SBE in byte 0.
3. Clear the CSR
4. Write byte 1 of the AUT with data of all ones.
5. Read CSR to check for SBE indication.
6. Write the CSR to Diag mode.
7. Read the AUT to check for the correct data -- all ones in high byte and all zeros in low byte.
8. Read the CSR to check for correct check bits corresonding to the data read in (7). These check bits are 000110.
9. Repeat (1)-(8) this time creating an error in byte 1 (2) and writing byte 0 in (4).

This test checks to see that a SBE will be corrected during the read portion of the byte write and that correct checkbits will be generated on the write.

NOTE

This test is only run for the MSV11-J

6.2.2.30 Test 44 Shifting Checkbits through the CSR Test

1. Write CSR to Diag Mode to Enable Checkbit register.
2. Write CSR with check bits of 000001, ECC disable and Diag mode
3. Write memory with data of zeros. This should write the check bits into memory.
4. Complement check bits pattern and write CSR as in (2).
5. Read CSR for complement check bit pattern.
6. Read memory to read check bits written in (2) into CSR.
7. Read CSR for corret check bits written in (2).
8. Shift check bit pattern and repeat (1-7) till CSR bits 5-10 are done.
9. Complement check bit pattern in (2) and repeat (1 8) shifting a zero through a field of ones.
10. Repeat 1-9 for every 100 octal locations in 16k

This test checks the ability to read check bits from the CSR to memory and back. The test is done twice. Once shifting a field of a one through a field of zeros and a zero through a field of ones. This tests the Checkbit/Syndrome bit register and Check bit RAM's. This test is done for every 100 octal locations in 16K.

NOTE

This test is only run for the MSV11-J

3041
3042
3043
3044
3045
3046 6.2.2.31 Test 45 Syndrome Bits to the CSR on a DBE Test
3047
3048 1. Write CSR with Diag mode to enable Check/Syndrome bit Register.
3049
3050 2. Write CSR with DBE check bits of 110011 with Diag mode.
3051
3052 3. Write memory with data of zeros creating a DBE.
3053
3054 4. Clear CSR.
3055
3056 5. Read memory to detect DBE.
3057
3058 6. Read CSR for Uncorrectable error indicator.
3059
3060 7. Write CSR to Diag mode to read Syndrome bits into CSR.
3061
3062 8. Read CSR for correct Syndrome bits of 111111.
3063
3064 9. Repeat (1-8) with Muliple Bit Error check bits of 111100 and
3065 corresponding Syndrome Bits of 110000.
3066
3067
3068 This test checks the ability of the CSR to detect a DBE and read for the proper
3069 Syndrome bits generated by the EDC chip. This test is then repeated with check
3070 bits corresponding to a Multiple Bit error.
3071
3072 NOTE
3073
3074 This test is only run for the MSV11-J
3075
3076

6.2.2.32 Test 46 Check Single Bit Errors with ECC Disabled Test

1. Write CSR with check bits to correct bit 0 of the first address in a 16k bank from a 0 to a 1 with diag mode and ECC disabled.
2. Write AUT with data of 0's thus creating a SBE.
3. Write the CSR to ECC disable.
4. Read AUT to detect SBE.
5. Check to see that no trap occured.
6. Read CSR to see that uncorrectable error (CSR15) is set.
7. Repeat 1-6 for all 16 data bits.
8. Repeat 1-7 for data of ones so that a correction will occur from a 1 to a zero.
9. Repeat 1-8 except in steps (3) the CSR is written to ECC Disable and BUS PBL enable and (5) we check for traps.

This test checks to see that SBE are treated a uncorrectable errors with ECC Disable. The test is repeated 2 times, once with traps disabled and again with it enabled. this is done for all 16 possible SBE conditions.

NOTE

This test is only run for the MSV11-J

6.2.2.33 Test 47 NO CSR Update On SBE with exsisting DBE test

1. Write the CSR to Diag mode to enable Checkbit/Syndrome bit Register.
2. Write the CSR with DBE check bits of 110011 and Diag mode.
3. Write memory with data of zeros creating a DBE.
4. Write CSR with SBE check bits of 000010 and Diag mode.
5. Write memory 4k above address in (3) creating a SBE.
6. Clear CSR.
7. Read memory with address in (3) to detect DBE.
8. Read CSR for correct address and Uncorrectable error ndicator
9. Read memory with address in (5) to detect SBE.
10. Read CSR for SBE indicator and no change in DBE status in CSR in (8)

This test checks to see that no update will occur in the CSR with a SBE in memory when a DBE already exists.

NOTE

This test is only run for the MSV11-J

6.2.2.34 Test 999 Null Test

This is an instant return added to preserve the software structure.

This test replaces any real tests when the APT E-Table does not specify a test to be run.

7.0 PROGRAM FEATURES

7.1 Fast Data Access Rates

One of the main areas of concern in testing memory in systems environments is speed. One of the prime reasons that system programs like RSTS,IAS and MUMPS can crash due to memory failures not detectable by memory diagnostics (0-124K,0-2 MEG,etc.) is because of multiple NPR devices contending for the bus. After some delay a NPR device becomes bus master and does several memory transfers at memory data rates.

On the other hand most diagnostics when writing reading and/or checking patterns spend most of their time fetching instructions and operands out of their program space and proportionally little time accessing the memory under test.

This diagnostic's error detecting abilities have been optimized around the primary design criteria of speed. To this end the following steps have been taken.

7.1.1 Fast City

Utilization of Memory Management Registers as Non Memory Bus, Non QBUS, Bipolar Memory. Since User Mode is only used for relocation and Data Space is never used, then subroutines can be executed from the UIPAR's, UDPAR's, KDPAR's, SDPAR's and with some Bit Pattern restrictions the UIPDR's, UDPDR's, KDPDR's, and SDPDR's.

The program runs in Kernel mode and Patterns are executed in Supervisor mode for mapping purposes. All core patterns and some MOS Patterns are subroutines that are moved to this Bipolar region referred to in the program as Fast City.

NOTE

18-Bit PDP-11's cannot execute from the PAR's because their PAR's are only 12 bits wide; they also have no Supervisor Mode. Therefore, all patterns are executed in memory, using User Mode (reference Section 7.5).

7.1.2 SOB's

Utilization of the full PDP-11 Instruction Set to speed pattern algorithms (principally the SOB).

7.1.3 CACHE

CACHE is used between pattern tests to decrease program pass times. CACHE can be defeated by the operator (reference section 2.4.3.1).

7.2 Bank Zero Testing

Bank Zero has been traditionally neglected by memory diagnostics for the following reason.

The vector space exists there and ALL traps must not access test pattern data. If the area is tested the diagnostic must not use any traps, and it is against the rules for power to fail.

Systems with Memory Management can overcome this because all traps are to Kernel Virtual space even if the power should fail (caution must be observed because power up goes to physical address 24 (because the Memory Management Unit comes up off)).

However, Catch 22 is that the diagnostic is not APT compatible in this mode because APT Accesses Physical Memory Locations.

The PDP-11/83 can over come this because the QBUS Map can fool APT.

Because of the previous arguments this program does not relocate in the true since of the word (i.e. no position independent code was written (at least not on purpose)), but rather this program moves and remaps (hereafter referred to as relocates). This enables the complete testing of Bank Zero or any other program space or privileged space exactly as all other banks are tested. (The conditional test to see if a bank is protected is complemented when relocated).

NOTE

The program will relocate only in the first pass under APT; after this, the program will remain fixed in Banks 0 and 1.

7.3 Memory Configuration Map

```
This map is printed out immediately after sizing the memory unless SW6
is set (reference section 2.4.1).  It can also be printed at any later
time in Field Service Mode (reference section 2.4.4.8.7)

Example:
                              MEMORY CONFIGURATION MAP
                                     16K BANKS
                1       2       3       4       5       6       7
        012345670123456701234567012345670123456701234567012345670123
ERRORS          XX
MEMTYPE EEEEEEEPPPPPPPPPPPPPPPPPPPPPPPPEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
CSR     000000001111111122222222222222224444444444444444444444444444
PROTECT PP      I       I       P       I
            1       1       1       1       1       1       1
            0       1       2       3       4       5       6
        456701234567012345670123456701234567012345670123456701234567
ERRORS
MEMTYPE EEEE
CSR     4444
PROTECT


D'splayed are Banks 0 77 Octal (1 meg words).   If  the  Fat  Terminal
Switch  was set (reference section 2.4.1) then all Banks (0-177) would
be shown.  If this was an 18-Bit PDP-11 (eg - 11/23), only  Banks  0-7
would be printed.
The fields:

     ERRORS:

          The siz'ng routine could not write zeros and ones  in  Banks
          10  11, nence they are marked as bad with X's.



     ERRORS:

     MEMTYPE:

          Banks 0-7 are Memory Type E (MSV11-J), and  Banks  10-37  are
          Memory  Type  P  (MSV11-L/P)  and Banks 40-77 are memory type
          E(MSV11-J).  Banks 100-167 do not exist.

     CSR:
```

Banks 0-7 are assigned to CSR 172100, 10-17 to CSR 172102, and 20-37 to interleaved CSR's 172104 and 172106 and banks 40-77 are assigned CSR 17210.

PROTECT:

Banks 0 and 1 are protected because they are program space. Bank 0 and 1 can also be protected because they are in the bottom 16K of an MSV11-L/P CSR. The protection is hierarchical and program space overshadows MSV11-L/P protection. Banks 0 and 1 will not be tested until the program relocates.

7.4 Everything You've Always Wanted To Know About SUPERMAC ...

SUPER-MAC is a set of structured programming macros that allows programs to be written in a high level, easily understood language.

As a general rule, most SUPER-MAC statements can be single-line statements or multiple-line (nested) block statements. A single-line statement must be completed on one source line; no continuation lines are allowed. Single-line statements should be as short and simple as possible. Comments may also be included on a source line. All the general rules, conditions, etc., that govern MACRO 11 also govern SUPER-MAC. Spacing on a source lne is very important. The elements should be separated by a comma or a space. Tabs should never be used for spacing. For example: The expression A+B is interpreted different than A + B.

All the conditional statements can be written as multiple-line nested blocks. Each level of nesting within a block must be terminated with an associated END statement. Each level of nesting should be indented two spaces.

User written macros or assembly language instructions may be included in a program if desired. As a debugging aid, if the symbol LST$$ is defined, it will cause generated code and labels to be listed. All programs must begin with the macro call SMACIT. This call initializes SUPER-MAC. All legal PDP 11 source and destination operands are legal in SUPER-MAC.

```
3368
3369                    7.4.1  Sample Source File -
3370                           .ENABL ABS
3371                           .ENABL AMA
3372                           .MCALL .SUPER
3373                           .SUPER
3374                           ;LST$$=0
3375                           BIT5=40
3376                    A:     0
3377                    B:     0
3378                    C:     0
3379                    D:     0
3380                    E:     0
3381                    F      0
3382                    G:     0
3383                    H:     0
3384                    I:     0
3385                    J:     0
3386                           .PAGE
3387                    ;LET EXAMPLES
3388                           LET R0 := A
3389                           LET B := C + D
3390                           LET E := F +  1
3391                           LET G := H +  2
3392                           LET J := J +  01
3393                           LET A :B= B
3394                    ;IF EXAMPLES
3395                           IF A IS TRUE
3396                             MOV    23,D
3397                           END ;OF IF A
3398                           IF B IS FALSE
3399                             MOV    34,E
3400                           END ;OF IF B
3401                           IF A EQ B THEN LET C := D
3402                           IF A LT B
3403                             MOV   C,D
3404                           ELSE
3405                             MOV   E,D
3406                           END ;OF IF A
3407                           IF A EQ B AND C NE D
3408                             MOV   F,G
3409                           END ;OF IF A
3410                           IF A EQ B OR C NE D
3411                             MOV   F,G
3412                           END ;OF IF A
3413                           IFB A EQ B AND C EQ  1
3414                             MOV   H,J
3415                           ELSE
3416                             MOV   E,J
3417                           END ;OF IFB A
3418                           IFB A EQ B ANDB C EQ  1
3419                             MOV   H,J
3420                           ELSE
3421                             MOV   E,J
```

```
3423                            END ;OF IFB A
3424                            IF RESULT IS EQ
3425                              MOV   A,B
3426                            END ;OF IF RESULT
3427                            IF  BIT5 SET.IN A
3428                              MOV   B,C
3429                            END ;OF IF  BIT5
3430                            IF  BIT5 OFF.IN A
3431                              MOV   C,D
3432                            END ;OF IF  BIT5
3433                    ;ON.ERROR IS LIKE AN IF STATEMENT ON THE C-BIT
3434                    ;ON.ERROR EXAMPLES
3435                            ON.ERROR
3436                              MOV   A,B
3437                            ELSE
3438                              MOV   C,B
3439                            END ;OF ON.ERROR
3440                            ON.NOERROR
3441
3442
3443                              MOV   C,B
3444                            ELSE
3445                              MOV   A,B
3446                            END ;OF ON.NOERROR
3447                            ON.ERROR THEN LET A :B= B
3448                    ;FOR EXAMPLES
3449                            FOR I :=  -5 TO  23
3450                              INC   A
3451                            END ;OF FOR I
3452                            FOR R0 :=  0 TO  140 BY  4
3453                              DEC   A(R0)
3454                            END ;OF FOR R0
3455                            FOR I :=  133 DOWNTO  3 BY  2
3456                              ADD   A,B
3457                            END ;OF FOR I
3458                    ;BEGIN EXAMPLES
3459                            BEGIN ALPHA
3460                              FOR R0 :=  0 TO  167
3461                                MOVB        A(R0),B
3462                                IF B LT  0 THEN LEAVE ALPHA
3463                              END ;OF FOR R0
3464                              FOR R0 :=  400 TO  567
3465                                IF B GE  0 THEN LEAVE ALPHA
3466                              END ;OF FOR R0
3467                            END ALPHA
3468                    ;$RETURN EXAMPLES
3469                            $RETURN
3470                            $RETURN ERROR
3471                            $RETURN NOERROR
3472                    ;CASE EXAMPLES
3473                            MOV     A,R0
3474                            CASE R0
3475                              A
```

```
3477                                    B
3478                                    C
3479                                    D
3480                                    E
3481                                    F
3482                                END ;OF CASE R0
3483
3484                                .END
3485
3486
3487                        7.4.2  Sample Listing File (with No Expanded Macros) - -
3488                        .MAIN.  MACRO M1111  01 APR-79 16:41  PAGE 2
3489
3490
3491                              1 000000                                  .ENABL ABS
3492                              2                                         .ENABL AMA
3493                              3                                         .MCALL .SUPER
3494                              4 000000                                  .SUPER
3495                              5                                         ;LST$$=0
3496                              6          000040                         BIT5=40
3497                              7 000000   000000                  A:     0
3498                              8 000002   000000                  B:     0
3499                              9 000004   000000                  C:     0
3500                             10 000006   000000                  D:     0
3501                             11 000010   000000                  E:     0
3502                             12 000012   000000                  F:     0
3503                             13 000014   000000                  G:     0
3504                             14 000016   000000                  H:     0
3505                             15 000020   000000                  I:     0
3506                             16 000022   000000                  J:     0
3507
3508
3509                        .MAIN.  MACRO M1111  01-APR-79 16:41  PAGE 3
3510
3511
3512                             18                                 ;LET EXAMPLES
3513                             19 000024                                 LET R0 := A
3514                             20 000030                                 LET B := C + D
3515                             21 000044                                 LET E := F +  1
3516                             22 000056                                 LET G := H +  2
3517                             23 000072                                 LET J := J +  01
3518                             24 000100                                 LET A :B= B
3519                             25                                 ;IF EXAMPLES
3520                             26 000106                                 IF A IS TRUE
3521                             27 000114  012737  000023  000006           MOV    23,D
3522                             28 000122                                 END ;OF IF A
3523                             29 000122                                 IF B IS FALSE
3524                             30 000130  012737  000034  000010           MOV    34,E
3525                             31 000136                                 END ;OF IF B
3526                             32 000136                                 IF A EQ B THEN LET C := D
3527                             33 000154                                 IF A LT B
3528                             34 000164  013737  000004  000006           MOV   C,D
3529                             35 000172                                 ELSE
```

```
3531                    36 000174  013737  000010  000006          MOV   E,D
3532                    37 000202                               END ;OF IF A
3533                    38 000202                               IF A EQ B AND C NE D
3534                    39 000222  013737  000012  000014          MOV   F,G
3535                    40 000230                               END ;OF IF A
3536                    41 000230                               IF A EQ B OR C NE D
3537                    42 000250  013737  000012  000014          MOV   F,G
3538                    43 000256                               END ;OF IF A
3539                    44 000256                               IFB A EQ B AND C EQ  1
3540                    45 000276  013737  000016  000022          MOV   H,J
3541                    46 000304                               ELSE
3542                    47 000306  013737  000010  000022          MOV   E,J
3543                    48 000314                               END ;OF IFB A
3544                    49 000314                               IFB A EQ B ANDB C EQ  1
3545                    50 000334  013737  000016  000022          MOV   H,J
3546                    51 000342                               ELSE
3547                    52 000344  013737  000010  000022          MOV   E,J
3548                    53 000352                               END ;OF IFB A
3549                    54 000352                               IF RESULT IS EQ
3550                    55 000354  013737  000000  000002          MOV   A,B
3551                    56 000362                               END ;OF IF RESULT
3552                    57 000362                               IF  BIT5 SET.IN A
3553                    58 000372  013737  000002  000004          MOV   B,C
3554                    59 000400                               END ;OF IF  BIT5
3555                    60 000400                               IF  BIT5 OFF.IN A
3556                    61 000410  013737  000004  000006          MOV   C,D
3557                    62 000416                               END ;OF IF  BIT5
3558                    63                              ;ON.ERROR IS LIKE AN IF STATEMENT ON THE C-BIT
3559                    64                              ;ON.ERROR EXAMPLES
3560                    65 000416                               ON.ERROR
3561                    66 000420  013737  000000  000002          MOV   A,B
3562                    67 000426                               ELSE
3563                    68 000430  013737  000004  000002          MOV   C,B
3564                    69 000436                               END ;OF ON.ERROR
3565                    70 000436                               ON.NOERROR
3566                    71 000440  013737  000004  000002          MOV   C,B
3567                    72 000446                               ELSE
3568                    73 000450  013737  000000  000002          MOV   A,B
3569                    74 000456                               END ;OF ON.NOERROR
3570
3571
3572                .MAIN.  MACRO M1111  01-APR-79 16:41  PAGE 3-1
3573
3574
3575                    75 000456                               ON.ERROR THEN LET A :B= B
3576                    76                              ;FOR EXAMPLES
3577                    77 000466                               FOR I :=  -5 TO  23
3578                    78 000474  005237  000000                 INC   A
3579                    79 000500                               END :OF FOR I
3580                    80 000514                               FOR RO :=  0 TO  140 BY  4
3581                    81 000516  005360  000000                 DEC   A(RO)
3582                    82 000522                               END ;OF FOR RO
3583                    83 000534                               FOR I :=  133 DOWNTO  3 BY  2
```

```
3585                                    84 000542  063737  000000  000002          ADD   A,B
3586                                    85 000550                               END ;OF FOR I
3587                                    86                              ;BEGIN EXAMPLES
3588                                    87 000566                               BEGIN ALPHA
3589                                    88 000566                                 FOR R0 :=  0 TO  167
3590                                    89 000570  116037  000000  000002            MOVB        A(R0),B
3591                                    90 000576                                   IF B LT  0 THEN LEAVE ALPHA
3592                                    91 000604                                 END ;OF FOR R0
3593                                    92 000614                                 FOR R0 :=  400 TO  567
3594                                    93 000620                                   IF B GE  0 THEN LEAVE ALPHA
3595                                    94 000626                                 END ;OF FOR R0
3596                                    95 000636                               END ALPHA
3597                                    96                              ;$RETURN EXAMPLES
3598                                    97 000636                               $RETURN
3599                                    98 000640                               $RETURN ERROR
3600                                    99 000644                               $RETURN NOERROR
3601                                   100                              ;CASE EXAMPLES
3602                                   101 000650  013700  000000               MOV     A,R0
3603                                   102 000654                               CASE R0
3604                                   103 000664  000000                         A
3605                                   104 000666  000002                         B
3606                                   105 000670  000004                         C
3607                                   106 000672  000006                         D
3608                                   107 000674  000010                         E
3609                                   108 000676  000012                         F
3610                                   109 000700                               END ;OF CASE R0
3611                                   110
3612                                   111         000001                       .END
3613
3614                          7.4.3  Sample Listing File (with Expanded Macros) - -
3615                          .MAIN.  MACRO M1111  01-APR-79 16:10  PAGE 2
3616
3617
3618                                     1 000000                               .ENABL ABS
3619                                     2                                      .ENABL AMA
3620                                     3                                      .MCALL .SUPER
3621                                     4 000000                               .SUPER
3622                                     5           000000                     LST$$=0
3623                                     6           000040                     BIT5=40
3624                                     7 000000    000000          A:         0
3625                                     8 000002    000000          B:         0
3626                                     9 000004    000000          C:         0
3627                                    10 000006    000000          D:         0
3628                                    11 000010    000000          E:         0
3629                                    12 000012    000000          F:         0
3630                                    13 000014    000000          G:         0
3631                                    14 000016    000000          H:         0
3632                                    15 000020    000000          I:         0
3633                                    16 000022    000000          J:         0
3634
3635
3636                          .MAIN.  MACRO M1111  01-APR-79 16:10  PAGE 3
```

```
                                        ;LET EXAMPLES
                                                LET R0 := A
000024  013700  000000                          MOV A,R0
                                                LET B := C + D
000030  013737  000004  000002                  MOV C,B
000036  063737  000006  000002                  ADD D,B
                                                LET E := F +  1
000044  013737  000012  000010                  MOV F,E
000052  005237  000010                          INC E
                                                LET G := H +  2
000056  013737  000016  000014                  MOV H,G
000064  062737  000002  000014                  ADD  2,G
                                                LET J := J +  01
000072  062737  000001  000022                  ADD  01,J
                                                LET A :B= B
000100  113737  000002  000000                  MOVB B,A
                                        ;IF EXAMPLES
                                                IF A IS TRUE
000106  005737  000000                          TST A
000112  001403                                  BEQ L0
000114  012737  000023  000006                    MOV    23,D
                                                END ;OF IF A
                                        L0:
                                                IF B IS FALSE
000122  005737  000002                          TST B
000126  001003                                  BNE L1
000130  012737  000034  000010                    MOV    34,E
                                                END ;OF IF B
                                        L1:
                                                IF A EQ B THEN LET C :- D
000136  023737  000000  000002                  CMP A,B
000144  001003                                  BNE L2
000146  013737  000006  000004                  MOV D,C
                                        L2:
                                                IF A LT B
000154  023737  000000  000002                  CMP A,B
000162  002004                                  BGE L3
000164  013737  000004  000006                    MOV   C,D
                                                ELSE
000172  000403                                  BR L4
                                        L3:
000174  013737  000010  000006                    MOV   E,D
                                                END ;OF IF A
                                        L4:
                                                IF A EQ B AND C NE D
000202  023737  000000  000002                  CMP A,B
000210  001007                                  BNE L5
000212  023737  000004  000006                  CMP C,D
000220  001403                                  BEQ L5
000222  013737  000012  000014                    MOV   F,G
                                                END ;OF IF A
```

```
                 000230                                   L5:
              41 000230                                             IF A EQ B OR C NE D
                 000230   023737   000000   000002                  CMP A,B
                 000236   001404                                    BEQ L6
                 000240   023737   000004   000006                  CMP C,D
                 000246   001403                                    BEQ L7


          .MAIN.  MACRO M1111  01-APR 79 16:10  PAGE 3-1


                 000250                                   L6:
              42 000250   013737   000012   000014                    MOV   F,G
              43 000256                                             END ;OF IF A
                 000256                                   L7:
              44 000256                                             IFB A EQ B AND C EQ  1
                 000256   123737   000000   000002                  CMPB A,B
                 000264   001010                                    BNE L10
                 000266   023727   000004   000001                  CMP C, 1
                 000274   001004                                    BNE L10
              45 000276   013737   000016   000022                    MOV   H,J
              46 000304                                             ELSE
                 000304   000403                                    BR L11
                 000306                                   L10:
              47 000306   013737   000010   000022                    MOV   E,J
              48 000314                                             END ;OF IFB A
                 000314                                   L11:
              49 000314                                             IFB A EQ B ANDB C EQ  1
                 000314   123737   000000   000002                  CMPB A,B
                 000322   001010                                    BNE L12
                 000324   123727   000004   000001                  CMPB C, 1
                 000332   001004                                    BNE L12
              50 000334   013737   000016   000022                    MOV   H,J
              51 000342                                             ELSE
                 000342   000403                                    BR L13
                 000344                                   L12:
              52 000344   013737   000010   000022                    MOV   E,J
              53 000352                                             END ;OF IFB A
                 000352                                   L13:
              54 000352                                             IF RESULT IS EQ
                 000352   001003                                    BNE L14
              55 000354   013737   000000   000002                    MOV   A,B
              56 000362                                             END ;OF IF RESULT
                 000362                                   L14:
              57 000362                                             IF  BIT5 SET.IN A
                 000362   032737   000040   000000                  BIT  BIT5,A
                 000370   001403                                    BEQ L15
              58 000372   013737   000002   000004                    MOV   B,C
              59 000400                                             END ;OF IF  BIT5
                 000400                                   L15:
              60 000400                                             IF  BIT5 OFF.IN A

                 000400   032737   000040   000000                  BIT  BIT5,A
```

```
3744                            61 000410  013737  000004  000006          MOV   C,D
3745
3746                            62 000416                               END ;OF IF  BIT5
3747                               000416                       L16:
3748                            63                              ;ON.ERROR IS LIKE AN IF STATEMENT ON THE C-BIT
3749                            64                              ;ON.ERROR EXAMPLES
3750                            65 000416                               ON.ERROR
3751                               000416  103004                       BCC L17
3752                            66 000420  013737  000000  000002          MOV   A,B
3753                            67 000426                               ELSE
3754                               000426  000403                       BR L20
3755                               000430                       L17:
3756
3757                            68 000430  013737  000004  000002          MOV   C,B
3758
3759                            69 000436                               END ;OF ON.ERROR
3760                               000436                       L20:
3761                            70 000436                               ON.NOERROR
3762
3763
3764                          .MAIN.  MACRO M1111  01-APR-79 16:10  PAGE 3-2
3765
3766
3767                               000436  103404                       BCS L21
3768                            71 000440  013737  000004  000002          MOV   C,B
3769                            72 000446                               ELSE
3770                               000446  000403                       BR L22
3771                               000450                       L21:
3772                            73 000450  013737  000000  000002          MOV   A,B
3773                            74 000456                               END ;OF ON.NOERROR
3774                               000456                       L22:
3775                            75 000456                               ON.ERROR THEN LET A :B  B
3776                               000456  103003                       BCC L23
3777                               000460  113737  000002  000000       MOVB B,A
3778                               000466                       L23:
3779                            76                              ;FOR EXAMPLES
3780                            77 000466                               FOR I :=  -5 TO  23
3781                               000466  012737  177773  000020       MOV  -5,I
3782                               000474                       B0:
3783                            78 000474  005237  000000                 INC   A
3784                            79 000500                               END ;OF FOR I
3785                               000500  005237  000020               INC I
3786                               000504  023727  000020  000023       CMP I, 23
3787                               000512  003770                       BLE B0
3788                               000514                       E0:
3789                            80 000514                               FOR R0 :=  0 TO  140 BY  4
3790                               000514  005000                       CLR R0
3791                               000516                       B1:
3792                            81 000516  005360  000000                 DEC   A(R0)
3793                            82 000522                               END ;OF FOR R0
3794                               000522  062700  00000                ADD  4,R0
3795                               000526  020027  000140               CMP R0, 140
```

```
                        000532  003771                  BLE B1
                        000534                  E1:
                    83  000534                          FOR I :=  133 DOWNTO  3 BY  2
                        000534  012737  000133  000020  MOV  133,I
                        000542                  B2:
                    84  000542  063737  000000  000002    ADD   A,B
                    85  000550                          END ;OF FOR I
                        000550  162737  000002  000020  SUB  2,I
                        000556  023727  000020  000003  CMP I, 3
                        000564  002366                  BGE B2
                        000566                  E2:
                    86                          ;BEGIN EXAMPLES
                    87  000566                          BEGIN ALPHA
                        000566                  B3:
                    88  000566                            FOR R0 :=  0 TO  167
                        000566  005000                  CLR R0
                        000570                  B4:
                    89  000570  116037  000000  000002      MOVB        A(R0),B
                    90  000576                            IF B LT  0 THEN LEAVE ALPHA
                        000576  005737  000002            TST B
                        000602  002415                    BLT E3
                    91  000604                            END ;OF FOR R0
                        000604  005200                    INC R0
                        000606  020027  000167            CMP R0, 167
                        000612  003766                    BLE B4
                        000614                  E4:
                    92  000614                            FOR R0 :=  400 TO  567
                        000614  012700  000400            MOV  400,R0


.MAIN.  MACRO M1111  01-APR-79 16:10  PAGE 3-3


                        000620                  B5:
                    93  000620                            IF B GE  0 THEN LEAVE ALPHA
                        000620  005737  000002            TST B
                        000624  002004                    BGE E3
                    94  000626                            END ;OF FOR R0
                        000626  005200                    INC R0
                        000630  020027  000567            CMP R0, 567
                        000634  003771                    BLE B5
                        000636                  E5:
                    95  000636                          END ALPHA
                        000636                  E3:
                    96                          ;$RETURN EXAMPLES
                    97  000636                          $RETURN
                        000636  000207                  RTS PC
                    98  000640                          $RETURN ERROR
                        000640  000261                  SEC
                        000642  000207                  RTS PC
                    99  000644                          $RETURN NOERROR
                        000644  000241                  CLC
                        000646  000207                  RTS PC
```

```
                        100
                        101 000650  013700  000000          ;CASE EXAMPLES
                        102 000654                          MOV     A,R0
                            000654  010046                  CASE R0
                            000656  006316                  MOV R0,-(SP)
                            000660  004737  000700          ASL @SP
                        103 000664  000000                  JSR PC,L24
                        104 000666  000002                    A
                        105 000670  000004                    B
                        106 000672  000006                    C
                        107 000674  000010                    D
                        108 000676  000012                    E
                        109 000700                            F
                            000700                          END ;OF CASE R0
                            000700                      L24:
                            000700  062616                  ADD (SP)+,@SP
                            000702  013646                  MOV @(SP)+,-(SP)
                            000704  004736                  JSR PC,@(SP)+
                        110
                        111         000001                  .END
```

7.5 Memory Management Mapping

7.5.1 Memory Management Mapping For The 11/83 -

PAR	SUPERVISOR	KERNEL	USER
0	Program	Program	Dst Bk/Fst Mem
1	Program	Program	Src Bk/Fst Mem
2	Program	Program	Src Bk/Fst Mem
3	Test Area	Program	Src Bk/Fst Mem
4	Test Area	Program	Dst Bk/Fst Mem
5	Test Area	Program	Dst Bk/Fst Mem
6	Test Area	Map to CSR's	Dst Bk/Fst Mem
7	Perif Page	Perif Page	Dst Bk/Fst Mem

7.5.2 Memory Management Mapping For QBUS-11's With Supervisor Mode (eg 11/23B) -

PAR	SUPERVISOR	KERNEL	USER
0	Program	Program	Dst Bk
1	Program	Program	Src Bk
2	Program	Program	Src Bk
3	Test Area	Program	Src Bk
4	Test Area	Program	Dst Bk
5	Test Area	Program	Dst Bk
6	Test Area	Map to CSR's	Dst Bk
7	Perif Page	Perif Page	Dst Bk

```
3902
3903                    7.5.3  Memory Management Mapping For QBUS-11's W/o Supervisor Mode (eg 11/2³) -
3904
3905                    PAR             KERNEL                  USER
3906                    ---             - ----                    -
3907                    0               Program                 Program/Dst Bk
3908                    1               Program                 Program/Src Bk
3909                    2               Program                 Program/Src Bk
3910                    3               Program                 Test Area/Src Bk
3911                    4               Program                 Test Area/Dst Bk
3912                    5               Program                 Test Area/Dst Bk
3913                    6               Map to CSR's            Test Area/Dst Bk
3914                    7               Perif Page              Perif Page/Dst Bk
3916
```

```
                                .LIST  TOC
                                .ENABL  ABS
                                .ENABL  AMA
                                .DSABL  GBL
                                ;NOTE:  CVMJAO.SML IS THE SUPER.MAC SOURCE AND IS RELEASED WITH
                                ;THIS PROGRAM.  ALL THESE .MCALL STATEMENTS REFERENCE THAT FILE.
                                .MCALL  SMACIT,..PUSH,..POP,..TAG,..BRAN,.EMIT,.EMITN,.EMITL,.EMITR
                                .MCALL  .IFOPR,.IS,.GENBR,.OPADD,.OPSUB,CLEAR,SET,CLEARB,SETB
                                .MCALL  RNE,REQ,RLT,RGE,RGT,RLE,RPL,RMI,RHI,RLOS,RHIS,RLO,RCS,RCC
                                .MCALL  IF,.OR,.IFARI,.LEAVE,.GOTO,OR,AND,THEN,ELSE,WHILE,CASE
                                .MCALL  FOR,TO,DOWNTO,REPEAT,UNTIL,THRU,END,BEGIN
                                .MCALL  $$END,LEAVE,JUMPTO,GOTO,PUSH,POP,LET
                                .MCALL  .SIMPLE,.ARITH,ORB,ANDB,IFB,UNTILB,WHILEB,ON.ERROR,ON.NOERROR
                                .MCALL  $CALL,$RETURN

                                .NLIST  TTM                     ;I WANT FAT PAPER!
                                .LIST   MC,SYM                  ;LIST MACRO CALLS, SYMBOL TABLE
                                .NLIST  MD,CND,ME               ;DON'T LIST MACRO DEFS & CONDITIONALS & EXPANSIONS
000000          000000          LST$$=  0                       ;DEFINED TO LIST SUPERMAC EXPANSIONS
000000          163000          $SWR=   163000                  ;USE THESE SYSMAC SWITCHES
000000          000001          $TN=    1                       ;FIRST TEST NUMBER TO ONE(1)
000000                          SMACIT
```

```
                                .SBTTL  DEFINE  TRAPS
                        ;ALL ENTRIES HERE MUST HAVE A CORRESPONDING ENTRY IN THE
                        ;TRAP TABLE "$TRPAD" (NEAR END OF PROGRAM).
                        ;*TRAP DEFINITIONS
                        ;
                        ;HERE IS HOW TRAPS WORK IN THIS PROGRAM
                        ;
                        ;ALL TRAPS EXECUTE A "TRAP" INSTRUCTION WHICH TAKES THE PROGRAM
                        ;TO SYMBOLIC LOCATION "$TRAP"
                        ;
                        ;AT $TRAP THE PROGRAM PICKS UP THE RIGHT BYTE OF THE TRAP INSTRUCTION
                        ;AND INDEXES INTO A TABLE AT LOCATION "$TRPAD" WHICH SENDS THE PROGRAM TO
                        ;THE SPECIFIC ROUTINE TO HANDLE THAT SPECIFIC TRAPS TASK.
                        ;
                        ;THE ULTIMATE DESTINATION OF A TRAP INSTRUCTION CAN BE GUESSED AT AS FOLLOWS
                        ;
                        ;EXAMPLE:       NOP
                        ;               NOP
                        ;               NOP
                        ;               KERNEL                  ;ENTER KERNFL MODE
                        ;               NOP
                        ;
                        ;       ADD A DOLLAR SIGN TO THE SYMBOLIC NAME AND CHECK THE CRF FOR SOMETHING CLOSE
                        ;       IN THIS CASE THE CRF HAS $KERNE LISTED AS 032546
                        ;       AT LOCATION 32546 YOU FIND THE ROUTINE $KERNEL
                        ;
                        ;       NOTE THAT CRF SYMBOLS ARE TRUCNATED TO 6 CHARACTERS
                        ;       SYMBOLIC NAMES GREATER THAT 6 CHARACTERS ARE USED SO I CAN
                        ;       REMEMBER WHAT THEY MEAN!
                        ;
                        ;       ALL GOOD TRAP ROUTINES RETURN VIA AN "RTI" INSTRUCTION
104401                  TYPEIT= 104401          ;;TTY TYPEOUT ROUTINE
104402                  TYPOC=  104402          ;;TYPE OCTAL NUMBER (WITH LEADING ZEROS)
104403                  TYPOS=  104403          ;;TYPE OCTAL NUMBER (NO LEADING ZEROS)
                        ;TYPON= 104404          ;;TYPE OCTAL NUMBER (AS PER LAST CALL)
104405                  TYPDS=  104405          ;;TYPE DECIMAL NUMBER (WITH SIGN)
                        ;TYPBN= 104406          ;;TYPE BINARY (ASCII) NUMBER

104407                  GTSWR=  104407          ;;GET SOFT-SWR SETTING
104410                  CKSWR=  104410          ;;TEST FOR CHANGE IN SOFT-SWR

104411                  RDCHR=  104411          ;;TTY TYPEIN CHARACTER ROUTINE
104412                  RDLIN=  104412          ;;TTY TYPEIN STRING ROUTINE
104413                  RDOCT=  104413          ;;READ AN OCTAL NUMBER FROM TTY
104414                  RDDEC=  104414          ;;READ A DECIMAL NUMBER FROM TTY

104415                  SAVREG= 104415          ;;SAVE R0-R5 ROUTINE
104416                  RESREG= 104416          ;;RESTORE R0-R5 ROUTINE

104417                  KERNEL= 104417          ;ENTER KERNEL MODE

104420                  ENERGIZE=104420         ;TURN ON MEMORY MANAGEMENT & TRAPS
104421                  DEENERGIZE=104421       ;TURN OFF MEMORY MANAGEMENT & TRAPS
104422                  KMAP=   104422          ;MAP KERNEL 1 TO 1

104423                  CACHON= 104423          ;TURN ON CACHE
104424                  CACHOFF=104424          ;TURN OFF CACHE
```

```
 3999
 4000          104425                  LOADCSR=104425          ;LOAD CORRECT CSR
 4001          104426                  READCSR=104426          ;READ CORRECT CSR
 4002
 4003          104427                  PERR01= 104427          ;PROGRAM DETECTED ERROR
 4004          104430                  PERR02= 104430          ;PROGRAM DETECTED ERROR
 4005          104431                  PERR03= 104431          ;PROGRAM DETECTED ERROR
 4006          104432                  PERR04= 104432          ;PROGRAM DETECTED ERROR
 4007          104433                  PERR07= 104433          ;PROGRAM DETECTED ERROR
 4008          104434                  PERR10= 104434          ;PROGRAM DETECTED ERROR
 4009          104435                  PERR11= 104435          ;PROGRAM DETECTED ERROR
 4010          104436                  PERR12= 104436          ;PROGRAM DETECTED ERROR
 4011          104437                  PERR13= 104437          ;PROGRAM DETECTED ERROR
 4012          104440                  PERR14= 104440          ;PROGRAM DETECTED ERROR
 4013          104441                  PERR15= 104441          ;PROGRAM DETECTED ERROR
 4014          104442                  PERR16= 104442          ;PROGRAM DETECTED ERROR
 4015          104443                  PERR17= 104443          ;PROGRAM DETECTED ERROR
 4016          104444                  PERR20= 104444          ;PROGRAM DETECTED ERROR
 4017          104445                  PERR21= 104445          ;PROGRAM DETECTED ERROR
 4018          104446                  PERR22= 104446          ;PROGRAM DETECTED ERROR
 4019          104447                  PERR23= 104447          ;PROGRAM DETECTED ERROR
 4020          104450                  PERR24= 104450          ;PROGRAM DETECTED ERROR
 4021          104451                  PERR25= 104451          ;PROGRAM DETECTED ERROR
 4022          104452                  PERR26= 104452          ;PROGRAM DETECTED ERROR
 4023          104453                  PERR27= 104453          ;PROGRAM DETECTED ERROR
 4024          104454                  PERR30= 104454          ;PROGRAM DETECTED ERROR
 4025          104455                  PERR31= 104455          ;PROGRAM DETECTED ERROR
 4026          104456                  PERR32= 104456          ;PROGRAM DETECTED ERROR
 4027          104457                  PERR33= 104457          ;PROGRAM DETECTED ERROR
 4028          104460                  PERR34= 104460          ;PROGRAM DETECTED ERROR
 4029          104461                  PERR35= 104461          ;PROGRAM DETECTED ERROR
 4030          104462                  PERR36= 104462          ;PROGRAM DETECTED ERROR
 4031          104463                  PERR37= 104463          ;PROGRAM DETECTED ERROR
 4032          104464                  PERR40= 104464          ;PROGRAM DETECTED ERROR
 4033          104465                  PERR41= 104465          ;PROGRAM DETECTED ERROR
 4034          104466                  PERR42= 104466          ;PROGRAM DETECTED ERROR
 4035          104467                  PERR43= 104467          ;PROGRAM DETECTED ERROR
 4036
 4037          104470                  ECCDIS= 104470          ;DISABLE ECC ON ALL CSR'S
 4038          104471                  ECC1DIS=104471          ;DISABLE ECC ON 1 SELECTED CSR
 4039          104472                  ECCINIT=104472          ;INITIALIZE ALL ECC CSR'S
 4040          104473                  ECC1INIT=104473         ;INITIALIZE 1 SELECTED ECC CSR
 4041          104474                  CBCSR=  104474          ;WRITE GENERATED CHECKBITS IN ALL CSR'S
 4042          104475                  CB1CSR= 104475          ;WRITE GENERATED CHECKBITS IN 1 SELECTED CSR
 4043          104476                  WASSBE= 104476          ;WAS THERE A SBE ON ANY CSR?
 4044          104477                  WAS1SBE=104477          ;WAS THERE A SBE ON 1 SELECTED CSR?
 4045          104500                  WASDBE= 104500          ;WAS THERE A DBE ON ANY CSR?
 4046          104501                  WAS1DBE=104501          ;WAS THERE A DBE ON 1 SELECTED CSR?
 4047          104502                  CLRCSR= 104502          ;CLEAR ALL CSR'S
 4048          104503                  CLR1CSR=104503          ;CLEAR 1 SELECTED CSR
 4049          104504                  CHKDIS= 104504          ;DISABLE ECC & WRITE CHECKBITS FROM ALL CSR'S
 4050          104505                  CHK1DIS=104505          ;DISABLE ECC & WRITE CHECKBITS FROM 1 SELECTED CSR
 4051          104506                  ENASBE= 104506          ;ENABLE TRAPS ON SBE'S FROM ALL CSR'S
 4052          104507                  ENA1SBE=104507          ;ENABLE TRAPS ON SBE'S FROM 1 SELECTED CSR
 4053          104510                  TSTREAD=104510          ;TEST LOC (R1) & TST FOR SBE (WITHOUT FETCHES)
 4054          104511                  INVALID=104511          ;INVALIDATE BACKGROUND PATTERN ON "BANK"
 4055          104512                  ERRGEN =104512          ;CHECK ERROR ADDRESS
```

```
 4056          104513                  CBREG  =104513          ;ENABLES CHECKBIT REGISTER
 4057          104514                  SYNREG  =104514          ;ENABLES SYNDROME BIT REGISTER
```

```
                                .SBTTL  DEFINE  BASIC PDP11 STUFF

                        ;*INITIAL ADDRESS OF THE STACK POINTER
002000                  STACK=  2000            ;;FIRST ADDRESS OF THE STACK
002000                  KERSTK= STACK           ;;KERNEL STACK
000740                  SUPSTK= 740             ;;SUPERVISOR STACK
000700                  USESTK= 700             ;;USER STACK
104000                  ERROR=EMT               ;;BASIC DEFINITION OF ERROR CALL
000004                  SCOPE=IOT               ;;BASIC DEFINITION OF SCOPE CALL
177776                  PSW=    177776          ;;PROCESSOR STATUS WORD
                        ;STKLMT=177774          ;;STACK LIMIT REGISTER
                        ;PIRQ=  177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                  DSWR=   177570          ;;HARDWARE SWITCH REGISTER
177570                  DDISP=  177570          ;;HARDWARE DISPLAY REGISTER
177546                  LKS=    177546          ;;LINE CLOCK (KW11-L) STATUS REGISTER

                        ;*MISCELLANEOUS DEFINITIONS
000011                  HT=     11              ;;CODE FOR HORIZONTAL TAB
000012                  LF=     12              ;;CODE LINE FEED
000015                  CR=     15              ;;CODE CARRIAGE RETURN
000200                  CRLF=   200             ;;CODE FOR CARRIAGE RETURN-LINE FEED
000007                  MFPT=   7               ;;CODE FOR PROCESSOR TYPE INSTRUCTION

                        ;*GENERAL PURPOSE REGISTER DEFINITIONS
                        ;SP=R6                 ;;STACK POINTER
                        ;KSP=SP                ;;KERNEL STACK POINTER
000006                  SSP=SP                  ;;SUPERVISOR STACK POINTER
000006                  USP=SP                  ;;USER STACK POINTER
                        ;PC=R7                 ;;PROGRAM COUNTER

                        ;*"SWITCH REGISTER" SWITCH DEFINITIONS
100000                  SW15=   100000
040000                  SW14=   40000
020000                  SW13=   20000
010000                  SW12=   10000
004000                  SW11=   4000
002000                  SW10=   2000
001000                  SW9=    1000
000400                  SW8=    400
000200                  SW7=    200
000100                  SW6=    100
000040                  SW5=    40
000020                  SW4=    20
000010                  SW3=    10
000004                  SW2=    4
000002                  SW1=    2
000001                  SW0=    1

                        ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
100000                  BIT15=  100000
040000                  BIT14=  40000
020000                  BIT13=  20000
010000                  BIT12=  10000
004000                  BIT11=  4000
002000                  BIT10=  2000
001000                  BIT9=   1000
000400                  BIT8=   400
```

```
 4117          000200                  BIT7=   200
 4118          000100                  BIT6=   100
 4119          000040                  BIT5=   40
 4120          000020                  BIT4=   20
 4121          000010                  BIT3=   10
 4122          000004                  BIT2=   4
 4123          000002                  BIT1=   2
 4124          000001                  BIT0=   1
 4125
 4126                                  ;*BASIC "CPU" TRAP VECTOR ADDRESSES
 4127          000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
 4128          000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
 4129                                  ;TBITVEC=14             ;;"T" BIT
 4130                                  ;TRTVEC=        14              ;;TRACE TRAP
 4131                                  ;BPTVEC=        14              ;;BREAKPOINT TRAP (BPT)
 4132          000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
 4133          000024                  PWRVEC= 24              ;;POWER FAIL
 4134          000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
 4135          000034                  TRAPVEC=34              ;;"TRAP" TRAP
 4136          000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
 4137                                  ;TPVEC= 64              ;;TTY PRINTER VECTOR
 4138                                  ;LKVEC= 100             ;;LINE CLOCK (KW11-L) VECTER
 4139          000114                  CACHVEC=114             ;;CACHE ERROR INTERRUPT VECTOR
 4140          000114                  PARVEC=CACHVEC
 4141                                  ;PIRQVEC=240            ;;PROGRAM INTERRUPT REQUEST VECTOR
 4142          000250                  MMVEC=  250             ;;MEMORY MANAGEMENT VECTOR
 4143                                          .SBTTL  DEFINE  CACHE REGISTERS
 4144                                  ;MEMERR = 177744                ;;CACHE ERROR REGISTER
 4145          177746                  CONTRL  = 177746                ;;MEMORY CONTROL REGISTER
 4146          177750                  MAINT   = 177750                ;;MEMORY MAINTENENCE REGISTER
 4147                                  ;HITMIS = 177752                ;;HIT MISS REGISTER "1" IMPLIES HIT IN CACHE
 4148          177754                  DATARG  = 177754                ;;DATA REGISTER
 4149
 4150                                          .SBTTL  DEFINE  CPU REGISTERS
 4151          177766                  CPUERR = 177766         ;;CPU ERROR REGISTER HOLDS CONDITION THAT CAUSED
 4152
 4153                                          .SBTTL  DEFINE  MEMORY MANAGEMENT REGISTERS
 4154                                          ;*MEMORY MANAGEMENT STATUS REGISTER ADDRESSES
 4155          177572                  MMR0=   177572
 4156          177574                  MMR1=   177574
 4157          177576                  MMR2=   177576
 4158          172516                  MMR3=   172516
 4159
 4160                                          ;*USER "I" PAGE DESCRIPTOR REGISTERS
 4161          177600                  UIPDR0= 177600
 4162                                  ;UIPDR1=        177602
 4163                                  ;UIPDR2=        177604
 4164                                  ;UIPDR3=        177606
 4165                                  ;UIPDR4=        177610
 4166                                  ;UIPDR5=        177612
 4167                                  ;UIPDR6=        177614
 4168                                  ;UIPDR7=        177616
 4169
 4170                                  ;*USER "D" PAGE DESCRIPTOR REGISTORS
 4171                                  ;UDPDR0=        177620
 4172                                  ;UDPDR1=        177622
 4173                                  ;UDPDR2=        177624
```

```
                        ;UDPDR3=        177626
                        ;UDPDR4=        177630
                        ;UDPDR5=        177632
                        ;UDPDR6=        177634
                        ;UDPDR7=        177636

                                ;*USER "I" PAGE ADDRESS REGISTERS
177640                  FASTCITY=UIPAR0
177640                  UIPAR0= 177640          ;PATTERN PROGRAM SPACE
177642                  UIPAR1= 177642          ;PATTERN PROGRAM SPACE
177644                  UIPAR2= 177644          ;PATTERN PROGRAM SPACE
177646                  UIPAR3= 177646          ;PATTERN PROGRAM SPACE
177650                  UIPAR4= 177650          ;PATTERN PROGRAM SPACE
177652                  UIPAR5= 177652          ;PATTERN PROGRAM SPACE
177654                  UIPAR6= 177654          ;PATTERN PROGRAM SPACE
                        ;UIPAR7=        177656          ;PATTERN PROGRAM SPACE

                                ;*USER "D" PAGE ADDRESS REGISTERS
177660                  UDPAR0= 177660          ;PATTERN PROGRAM SPACE
                        ;UDPAR1=        177662          ;PATTERN PROGRAM SPACE
                        ;UDPAR2=        177664          ;PATTERN PROGRAM SPACE
                        ;UDPAR3=        177666          ;PATTERN PROGRAM SPACE
                        ;UDPAR4=        177670          ;PATTERN PROGRAM SPACE
                        ;UDPAR5=        177672          ;PATTERN PROGRAM SPACE
                        ;UDPAR6=        177674          ;PATTERN PROGRAM SPACE
177676                  UDPAR7= 177676          ;PATTERN PROGRAM SPACE

                                ;*SUPERVISOR "I" PAGE DESCRIPTOR REGISTERS
172200                  SIPDR0= 172200
                        ;SIPDR1=        172202
                        ;SIPDR2=        172204
                        ;SIPDR3=        172206
                        ;SIPDR4=        172210
                        ;SIPDR5=        172212
                        ;SIPDR6=        172214
                        ;SIPDR7=        172216

                                ;*SUPERVISOR "D" PAGE DESCRIPTOR REGISTERS
                        ;SDPDR0=        172220
                        ;SDPDR1=        172222
                        ;SDPDR2=        172224
                        ;SDPDR3=        172226
                        ;SDPDR4=        172230
                        ;SDPDR5=        172232
                        ;SDPDR6=        172234
                        ;SDPDR7=        172236

                                ;*SUPERVISOR "I" PAGE ADDRESS REGISTERS
172240                   SIPAR0=        172240
                        ;SIPAR1=        172242
                        ;SIPAR2=        172244
172246                   SIPAR3=        172246                  ;TEST AREA
                        ;SIPAR4=        172250                  ;TEST AREA
172252                   SIPAR5=        172252                  ;TEST AREA
172254                   SIPAR6=        172254                  ;TEST AREA
                        ;SIPAR7=        172256
```

```
                                        ;*SUPERVISOR "D" PAGE ADDRESS REGISTERS
172260                          SDPAR0=         172260
                               ;SDPAR1=         172262
                               ;SDPAR2=         172264
                               ;SDPAR3=         172266
                               ;SDPAR4=         172270
172272                          SDPAR5=         172272
172274                          SDPAR6=         172274
172276                          SDPAR7=         172276

                                        ;*KERNEL "I" PAGE DESCRIPTOR REGISTERS
172300                          KIPDR0-         172300
                               ;KIPDR1=         172302
                               ;KIPDR2=         172304
                               ;KIPDR3=         172306
                               ;KIPDR4=         172310
                               ;KIPDR5=         172312
                               ;KIPDR6=         172314
                               ;KIPDR7=         172316

                                        ;*KERNEL "D" PAGE DESCRIPTOR REGISTERS
                               ;KDPDR0=         172320
                               ;KDPDR1=         172322
                               ;KDPDR2=         172324
                               ;KDPDR3=         172326
                               ;KDPDR4=         172330
                               ;KDPDR5=         172332
                               ;KDPDR6=         172334
                               ;KDPDR7=         172336

                                        ;*KERNEL "I" PAGE ADDRESS REGISTERS
172340                          KIPAR0=         172340
                               ;KIPAR1=         172342
                               ;KIPAR2=         172344
                               ;KIPAR3=         172346
172350                          KIPAR4=         172350
172352                          KIPAR5=         172352
172354                          KIPAR6=         172354
                               ;KIPAR7=         172356

                                        ;*KERNEL "D" PAGE ADDRESS REGISTERS
172360                          KDPAR0=         172360
                               ;KDPAR1=         172362
                               ;KDPAR2=         172364
                               ;KDPAR3=         172366
                               ;KDPAR4=         172370
                               ;KDPAR5=         172372
172374                          KDPAR6=         172374
172376                          KDPAR7=         172376
```

```
                                        .SBTTL  DEFINE  Q-BUS MAP REGISTERS
                                        ;*THE LOWER 16 BITS OF THE MAP REGISTERS ARE LABELED 'MAPLXX'
                                        ;*THE UPPER 6 BITS OF THE MAP REGISTERS ARE LABELED 'MAPHXX'
170200                          MAPL0 = 170200
170202                          MAPH0 = 170202
170204                          MAPL1 = 170204
                               ;MAPH1 = 170206
                               ;MAPL2 = 170210
                               ;MAPH2 = 170212
                               ;MAPL3 = 170214
                               ;MAPH3 = 170216
                               ;MAPL4 = 170220
                               ;MAPH4 = 170222
                               ;MAPL5 = 170224
                               ;MAPH5 = 170226
                               ;MAPL6 = 170230
                               ;MAPH6 = 170232
                               ;MAPL7 = 170234
                               ;MAPH7 = 170236
                               ;MAPL10 = 170240
                               ;MAPH10 = 170242
                               ;MAPL11 = 170244
                               ;MAPH11 = 170246
                               ;MAPL12 = 170250
                               ;MAPH12 = 170252
                               ;MAPL13 = 170254
                               ;MAPH13 = 170256
                               ;MAPL14 = 170260
                               ;MAPH14 = 170262
                               ;MAPL15 = 170264
                               ;MAPH15 = 170266
                               ;MAPL16 = 170270
                               ;MAPH16 = 170272
                               ;MAPL17 = 170274
                               ;MAPH17 = 170276
                               ;MAPL20 = 170300
                               ;MAPH20 = 170302
                               ;MAPL21 = 170304
                               ;MAPH21 = 170306
                               ;MAPL22 = 170310
                               ;MAPH22 = 170312
                               ;MAPL23 = 170314
                               ;MAPH23 = 170316
                               ;MAPL24 = 170320
                               ;MAPH24 = 170320
                               ;MAPL25 = 170324
                               ;MAPH25 = 170326
                               ;MAPL26 = 170330
                               ;MAPH26 = 170332
                               ;MAPL27 = 170334
                               ;MAPH27 = 170336
                               ;MAPL30 = 170340
                               ;MAPH30 = 170342
                               ;MAPL31 = 170344
                               ;MAPH31 = 170346
                               ;MAPL32 = 170350
                               ;MAPH32 = 170352
```

```
                        ;MAPL33 = 170354
                        ;MAPH33 = 170356
                        ;MAPL34 = 170360
                        ;MAPH34 = 170362
                        ;MAPL35 = 170364
                        ;MAPH35 = 170366
                        ;MAPL36 = 170370
                        ;MAPH36 = 170372
                        ;MAPL37 = 170374
                        ;MAPH37 = 170376


                                .SBTTL  DEFINE  SOFTWARE SWITCH & DISPLAY REGISTERS
000174                  DISPREG=174
000176                  SWREG=  176

                                .SBTTL  DEFINE  CONTROL STATUS REGISTERS
172100                  CSRADD=172100

                                .SBTTL  DEFINE  PARAMETERS
060000                  FIRST=60000                     ;START OF THE 16K TEST PATTERN AREA
157776                  LAST=157776                     ;END OF THE 16K TEST PATTERN AREA
040000                  SIZE=40000                      ;SIZE OF THE 16K TEST PATTERN AREA (FOR SOB INSTRUCTIONS)
```

```
                        .LIST   MD                      ;BE NICE TO SEE MY DEFINITIONS
                        .SBTTL  MACRO   FATAL
                ;********************* FATAL *************************
                ;
                ;FATAL IS USED TO REPORT FATAL ERRORS (ERRORS THAT PREVENT
                ;       THE PROGRAM FROM CONTINUING).
                ;
                ;*****************************************************
                        .MACRO  FATAL   ARG             ;***MACRO***MACRO***MACRO***
                        .NLIST
                        .DSABL  CRF
                        .IIF DF LST$$ .LIST  ME
                        .ENABL  CRF
                        .LIST
                        INC     FATAL$                  ;SET FATAL INDICATOR
                        ERROR   +ARG
                        .DSABL  CRF
                        .IIF DF LST$$ .NLIST  ME
                        .ENABL  CRF
                        .ENDM   FATAL

                        .SBTTL  MACRO   TYPE
                        .MACRO  TYPE    ARG
                        .NLIST
                        .DSABL  CRF
                        .IIF DF LST$$ .LIST  ME
                        .ENABL  CRF
                        .LIST
                        .IF B ARG
                        TYPEIT
                        .IFF
                        TYPEIT  ,ARG
                        .ENDC
                        .DSABL  CRF
                        .IIF DF LST$$ .NLIST  ME
                        .ENABL  CRF
                        .ENDM   TYPE
```

```
                        .SBTTL  MACRO   NEWTST
                ;********************** NEWTST **********************
                ;NEWTST IS USED AS THE FIRST INSTRUCTION OF A TEST.
                ;IT WILL:
                ;1)  GENERATE A TEST NUMBER FOR THE LABEL OF THIS TEST
                ;2)  PUT STARS BEFORE AND AFTER A MESSAGE
                ;ARGUMENTS
                ;1)  ASCII  --  THIS IS THE MESSAGE THAT WILL APPEAR
                ;               ON THE LISTING
                ;2)  ICOUNT --  IF NON-BLANK AND BIT 11 OF $SWR = 1 IT WILL BE
                ;               THE NUMBER OF ITERATIONS TO MAKE ON THIS TEST
                ;3)  RETURN --  IF NON-BLANK WILL BE THE ADDRESS TO
                ;               WHICH THE NEXT SCOPE STATEMENT WILL
                ;               LOOP BACK TO.
                ;4)  COMAND --  IF NON-BLANK WILL BE THE FIRST
                ;               INSTRUCTION OF THE TEST
                ;               IF BLANK SCOPE WILL BE THE
                ;               FIRST INSTRUCTION
                ;*****************************************************
                        .MACRO  NEWTST  ASCII,ICOUNT,RETURN,COMAND
                        $STN=1
                        $NWTST=0
                        .NLIST  MC
                        .IF B <COMAND>
                        $$NEWTEST       \$TN,<ASCII>,SCOPE
                        .IFF
                        $$NEWTEST       \$TN,<ASCII>,<COMAND>
                        .ENDC
                        .NLIST
                        .LIST   ME
                        .LIST
                        .IF NE 4000&$SWR
                        .IF NB ICOUNT
                        .IF LE <ICOUNT-1>
                        MOV     #1,$TIMES       ;;DO 1 ITERATION
                        .IFF
                        MOV     #ICOUNT,$TIMES  ;;DO ICOUNT ITERATIONS
                        .ENDC
                        .ENDC
                        .IF NB RETURN
                        MOV     #RETURN,$LPADR  ;;SET SCOPE LOOP ADDRESS
                        .ENDC
                        .ENDC
                        .NLIST
                        .LIST   MC
                        .LIST
                        .NLIST  ME
                        .ENDM   NEWTST
```

```
                        .SBTTL  MACRO   $$NEWTEST
                        .MACRO  $$NEWTEST       A,ASC,COMND
                        .IRP    ASCI,<ASC>
                        .IF EQ $NWTST
                        $NWTST=1
                        .SBTTL  T'A'    ASCI
                        .NLIST
                        .LIST   ME
                        .LIST
                ;*******************************************************************************
                ;*TEST A         ASCI
                        .IFF
                        ASCI
                        .ENDC
                        .ENDM
                ;*******************************************************************************
                TST'A:  COMND
                        .NLIST  ME
                        $TN=$TN+1
                        .ENDM   $$NEWTEST

                        .SBTTL  MACRO   SUBTST
                ;************** SUBTST ******************************
                ;
                ;THIS MACRO WILL FORMAT A SUBTEST HEADING WITH STARS
                ;A .SBTTL WILL BE FORCED & .NLISTED FOR THE TABLE OF CONTENTS.
                ;
                ;ARGUMENT:
                ;1) TXT --      THIS IS THE MESSAGE THAT WILL APPEAR IN THE TABLE OF CONTENTS & LISTING.
                ;
                ;EXAMPLE:       SUBTST  <<THIS IS A FUN SUBTST>>
                ;
                ;************************************************************

                        .MACRO  SUBTST  ASCII
                        .NLIST  MC
                        $SUBTST <ASCII>
                        .LIST   MC
                        .ENDM   SUBTST

                        .SBTTL  MACRO   $SUBTST
                        .MACRO  $SUBTST ASC
                        .IRP    ASCI,<ASC>
                        .SBTTL  ASCI
                        .NLIST
                        .LIST   ME
                        .LIST
                ;*******************************************************************************
                ;*SUBTEST        ASCI
                        .ENDM
                ;*******************************************************************************
                        .NLIST  ME
                        .ENDM   $SUBTST
```

```
                        .SBTTL  MACRO   TYPOCT
                ;******************** TYPOCT ********************
                ;
                ;TYPOCT IS USED TO CHANGE A BINARY NUMBER
                ;       TO A 6 DIGIT OCTAL NUMBER AND TYPE IT
                ;
                ;ARGUMENTS:
                ;
                ;1)     NUM     THE NUMBER TO BE TYPED
                ;
                ;2)     REMARK  ALLOWS A COMMENT TO BE MADE
                ;
                ;ROUTINES REQUIRED
                ;
                ;1)     CONVERT BINARY TO OCTAL AND TYPE (.$TYPOCT)
                ;
                ;2)     TYPE AN ASCIZ STRING (.$TYPE)
                ;
                ;EXAMPLES:
                ;
                ;1)     TYPOCT  HILMT,<TYPES THE CONTENTS OF HILMT>
                ;2)     TYPOCT  #5,<TYPES ' 000005'>
                ;
                ;*****************************************************************

                        .MACRO  TYPOCT  NUM,REMARK
                        .NLIST
                        .DSABL  CRF
                        .IIF DF LST$$ .LIST  ME
                        .ENABL  CRF
                        .LIST
                        MOV     NUM,-(SP)       ;;SAVE NUM FOR TYPEOUT
                        .IIF NB <REMARK>,                               ;;REMARK
                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                        .DSABL  CRF
                        .IIF DF LST$$ .NLIST  ME
                        .ENABL  CRF
                        .ENDM   TYPOCT
```

```
                        .SBTTL  MACRO   TYPOCS
                ;******************** TYPOCS ********************
                ;
                ;TYPOCS IS USED TO CHANGE A BINARY NUMBER TO AN OCTAL
                ;       NUMBER AND TYPE 1 TO 6 DIGITS
                ;       WITH OR WITHOUT LEADING ZEROS.
                ;
                ;ARGUMENTS:
                ;
                ;1)     NUM     NUMBER TO BE TYPED
                ;
                ;2)     REMARK  ALLOWS A COMMENT TO BE MADE
                ;
                ;3)     N       NUMBER OF DIGITS (1 TO 6) TO BE TYPED
                ;
                ;4)     Z       BLANK=SUPPRESS LEADING ZEROS (TYPES SPACES)
                ;               NON-BLANK-TYPE LEADING ZEROS
                ;
                ;ROUTINES REQUIRED
                ;
                ;1)     CONVERT BINARY TO OCTAL AND TYPE (.$TYPOCT)
                ;
                ;2)     TYPE AN ASCIZ STRING (.$TYPE)
                ;
                ;EXAMPLES:
                ;1)     TYPOCS  #12345,<TYPES "5">,1
                ;2)     TYPOCS  #004,<TYPES "04">,2,X
                ;3)     TYPOCS  #004,<TYPES " 4">,2
                ;
                ;*****************************************************************

                        .MACRO  TYPOCS  NUM,REMARK,N,Z
                        .NLIST
                        .DSABL  CRF
                        .IIF DF LST$$ .LIST  ME
                        .ENABL  CRF
                        .LIST
                        MOV     NUM,-(SP)       ;;SAVE NUM FOR TYPEOUT
                        .IIF NB <REMARK>,                               ;;REMARK
                        TYPOS                   ;;GO TYPE--OCTAL ASCII
                        .IF NB N
                        .BYTE   N               ;;TYPE N DIGIT(S)
                        .IFF
                        .BYTE   6               ;;TYPE 6 DIGITS
                        .ENDC
                        .IF NB Z
                        .BYTE   1               ;;TYPE LEADING ZEROS
                        .IFF
                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
                        .ENDC
                        .DSABL  CRF
                        .IIF DF LST$$ .NLIST  ME
                        .ENABL  CRF
                        .ENDM   TYPOCS
```

```
                        .SBTTL  MACRO   TYPDEC
                ;******************** TYPDEC ********************
                ;
                ;TYPDEC IS USE TO CHANGE A BINARY NUMBER TO A SIGNED
                ;       DECIMAL NUMBER AND TYPE IT REPLACING LEADING ZERO
                ;       WITH SPACES.
                ;NOTE:  IF THE NUMBER IS NEGATIVE A
                ;       MINUS SIGN WILL BE TYPED.
                ;
                ;ARGUMENTS:
                ;
                ;1)     NUM     NUMBER TO BE TYPED
                ;
                ;2)     REMARK ALLOWS A COMMENT TO BE MADE
                ;
                ;ROUTINES REQUIRED
                ;
                ;1)     CONVERT BINARY TO DECIMAL AND TYPE (.$TYPDEC)
                ;
                ;2)     TYPE AN ASCIZ STRING (.$TYPE)
                ;
                ;EXAMPLES
                ;
                ;1)     TYPDEC  SIZE,<TYPE THE CONTENTS OF SIZE>
                ;2)     TYPDEC  #-10.,<TYPE A MINUS TEN>
                ;
                ;*****************************************************************

                        .MACRO  TYPDEC  NUM,REMARK
                        .NLIST
                        .DSABL  CRF
                        .IIF DF LST$$ .LIST  ME
                        .ENABL  CRF
                        .LIST
                        MOV     NUM,-(SP)       ;;SAVE NUM FOR TYPFOUT
                        .IIF NB <REMARK>,                       ;;REMARK
                        TYPDS                   ;;GO TYPE -DECIMAL ASCII WITH SIGN
                        .DSABL  CRF
                        .IIF DF LST$$ .NLIST  ME
                        .ENABL  CRF
                        .ENDM   TYPDEC
```

```
                        .SBTTL  MACRO   BMOV
                ;****************** BMOV ****************************
                ;
                ; THIS MACRO MOVES A BLOCK OF DATA.
                ;
                ;ARGUEMENTS:
                ;
                ;1)     FROMHERE        THE FIRST ADDRESS OF THE SOURCE BLOCK.
                ;
                ;2)     TOHERE          THE FIRST ADDRESS OF THE DESTINATION BLOCK.
                ;                       IF BLANK THE 1ST ADDRESS OF THE USER INSTRUCTION
                ;                       PAR'S IS USED (FASTCITY).
                ;
                ;3)     SIZE            THE SIZE OF THE SOURCE BLOCK.
                ;                       IF BLANK A 16 WORD TRANSFER IS ASSUMED.
                ;                       "WHY DEFAULT TO 16 WORDS?" YOU ASK!
                ;                       "BECAUSE THAT'S HOW MANY WORDS TO THE USER PAR
                ;                       REGISTERS & THAT'S WHERE I INTEND TO MOVE LOTS
                ;                       OF STUFF." I REPLY!
                ;
                ;************************************************

                .MACRO  BMOV    FROMHERE,TOHERE,SIZE
                  .IF B TOHERE
                    .NLIST
                    .DSABL      CRF
                    .IIF DF LST$$ .LIST  ME
                    .ENABL      CRF
                    .LIST
                    JSR R5,BLOCK1
                    FROMHERE
                    .DSABL      CRF
                    .IIF DF LST$$ .NLIST  ME
                    .ENABL      CRF
                    .MEXIT
                  .ENDC
                  .IF B SIZE
                    .NLIST
                    .DSABL      CRF
                    .IIF DF LST$$ .LIST  ME
                    .ENABL      CRF
                    .LIST
                    JSR R5,BLOCK2
                    TOHERE
                    FROMHERE
                    .DSABL      CRF
                    .IIF DF LST$$ .NLIST  ME
                    .ENABL      CRF
                    .MEXIT
                  .IFF
                    .NLIST
                    .DSABL      CRF
                    .IIF DF LST$$ .LIST  ME
                    .ENABL      CRF
                    .LIST
                    JSR R5,BLOCK3
                    SIZE
```

```
                        TOHERE
                        FROMHERE
                        .DSABL      CRF
                        .IIF DF LST$$ .NLIST  ME
                        .ENABL      CRF
                    .ENDC
                .ENDM   BMOV
```

```
                        .SBTTL  MACRO   MAP
                ;****************** MAP ****************************
                ;
                ; THIS MACRO MAPS A MEMORY BANK (16K) INTO THE
                ; TEST PATTERN AREA (SUPERVISOR VIRTUAL (60000-157777)).
                ;
                ;ARGUEMENTS:
                ;
                ;1)     BANK    THE BANK OF 16K WORDS TO BE MAPPED.
                ;               THERE ARE 120 BANKS OF 16K WORDS
                ;
                ;EXAMPLES
                ;
                ;       MAP     LOC             ;LOCATION "LOC" CONTAINS THE # OF THE BANK TO MAP
                ;
                ;       MAP     #28.            ;BANK 34 (OCTAL) WILL BE MAPPED
                ;
                ;***************************************************

                .MACRO  MAP     BANK
                PUSH    R3
                .NLIST
                .DSABL  CRF
                .IIF DF LST$$ .LIST  ME
                .ENABL  CRF
                .LIST
                .IF B BANK
                MOV     #200,R3
                .IFF
                MOV     BANK,R3
                .ENDC
                CALL    MAPPER
                .DSABL  CRF
                .IIF DF LST$$ .NLIST  ME
                .ENABL  CRF
                POP     R3
                .ENDM   MAP
```

```
                        .SBTTL  MACRO   SUPERVISOR
                ;****************** SUPERVISOR **********************
                ;
                ; THIS MACRO SWITCHES TO SUPERVISOR MODE.
                ;
                ;ARGUEMENTS: NONE.
                ;
                ;*************************************************

                        .MACRO  SUPERVISOR
                        .NLIST
                        .DSABL  CRF
                        .IIF DF LST$$ .LIST  ME
                        .ENABL  CRF
                        .LIST
                        BIS     #BIT14,PSW                      ;GO TO SUPERVISOR MODE
                        .DSABL  CRF
                        .IIF DF LST$$ .NLIST  ME
                        .ENABL  CRF
                        .ENDM   SUPERVISOR

                        .SBTTL  MACRO   USER
                ;****************** USER ****************************
                ;
                ; THIS MACRO SWITCHES TO USER MODE.
                ;
                ;ARGUEMENTS: NONE.
                ;
                ;*************************************************

                        .MACRO  USER
                        .NLIST
                        .DSABL  CRF
                        .IIF DF LST$$ .LIST  ME
                        .ENABL  CRF
                        .LIST
                        BIS     #BIT15!BIT14,PSW                ;GO TO USER MODE
                        .DSABL  CRF
                        .IIF DF LST$$ .NLIST  ME
                        .ENABL  CRF
                        .ENDM   USER
```

```
                        .SBTTL  MACRO   TESTAREA
                ;****************** TESTAREA ************************
                ;
                ; THIS MACRO SWITCHES TO THE SPECIFIED TEST MODE.
                ;
                ;ARGUEMENTS: NONE.
                ;
                ;*****************************************************

                        .MACRO  TESTAREA
                        .NLIST
                        .DSABL  CRF
                        .IIF DF LST$$ .LIST  ME
                        .ENABL  CRF
                        .LIST
                        BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                        .DSABL  CRF
                        .IIF DF LST$$ .NLIST  ME
                        .ENABL  CRF
                        .ENDM   TESTAREA
```

```
                        .SBTTL  MACRO   SET4 & RES4
                ;****************** SET4 & RES4 ********************
                ;
                ; THESE MACROS SET & RESTORE VECTOR 4(TIMEOUT TRAP)
                ;
                ; IN IT'S RESTORED MODE TRAPS ARE REPORTED AS SUCH.
                ;
                ;ARGUEMENTS:    LOC     ;THE LOCATION TO VECTOR TO (ONLY USED IN "SET4" NOT "RES4')
                ;
                ;I USE THE SET4 AND RES4 MACROS AROUND CODE THAT I EXPECT TO TRAP TO 4
                ;LIKE LOOKING FOR ALL POSSIBLE CSR'S AND ETC.  WHENEVER CODE IS NOT
                ;SURROUNDED BY SET4 AND RES4 THEN ANY TRAPS TO 4 WILL CAUSE AN ERROR
                ;PRINTOUT THAT SAYS "UNEXPFCTED TRAP TO 4" AND ALL THE ASSOCIATED REGISTER JUNK
                ;*************************************************

                        .MACRO  SET4    ARG
                        .NLIST
                        .DSABL  CRF
                         IIF DF LST$$ .LIST  ME
                        .ENABL  CRF
                        .LIST
                        MOV     ARG,4
                        .DSABL  CRF
                        .IIF DF LST$$ .NLIST  ME
                        .ENABL  CRF
                        .ENDM   SET4

                        .MACRO  RES4
                        .NLIST
                        .DSABL  CRF
                        .IIF DF LST$$ .LIST  ME
                        .ENABL  CRF
                        .LIST
                        MOV     #TIMEOUT,4
                        CMP     #5,PROTYP       ;IS THIS AN 11/83/84 ?
                        BNE     101$            ;BRANCH IF NOT
                        CLR     CPUERR          ;CLEAR OUT THE CPU ERROR REGISTER BITS
                101$:
                                                ;THAT A EXPECTED TRAP COULD HAVE SET
                        .DSABL  CRF
                        .IIF DF LST$$ .NLIST  ME
                        .ENABL  CRF
                        .ENDM   RES4
```

```
                                        .SBTTL  MACRO   DLEFT
                                ;***************** DLEFT ***************************
                                ;
                                ; THIS MACRO DOES A DOUBLE WORD LEFT SHIFT
                                ;
                                ;ARGUEMENTS:    LOC     ;THE LOCATION TO BE SHIFTED LEFT (CARRY TO LOC+2)
                                ;
                                ;***************************************************

                                        .MACRO  DLEFT   ARG
                                        .NLIST
                                        .DSABL  CRF
                                        .IIF DF LST$$ .LIST  ME
                                        .ENABL  CRF
                                        .LIST
                                        ROL     ARG
                                        ROL     ARG+2
                                        .DSABL  CRF
                                        .IIF DF LST$$ .NLIST  ME
                                        .ENABL  CRF
                                        .ENDM   DLEFT
                                        .NLIST  MD              ;DON'T NEED TO SEE THEM ANY MORE
                                ;*********************************************
                                .SBTTL  ABORT ROUTINE FOR ORION UFD MODE (VMK)
                                ;*********************************************

000000  105737  056732          ABORT:  TSTB    $DDW7           ;TEST FOR USER FRIENDLY MODE
000004  001420                          BEQ     ABORT2          ;IF NOT UFD THEN CONTINUE NORMAL OPERATION
000006  013737  003706  000030          MOV     SAV30,30        ;RESTORE EMT LOCATION (30)
000014  013737  003710  000032          MOV     SAV32,32        ;RESTORE EMT PRIORITY LOCATION (32)
000022  104042                          EMT     +42             ;GET DCA LOCATION INTO R0 FROM MONITOR
000024  012760  177777  000042          MOV     #-1,42(R0)      ;SET A -1 INTO LOCATION DRSERR IN MONITOR
000032  013700  000042          ABORT1: MOV     42,R0           ;AND PUT THE MONITOR RETURN ADDRESS IN R0
000036  005037  000042                  CLR     42              ;CLEAR MONITOR RETURN FLAG
000042  000137  014042                  JMP     $ENDAD          ;RETURN TO MONITOR DO NOT PUSH STACK HERE
000046  000207                  ABORT2: RTS     PC              ;IF NOTUFD RETURN TO MAINLINE
```

```
 4902                                   .SBTTL  TRAP CATCHER
 4903           000000                  .=0
 4904 000000    000000  000000          .WORD   0,0
 4905           000177                  .REPT   177             ;.WORD  .+2,HALT
 4909
 4910                                   .SBTTL  ACT11 HOOKS
 4911                           ;*THE HOOKS REQUIRED BY ACT11 ARE DEFINED AND SETUP BELOW:
 4912                           ;*      DEFINITIONS:
 4913                           ;*                      1)LOC.46        "END OF-PASS" HOOK
 4914                           ;*                              =ADDRESS OF END OF PASS ROUTINE
 4915                           ;*                               MODIFIED BY ACT11.
 4916                           ;*                      2)LOC.52        PROGRAM NEEDS HOOK
 4917                           ;*                              BIT 15=1 PROGRAM SHOULD BE POWER
 4918                           ;*                                       FAILED WHILE RUNNING
 4919                           ;*                                    =0 NO POWER FAIL
 4920                           ;*                              BIT 14=1 PROGRAM MEMORY SIZE DEPENDENT
 4921                           ;*                                    =0 NOT MEMORY SIZE DEPENDENT
 4922                           ;*                              BIT 13=1 PROGRAM REQUIRES MANUAL INTERVENTION
 4923                           ;*                                    =0  MANUAL INTERVENTION NOT REQUIRED
 4924                           ;*                              BITS 12-0  MUST BE ZERO'S
 4925           000046                  .=46
 4926 000046    014042                  $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
 4927           000052                  .=52
 4928 000052    000020                  .WORD   BIT4            ;;2)SET LOC.52 TO INDICATE MEMORY SIZE DEPENDANT
 4929                                   .SBTTL  APT11 HOOKS
 4930           000024                  .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
 4931 000024    000200                  200     ;;FOR APT START UP
 4932           000042                  .=42
 4933 000042    002000                  STACK                   ;SO RT11 CAN START WITH RUN COMMAND
 4934           000044                  .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
 4935 000044    056750                  $APTHDR ;;POINT TO APT HEADER BLOCK
 4936           000200                  .=200
 4937 000200    000437          START3: BR      START1          ;"NORMAL" START
 4938 000202    000442                  BR      START2          ;RESTART (SAVE ERROR ACCOUNTING)
 4939           000300                  .=300
 4940 000300    005037  002626  START1: CLR     RESTART
 4941 000304    000137  003670          JMP     START
 4942 000310                    START2: SET     RESTART
      000310    012737  177777  002626                                          MOV  #-1,RESTART
 4943 000316    000137  003670          JMP     START
 4944           002000                  .=STACK
```

```
                                .SBTTL  VARIABLES       INITIALIZED TO ZERO
                        ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
                        ;*USED IN THE PROGRAM.
002000                  $CMTAG:                         ;;START OF COMMON TAGS
002000  000000          UFDSET:0                        ;USER FRIENDLY FLAG
002002  000000          SELONLY:0                       ;SELECT ONLY BANKS MARKED BY FIELD SERVICE MODE FLAG
002004  000000          DIAGFLAG:0                      ;SET FOR SHIFTING DIAGONAL TEST
002006  000000          KAMIKAZE:0                      ;SET FOR KAMIKAZE MODE TESTING
002010  000000          SKIPKAMI:0                      ;USED TO SKIP RESTORING KAMIKAZE MODE WHEN MODIFIED
                        ;NEXT TWO BYTES ARE DISPLAYED IN THE DISPLAY REGISTER
002012  000             $PATMAR:.BYTE   0               ;PATTERN NUMBER
002013  000             $BANK:  .BYTE   0               ;BANK & SIGN
002014  000             $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
002015  000             $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
002016  000000          LASTERROR:.WORD 0               ;NUMBER OF ERRORS ON LAST PASS
002020  000000          ERRPC:  .WORD   0               ;CONTAINS PC OF ERROR FOR TYPEOUT
002022  000000          BADPC:  .WORD   0               ;CONTAINS PC OF ERROR
002024  000000          ERRSP:  .WORD   0               ;CONTAINS SP OF ERROR FOR TYPEOUT
002026  000000          BADSP:  .WORD   0               ;CONTAINS SP OF ERROR
002030  000000          ERRPSW: .WORD   0               ;CONTAINS PSW OF ERROR FOR TYPEOUT
002032  000000          BADPSW: .WORD   0               ;CONTAINS PSW OF ERROR
002034  000000          ADDRESS:.WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
002036  000000          PADDRESS:.WORD  0               ;ADDRESS OF PARITY ERROR
002040  000000  000000  PHYADD: .WORD   0,0             ;22 BIT PHYSICAL ADDRESS
002044  000000          GOOD:   .WORD   0               ;;CONTAINS 'GOOD' DATA
002046  000000          GOOD2:  .WORD   0               ;;CONTAINS 'GOOD2' DATA
002050  000000          GOOD3:  .WORD   0               ;;CONTAINS 'GOOD3' DATA
002052  000000          BAD:    .WORD   0               ;;CONTAINS 'BAD' DATA
002054  000000          BAD2:   .WORD   0               ;;CONTAINS 'BAD2' DATA
002056  000000          BAD3:   .WORD   0               ;;CONTAINS 'BAD3' DATA
002060  000000          BADXOR: .WORD   0               ;XOR OF GOOD & BAD = BAD BITS!
002062  000000          $AUTO:  .WORD   0               ;;AUTOMATIC MODE INDICATOR FOR APT,ACT, & XXDP
002064  000000          FATAL$: .WORD   0               ;FATAL ERROR INDICATOR
002066  000000          SKPERR: .WORD   0               ;USED TO SKIP ERROR MESSAGE IN "$ERRGEN"
002070  000000          NEMCNT: 0                       ;NON-EXISTANT MEMORY COUNTER (HOLES)
002072  000000          PARCNT: 0                       ;PARITY ERROR COUNTER
002074  000000          PATERR: 0                       ;PATTERN ERROR COUNTER
002076  000000          NOPAR:  0                       ;NO PARITY ERROR MODE INDICATOR
002100  000000          NONEM:  0                       ;NO NON-EXISTANT MEMORY (HOLES) MODE INDICATOR
002102  000000          BANK:   0                       ;MEMORY BANK UNDER TEST
002104  000000          BANKINDEX:0                     ;USED TO INDEX INTO CONFIG TABLE
002106  000000          CPUBIT: 0                       ;CONTAINS 1 BIT TO IDENTIFY CPU TO CONFIGURATION TABLE
002110  000000          MUT:    0                       ;MEMORY UNDER TEST FLAG
002112  000000          PATTERN:0                       ;PATTERN NUMBER UNDER TEST
002114  000000          KPFLAG: .WORD   0               ;BANK IS PROTECTED REGION OF ECC
002116  000000          ACFLAG: .WORD   0               ;BANK CAN BE ACCESSED BY THIS CPU
002120  000000          MKFLAG: .WORD   0               ;IF SET INDICATES MSV11-J OR MF11S-K UNDER TEST********** ?
002122  000000          PFLAG:  .WORD   0               ;BANK IS IN PROGRAM SPACE
002124  000000          RRFLAG: .WORD   0               ;BANK IS WHERE PROGRAM RELOCATION IS REQUIRED TO TEST
002126  000000          RLFLAG: .WORD   0               ;PROGRAM IS RELOCATED FLAG
002130  000000          BMFLAG: .WORD   0               ;"BANK IS IDENTIFIED AS BAD MEMORY' FLAG
002132  000000          EQFLAG: .WORD   0               ;"BANK HAS EQB MEMORY" FLAG
002134  000000          TMFLAG: .WORD   0               ;"TYPE OF MEMORY TO TEST" FLAG; 0 = PARITY, 1 = ECC
002136  000000          INTFLAG:.WORD   0               ;"BANK IS INTERLEAVED" FLAG************************** ? **
002140  000000          INT64K: .WORD   0               ;"BANK IS 64K INTERLEAVED' FLAG********************** ? **
002142  000000          PMEMFLG:.WORD   0               ;"MEMORY UNDER TEST IS A MSV11-J" FLAG
002144  000000          ABORTFLAG:.WORD 0               ;"ABORT OCCURED' FLAG
```

```
5004 002146  000000                CTLKVEC:.WORD   0               ;HOLDS OLD KERNAL STACK POINTER IN CASE OF CNTL/K
5005 002150  000000                CSR:    .WORD   0               ;DATA TO OR FROM CSR
5006 002152  000000                CSRNO:  0                       ;CSR ADDRESS NUMBER (4 LSB'S)
5007 002154  000000                SAVCSR: .WORD   0               ;LOCATION TO SAVE CSRNO DURING FS COMMAND
5008 002156  000000                OLDCSR: .WORD   0               ;OLD CSR NUMBER(USED IN INH PTR TEST)
5009                                        ;THESE LOCATIONS STORE GPR'S DURING SUPERVISOR TESTS
5010 002160  000000                SUPDR0: 0
5011 002162  000000                SUPDR1: 0
5012 002164  000000                SUPDR2: 0
5013 002166  000000                SUPDR3: 0
5014 002170  000000                SUPDR4: 0
5015 002172  000000                SUPDR5: 0
5016 002174  000000                SUPDR6: 0
5017 002176  000000                DUMMY:  0                       ;DUMMY LOCATION FOR ADDRESS PASSING
5018                                ;THESE LOCATIONS STORE GPR'S & PSW DURING DETAILED ERROR PRINTOUTS
5019 002200  000000                DETR0:  0
5020 002202  000000                DETR1:  0
5021 002204  000000                DETR2:  0
5022 002206  000000                DETR3:  0
5023 002210  000000                DETR4:  0
5024 002212  000000                DETR5:  0
5025 002214  000000                DETSP:  0
5026 002216  000000                DETPSW: 0
5027 002220  000000                DETFLAG:0                       ;DETAILED REPORT FLAG
5028 002222  000000                CONTFLAG:0                      ;CSR'S HAVE BEEN TESTED FLAG
5029 002224  000000                TOTCSRS:.WORD   0               ;1 BIT PER EXISTING CSR, EG-
5030                                                               ;CSR 0 REPRESENTED BY BIT 15, ETC.
5031 002226  000000                CSRFIRST:.WORD  0               ;FIRST ADDRESS UNDER CONTROL OF THIS CSR
5032 002230  000000                CSRLAST: .WORD  0               ;
5033 002232  000000                CSRFBANK:.WORD  0               ;
5034 002234  000000                CSRLBANK:.WORD  0               ;
5035 002236  000000                CSRINT:  .WORD  0               ;
5036 002240  000000                SPLTCSR: .WORD  0               ;
5037 002242  000000  000000        DATBUF: .WORD   0,0             ;TWO WORD DATA BUFFER
5038 002246  000000  000000        TSTDAT: .WORD   0,0             ;TWO WORD TEST DATA
5039 002252  000000  000000        SBEMSK: .WORD   0,0             ;TWO WORD SINGLE BIT ERROR MASK
5040 002256  000000  000000        DBEMSK: .WORD   0,0             ;TWO WORD DOUBLE BIT ERROR MASK
5041 002262  000000                SUPDOADD:.WORD  0               ;ADDRESS OF SUBROUTINE TO EXECUTE IN SUPERVISOR MODE
5042 002264     000                PASFLG: .BYTE   0               ;LOCAL LOOP PASS CONTROL
5043 002265     000                UPPFLG: .BYTE   0               ;LOCAL LOOP PASS CONTROL
5044 002266  000000                PASSNO: .WORD   0               ;LOCAL LOOP PASS CONTROL
5045 002270  000000                SAV4:   .WORD   0               ;USED TO SAVE KERNAL PAR 5                          ;;I.L.C.;REV
5046 002272  000000                SAVPAR: .WORD   0               ;USED TO SAVE KERNAL PAR 5
5047 002274  000000                SAVMON: .WORD   0               ;XXDP MONITOR RETURN ADDRESS
5048 002276  000000                MONFLG: .WORD   0               ;RETURN TO MONITOR FLAG
5049 002300  000000                REALPAT:.WORD   0               ;REAL PATTERN UNDER TEST
5050 002302  000000                OLDCACHE:.WORD  0               ;BACKED UP VALUE OF CACHE CONTROL REGISTER
5051 002304  000000                PARTHERE:.WORD  0               ;PARITY TRAPS SOMETIMES GO TO ADDRESS STORED HERE
5052 002306  000000                FSSTACK:.WORD   0               ;STACK SAVED HERE IF IN FIELD SERVICE MODE
5053 002310  000000                NEWBANK:.WORD   0               ;USED FOR RELOCATION TO A NEW BANK
5054 002312  000000                SOURCE: .WORD   0               ;SOURCE OF DATA WORDS FOR CHECKBIT GENERATION SUBROUTINE
5055 002314  000000                CHECK:  .WORD   0               ;CHECKBITS TO BE LOADED INTO CSR
5056 002316  000000                CBITS:  .WORD   0               ;CHECK BITS TO BE WRITTEN
5057 002320  000000                MASK:   .WORD   0               ;BIT MASK FOR CSR
5058 002322  000000                CSR1S:  .WORD   0               ;CSR ALL 1'S PATTERN
5059 002324  000000                BITNO:  .WORD   0               ;BIT POINTER
5060 002326  000000                PCBUMP: .WORD   0               ;VALUE TO BUMP THE PC BY TO RECOVER AFTER A PARITY TRAP
```

```
 5061 002330  000000                CSRINC: .WORD   0               ;VALUE TO INCREMENT ADDRESS BY TO REMAIN IN THE SAME CSR
 5062 002332  000000                CSRLOOP:.WORD   0               ;LOOP CONTROL FOR CSR TESTING
 5063 002334  000000                SUCCESS:.WORD   0               ;FLAG SET BY SUCCESSFULL TASK OR SUBROUTINE
 5064 002336  000000                ZEROS:  .WORD   0               ;FOR AID IN "MOV" INSTRUCTIONS
 5065 002340  000000                TIME:   .WORD   0               ;SECONDS THAT BATTERIES SHOULD LAST
 5066 002342  000000                SKIPMK: .WORD   0               ;FLAG TO SKIP MKCONTROL SUBROUTINE
 5067 002344  000000                NULLFLAG:.WORD  0               ;SET WHEN RUNNING NULL PATTERNS
 5068 002346  000000                QVFLAG: 0                       ;FLAGS QUICK VERIFY PASS UNDER APT, ACT, OR XXDP CHAIN MODE
 5069 002350  000000                ACTFLAG:0                       ;FLAGS ACT AUTOMATIC MODE PROGRAMMING RULES
 5070 002352  000000                APTFLAG:0                       ;FLAGS APT AUTOMATIC MODE PROGRAMMING RULES
 5071 002354  000000                XXDPCHAIN:0                     ;FLAGS XXDP CHAIN MODE PROGRAMMING RULES
 5072                               ;NOTE: THESE TWO BYTES MUST STAY TOGETHER
 5073 002356     000                $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
 5074 002357     000                $FILLS: .BYTE   0               ;;CONTAINS # OF FILL CHARACTERS
 5075 002360     000                $TPFLG: .BYTE   0               ;;'TERMINAL NOT AVAILABLE" FLAG
 5076                                       .EVEN
 5077 002362  000000                $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
 5078 002364  000000                EVEN:   0                       ;USED FOR ALTERNATE DATA PATTERNS
 5079 002366  000000                STRIPES:0                       ;COUNTS DIAGONAL STRIPES
 5080 002370  000000                COUNT:  0                       ;BACKED UP COPY OF STRIPES
 5081 002372  000000                NOTAB:  0                       ;NO TABLE BEING PRINTED - NOW
 5082 002374  000000                BSIZE:  0                       ;SIZE OF 11/45 MOS MEMORY IN K WORDS********** ? ******
 5083 002376  000000                KSIZE:  0                       ;SIZE OF MF11S-K MEMORY IN K WORDS********** ? ******
 5084 002400  000000                LSIZE:  0                       ;SIZE OF MSV11-L/P MEMORY IN K WORDS
 5085 002402  000000                MSIZE:  0                       ;SIZE OF MSV11-J MEMORY IN K WORDS
 5086 002404  000000                PSIZE:  0                       ;SIZE OF Q-BUS PARITY MEMORY IN K WORDS
 5087 002406  000000                TOOMANY:0                       ;FLAGS WHEN TOO MANY ERRORS HAVE BEEN PRINTED FOR A BANK
 5088 002410  000000                READONLY:0                      ;FLAG TO PATTERNS TO READ ONLY
 5089 002412  000000  000000        TESTADD:0,0                     ;THE ADDRESS TO RUN CSR TESTS ON
 5090 002416  000000                UNITOP: 0                       ;HIGHEST ACCESSABLE BANK OF MEMORY THRU Q-BUS MAP
 5091 002420  000000                STOPOK: 0                       ;FLAG TO ALLOW STOPPING WITH SWITCH REGISTER
 5092 002422  000000                APTPAR: .WORD   0               ;AMOUNT OF PARITY MEMORY ACCORDING TO APT
 5093 002424  000000                APTECC: .WORD   0               ;AMOUNT OF ECC MEMORY ACCORDING TO APT
 5094 002426  000000                NOFSMODE:0                      ;FLAG TO DISABLE FIELD SERVICE MODE
 5095 002430  000000                NOERROR:0                       ;"THIS IS NOT AN ERROR" FLAG
 5096 002432  000000                LOADBANK:0                      ;BANK LOADERS ARE RELOCATED TO
 5097 002434  000000                TEMP:   0                       ;USED FOR JUNK
 5098 002436  000000                QUICK:  0                       ;QUICK STOP FLAG FOR APT POWER FAIL
 5099 002440  000000                NOSCOPE:0                       ;"NO SCOPE LOOP ALLOWED" FLAG
 5100 002442  000000                FSINFLAG:0                      ;"FIELD SERVICE - NO INTERNAL INTERLEAVE" FLAG
 5101 002444  000000                APTSIZE:0                       ;APT SIZING INFO FLAG
 5102 002446  000000                FS7FLAG:0                       ;TRUE WHEN IN FIELD SERVICE COMMAND 7
 5103 002450  000000                CONFGERROR:0                    ;CONFIGURATION ERROR FLAG
 5104 002452  000000                I:      0                       ;USED FOR GENERAL PURPOSE INDEXING
 5105 002454  000000                NO22BIT:0                       ;NO 22-BIT MODE FLAG
 5106 002456  000000                NOSUPER:0                       ;NO SUPERVISOR MODE FLAG
 5107 002460  000000                ERRADD: .WORD   0               ;HOLDS THE CSR'S ERROR ADDRESS
 5108 002462  000000  000000  000000 CSRINFO:0,0,0,0,0,0,0,0        ;USED TO STORE INFORMATION ABOUT THE 16
      002470  000000  000000  000000
      002476  000000  000000
 5109 002502  000000  000000  000000       0,0,0,0,0,0,0,0         ;POSSIBLE CSR'S
      002510  000000  000000  000000
      002516  000000  000000
 5110 002522  000000                LINK1:  0                       ;USED TO HOLD LINKS TO PATTERNS WHICH
 5111 002524  000000                LINK2:  0                       ;CAN EXECUTE IN THE PAR/PDR'S OR NOT
 5112 002526  000000                CSRHOLD:0                       ;USED TO STORE CSR VALUES FOR CSR TESTS
 5113 002530  000000                KFLAG:  0                       ;USED TO FLAG MF11S-K MEMORY TO TESTS**********************
```

```
   5114 002532  000000  000000          PGMCSR. .WORD   0,0             ;POINTS TO PROGRAM CSR
   5115 002536  000000                  INHECC: .WORD   0               ;FLAGS INHIBIT ECC TESTS ON RELOCATION
   5116 002540  000000                  INHBANK:.WORD   0               ;
   5117 002542  000000                  FULLREL:.WORD   0               ;
   5118 002544                          $CMTGE: ;*END OF COMMON TAGS
```

```
                                        .SBTTL  VARIABLES       INITIALIZED TO NON ZERO
002544  000401  000000          CACHKN: 401,0                   ;CACHE CONSTANT (MOVED TO CONTRL TO TURN ON CACHE)
002550  001014                  CACHKF: 1014                    ;CACHE CONSTANT (MOVED TO CONTRL TO TURN OFF CACHE)
002552  040000                  TESTMODE:40000                  ;USED TO SELECT THE PROPER TEST MODE FOR A PATTERN RUN
002554  000012                  ERRMAX: 10.                     ;MAX # OF ERRORS PER BANK WITH SW11
002556  000177                  LASTBANK:177                    ;HIGHEST BANK OF MEMORY
002560  177000                  LASTBLOCK:177000                ;HIGHEST BANK OF MEMORY+1 (IN PAR FORMAT)
002562  160000                  ENDADD: 160000                  ;ENDING ADDRESS
002564  000000                  ENDFLG: 0                       ;END FLAG
002566  000000                  SWRFLG: 0                       ;USED TO BUMP STACK ON FIRST CALL TO GTSWR
002570  000000                  PASCNT: 0                       ;PASS COUNTER
002572  000031                  SOBK:   25.                     ;SOB CONSTANT
002574  002000                  KSTACK: STACK                   ;STACK BEGINNING
002576  000001                  LOADHOME:1                      ;HOME BANK OF LOADERS
002600  177777                  WORST:  177777                  ;SET IF TESTING BANKS IN WORST FIRST MODE(1ST PASS)
002602  176543                  SEEDHI: 176543                  ;WORKING SEED HI (USED FOR RANDOM NUMBER GENERATOR)
002604  123456                  SEEDLO: 123456                  ;WORKING SEED LO (USED FOR RANDOM NUMBER GENERATOR)
002606  176543                  MSEEDH: 176543                  ;MASTER SEED HI (USED FOR RANDOM NUMBER GENERATOR)
002610  123456                  MSEEDL: 123456                  ;MASTER SEED LO (USED FOR RANDOM NUMBER GENERATOR)
002612  177777                  HEADER: 177777                  ;USED TO PRINT HEADINGS ONLY ONCE
002614  177777                  ONES:   177777                  ;FOR AID IN "MOV" INSTRUCTIONS
002616  000003                  FLIPLOC:3                       ;COUNTER FOR FLIPING DATA ON WORST CASE NOISE TEST
002620  052525                  SOFTPAT:52525                   ;PATTERN FOR SOFT ERROR BACKGROUND TESTS
002622  000000                  $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
002624  000000                  $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
002626  000000                  RESTART:0                       ;RESTART (START ADD 202) FLAG
002630  000000                  $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS

                                ;********************** NOTE THESE TWO LOCATIONS MUST STAY TOGETHER ************
002632  000377                  BAKPAT: .WORD   377             ;BACKGROUND PATTERN                              *
002634  177400                  SWAPAT: .WORD   177400          ;SWAPPED BAKPAT                                  *
                                ;*****************************************************************************

002636  177570                  SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
002640  177570                  DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
002642  177560                  $TKS:   177560                  ;;TTY KBD STATUS
002644  177562                  $TKB:   177562                  ;;TTY KBD BUFFER
002646  177564                  $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
002650  177566                  $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
002652     012                  $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED"
002653     207      377     377 $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
002656     000
002657     077                  $QUES:  .ASCII  /?/             ;;QUESTION MARK
002660     015                  $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
002661     012      000         $LF:    .ASCIZ  <12>            ;;LINE FEED
                                        .EVEN
```

```
                                .SBTTL  CONFIGURATION TABLE
                        ;CONFIG:FIRST 16K CONFIGURATION WORDS (2 EACH)
                        ;       2ND     16K CONFIGURATION WORDS (2 EACH)
                        ;       .....................
                        ;       200TH   16K CONFIGURATION WORDS (2 EACH)
                        ;
                        ;CONFIGURATION WORDS:
                        ;               LOW:    BIT 0     ERRORS PRESENT
                        ;                       BIT 1     MEMORY SUCESSFULLY ACCESSED
                        ;                       BIT 2-4   RESERVED
                        ;                       BIT 5     SKIP ECC LOGIC TESTS FLAG (1=SKIP)
                        ;                       BIT 6     PROTECTED REGION OF ECC MEMORY
                        ;                       BIT 7     PROTECTED (PROGRAM SPACE)
                        ;                       BIT 8-11  CSR CODE
                        ;                       BIT 12-15 RESERVED
                        ;               HIGH:   BIT 0-7   NUMBER OF ERRORS
                        ;                       BIT 8-10  MEMORY TYPE
                        ;                       BIT 11    RESERVED
                        ;                       BIT 12    RESERVED
                        ;                       BIT 13    "BACKGROUND PATTERN VALID" FLAG
                        ;                       BIT 14    BANK SELECTED FOR TEST BY FIELD SERVICE MODE
                        ;                       BIT 15    LOADERS HOME BANK
5190 002664  000201     CONFIG: .REPT   201
5193 003670             CONFIEND:
```

```
5195                                    .SBTTL  ********** MAIN **********
5196 003670                     START:  SUBTST  <<INITIALIZE VARIABLES TO ZERO>>
                                ;*****************************************************************************
                                ;*SUBTEST        INITIALIZE VARIABLES TO ZERO
                                ;*****************************************************************************
5197
5198 003670                             SUBTST  <<SAVEMT>>
                                ;*****************************************************************************
                                ;*SUBTEST        SAVEMT
                                ;*****************************************************************************
5199                            ;SAVEMT SAVES THE EMULATOR AND PRIORITY LOCATION
5200                            ;UNDER THE NAMES OF SAV30 AND SAV32.
5201
5202 003670  013737  000030  003706  EMTSAV: MOV     30,SAV30                ;;SAVE EMULATOR ADDRESS
5203 003676  013737  000032  003710          MOV     32,SAV32                ;;SAVE EMULATOR PRIORITY LEVEL
5204 003704  000402                          BR      VMKOR                   ;;GET AROUND TAG AREA
5205 003706  000000                  SAV30:  .WORD   0                       ;;PUT EMULATOR INFO HERE
5206 003710  000000                  SAV32:  .WORD   0                       ;;PUT PRIORITY LOCATION HERE
5207 003712  105737  056666          VMKOR:  TSTB    $ENV
5208 003716  001001                          BNE     NORES
5209 003720  000005                          RESET
5210 003722                     NORES:  CLEAR   MONFLG          ;;CLEAR RETURN TO MONITOR FLAG
     003722  005037  002276                                                  CLR  MONFLG
5211 003726  010637  002274          MOV     SP,SAVMON       ;;SAVE XXDP MONITOR RESTART ADDRESS
5212 003732  013706  002574          MOV     KSTACK,SP       ;;SETUP THE STACK POINTER
5213 003736  012700  002000          MOV     #$CMTAG,R0      ;;FIRST LOCATION TO BE CLEARED
5214 003742  005020                  1$:     CLR     (R0)+           ;;CLEAR MEMORY LOCATION
5215 003744  022700  002544          CMP     #$CMTGE,R0      ;;DONE?
5216 003750  001374                  BNE     1$              ;LOOP BACK IF NO
5217 003752  012737  000177  002556  MOV     #177,LASTBANK   ;RESTORE LASTBANK (THIS MUST BE DONE PRIOR TO SYSTEM SIZING)
5218 003760                          SUBTST  <<CLEAR NON-PROGRAM SPACE>>
                                ;*****************************************************************************
                                ;*SUBTEST        CLEAR NON-PROGRAM SPACE
                                ;*****************************************************************************
5219                                    ;THIS ATTEMPS TO GET RID OF ANY PARITY ERRORS BY WRITING INTO
5220                                    ;EVERY LOCATION THAT IS NOT LOADED INTO BY THE PROGRAM OR ALLOCATED
5221                                    ;TO THE XXDP LOADERS
5222 003760  012737  000001  002076          MOV     #1,NOPAR                ;PARITY ACTION = COUNT & IGNORE
5223 003766  005000                          CLR     R0
5224 003770  000241                  2$:     CLC
5225 003772  005520                          ADC     (R0)+
5226 003774  020027  160000                  CMP     R0,#160000
5227 004000  103773                          BLO     2$
5228 004002  005037  002076                  CLR     NOPAR                   ;RESTORE DEFAULT PARITY ACTION
5229
```

```
5231 004006                                    SUBTST   <<TYPE OF SYSTEM SIZER>>
                                       ;*****************************************************************************
                                       ;*SUBTEST       TYPE OF SYSTEM SIZER
                                       ;*****************************************************************************
5232 004006  000401                    BR       SYSSIZ                    ;SKIP OVER VARIABLE LOCATION
5233 004010  000000              PROTYP: .WORD    0
5234 004012                      SYSSIZ: SET4     #3$
     004012  012737  004074  000004    MOV      #3$,4
                                        .DSABL   CRF
5235 004020  012737  004032  000010    MOV      #1$,10                    ;TRAPS TO 10 = BAD PROCESSOR TYPE
5236 004026  000007                    MFPT                               ;TYPE OF PROCESSOR TEST: THIS INSTRUCTION
5237                                                                       ;(AVAILABLE ON NEWER PROCESSORS ONLY) PLACES
5238                                                                       ;A CODE IN THE LOWER BYTE OF R0 THAT
5239                                                                       ;INDICATES THE  PROCESSOR TYPE. 1=11/44
5240                                                                       ;3=11/23, 5=11/83/84 (Orion)
5241 004030  000406                    BR       2$
5242 004032  012737  047122  000034  1$:       MOV      #$TYPE,34         ;LOAD TRAP VECTOR
5243 004040                            TYPE     MSG130                    ;TELL THEM BAD PROCESSOR TYPE
     004040  104401  071474            TYPEIT   ,MSG130
                                        .DSABL   CRF
5244 004044  000000                    HALT                               ;NO NEED TO GO ON
5245 004046  012737  000012  000010  2$:       MOV      #12,10           ;RESTORE TRAPS TO 10
5246 004054  110037  004010            MOVB     R0,PROTYP                ;MOV THE CODE TO PROTYP
5247 004060                            SET4     #3$                      ;
     004060  012737  004074  000004    MOV      #3$,4
                                        .DSABL   CRF
5248 004066  005737  177746            TST      CONTRL                   ;SEE IF CACHE REGISTER RESPONDS
5249 004072  000447                    BR       6$                       ;BRANCH IF CACHE AVAILABLE
5250 004074  005037  002544          3$:       CLR      CACHKN           ;NO CACHE ON SYSTEM
5251 004100  012737  002336  060342    MOV      #ZEROS,DT14              ;DO NOT PRINT CONTRL ERROR MESSAGES
5252 004106  022737  000005  004010    CMP      #5,PROTYP                ;IS THIS A 11/83/84
5253 004114  001436                    BEQ      6$                       ;YES -  BRANCH
5254 004116                            SET4     #4$                      ;
     004116  012737  004146  000004    MOV      #4$,4
                                        .DSABL   CRF
5255 004124  005037  172516            CLR      MMR3                     ;SEE IF THERE IS 22-BIT ADDRESSING
5256 004130  052737  000020  172516    BIS      #BIT4,MMR3               ;
5257 004136  032737  000020  172516    BIT      #BIT4,MMR3               ;
5258 004144  001005                    BNE      5$                       ;BRANCH IF 22-BIT RELOCATION
5259 004146  005237  002454          4$:       INC      NO22BIT          ;SET FOR NO 22 BIT ADDRESSING
5260 004152  012737  000007  002556    MOV      #7,LASTBANK              ;HIGHEST BANK OF MEMORY
5261 004160  012737  140000  002552  5$:       MOV      #140000,TESTMODE ;MAKE TESTMODE USER
5262 004166  005237  002456            INC      NOSUPER                  ;
5263 004172  005037  060212            CLR      DT5+10                   ;CLEAR SOME ERROR DATA TAGS
5264 004176  005037  060352            CLR      DT14+10                  ;
5265 004202  005037  060214            CLR      DT5+12                   ;
5266 004206  005037  060354            CLR      DT14+12                  ;
5267 004212  022737  000005  004010  6$:       CMP      #5,PROTYP        ;CPU TYPE = 11/83/84
5268 004220  001003                    BNE      22$                      ;NO -   BRANCH
5269 004222  052737  000020  172516    BIS      #BIT4,MMR3               ;SET UP 22 BIT ADDRESSING
5270 004230                          22$:       SET4     #7$             ;TRAPS GO TO 4$
     004230  012737  004254  000004    MOV      #7$,4
                                        .DSABL   CRF
5271 004236  005037  052314            CLR      CPERRF                   ;CLEAR THE FLAG
5272 004242  005737  177766            TST      @#177766                 ;IS THERE A CPU ERROR REGISTER?
5273 004246  012737  177777  052314    MOV      #-1,CPERRF               ;YES-TRAPPED
5274 004254                          7$:       RES4                      ;ENABLE TRAPS TO 4
```

```
004254  012737  034114  000004          MOV     #TIMEOUT,4
004262  022737  000005  004010          CMP     #5,PROTYP       ;IS THIS AN 11/83/84 ?
004270  001002                          BNE     101$            ;BRANCH IF NOT
004272  005037  177766                  CLR     CPUERR          ;CLEAR OUT THE CPU ERROR REGISTER BITS
004276                          101$:                           ;THAT A EXPECTED TRAP COULD HAVE SET
                                        .DSABL  CRF
5275
```

```
                                        SUBTST  <<INITIALIZE VARIABLES TO NON ZERO>>
                                ;*******************************************************************************
                                ;*SUBTEST        INITIALIZE VARIABLES TO NON ZERO
                                ;*******************************************************************************
                                        SET     WORST
004276  012737  177777  002600                                                  MOV  #-1,WORST
                                        MOV     #3,FLIPLOC
                                        SET     HEADER
004312  012737  177777  002612                                                  MOV  #-1,HEADER
                                        MOV     #176543,MSEEDH
                                        MOV     #123456,MSEEDL
                                        MOV     MSEEDH,SEEDHI           ;PRIME THE RANDOM NUMBER GENERATOR
                                        MOV     MSEEDL,SEEDLO           ;BOTH HIGH AND LOW WORDS
                                        MOV     #377,BAKPAT
                                        MOV     #177400,SWAPAT
                                        SUBTST  <<INITIALIZE VECTORS>>
                                ;*******************************************************************************
                                ;*SUBTEST        INITIALIZE VECTORS
                                ;*******************************************************************************
                                        MOV     #$SCOPE,IOTVEC          ;;IOT VECTOR FOR SCOPE ROUTINE
                                        MOV     #340,IOTVEC+2           ;;LEVEL 7
                                        MOV     #$ERROR,EMTVEC          ;;EMT VECTOR FOR ERROR ROUTINE
                                        MOV     #340,EMTVEC+2           ;;LEVEL 7
                                        MOV     #$TRAP,TRAPVEC          ;;TRAP VECTOR FOR TRAP CALLS
                                        MOV     #340,TRAPVEC+2          ;LEVEL 7
                                        MOV     #$PWRDN,PWRVEC          ;;POWER FAILURE VECTOR
                                        MOV     #340,PWRVEC+2           ;;LEVEL 7
                                        MOV     #PARITY,PARVEC          ;GET READY FOR PARITY ERRORS
                                        MOV     #340,PARVEC+2
                                        MOV     #PDP1105,RESVEC         ;RESERVED INSTRUCTION TRAP
                                        MOV     #340,RESVEC+2
                                        MOV     #TIMEOUT,ERRVEC         ;SETUP TIMEOUT ERRORS
                                        MOV     #340,ERRVEC+2           ;SET PRIORITY OF ERROR TRAPS
                                        MOV     #MMTRAP,MMVEC           ;VECTOR FOR MEMORY MANAGEMENT
                                        MOV     #340,MMVEC+2
104423                                  CACHON                          ;TURN CACHE ON
```

```
                                        SUBTST  <<INITIALIZE PATTERNS>>
                                ;*****************************************************************************
                                ;*SUBTEST        INITIALIZE PATTERNS
                                ;*****************************************************************************
                                        ;THE APT E TABLE DETERMINES WHICH PATTERNS ARE GOING TO BE RUN.
                                        ;EACH BIT SET REPRESENTS A PATTERN TABLE ENTRY THAT IS TO BE LEFT
                                        ;ALONE (TO BE RUN).  EACH BIT CLEARED REPRESENTS A PATTERN TABLE ENTRY
                                        ;THAT IS TO BE OVERLAYED WITH THE ADDRESS OF A NULL PATTERN.
5313 004526  012700  056734             MOV     #$DDW0,R0
5314 004532  012001                     MOV     (R0)+,R1
5315 004534  012703  017014             MOV     #MKCSRT,R3
5316 004540  012702  000020             MOV     #16.,R2
5317 004544  004737  004644             CALL    PATPLUG
5318 004550  012001                     MOV     (R0)+,R1
5319 004552  012702  000010             MOV     #8.,R2
5320 004556  004737  004644             CALL    PATPLUG
5321 004562  012001                     MOV     (R0)+,R1
5322 004564  012703  017244             MOV     #MKPAT,R3
5323 004570  012702  000020             MOV     #16.,R2
5324 004574  004737  004644             CALL    PATPLUG
5325 004600  012001                     MOV     (R0)+,R1
5326 004602  012702  000010             MOV     #8.,R2
5327 004606  004737  004644             CALL    PATPLUG
5328 004612  012001                     MOV     (R0)+,R1
5329 004614  012703  017430             MOV     #MJPAT,R3
5330 004620  012702  000020             MOV     #16.,R2
5331 004624  004737  004644             CALL    PATPLUG
5332 004630  012001                     MOV     (R0)+,R1
5333 004632  012702  000010             MOV     #8.,R2
5334 004636  004737  004644             CALL    PATPLUG
5335 004642  000417                     BR      SUBAAA
5336
5337 004644                     PATPLUG:SUBTST  <<SUBR  PLUG IN NULL PATTERNS>>
                                ;*****************************************************************************
                                ;*SUBTEST        SUBR    PLUG IN NULL PATTERNS
                                ;*****************************************************************************
5338 004644                             FOR I := #1 TO R2
     004644  012737  000001  002452                                                 MOV #1,I
     004652                                                                 B0:;;;;;;;
5339 004652  006001                       ROR   R1
5340 004654                               ON.NOERROR            ;IF CARRY CLEAR
     004654  103402                                                             BCS L0
5341 004656  012713  024220                 MOV #MT0999,(R3)
5342 004662                               END ;OF ON.ERROR
     004662                                                                 L0:;;;;;;;
5343 004662  062703  000002               ADD #2,R3
5344 004666                             END ;OF FOR
     004666  005237  002452                                                         INC I
     004672  023702  002452                                                         CMP I,R2
     004676  003765                                                                 BLE B0
     004700                                                                 E0:;;;;;;;;
5345 004700  000207                     RETURN
```

```
 5348 004702                            SUBAAA: SUBTST  <<CLEAR THE CONFIGURATION TABLE>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       CLEAR THE CONFIGURATION TABLE
                                        ;*****************************************************************************
 5349                                           ;THIS ZEROS (UNLESS WE STARTED AT ADDRESS 202) THE CONFIG TABLE
 5350                                           ;WHICH IS FULLY DISCRIBED AT LOCATION "CONFIG".
 5351                                           .ENABLE LSB
 5352 004702                                    IF RESTART IS FALSE
      004702  005737  002626                                                              TST RESTART
      004706  001006                                                                      BNE L1
 5353 004710  012700  002664                      MOV   #CONFIG,R0
 5354 004714  005020                      1$:     CLR   (R0)+
 5355 004716  022700  003670                      CMP   #CONFIEND,R0
 5356 004722  001374                              BNE   1$
 5357 004724                                    END ;OF IF RESTART
      004724                                                                    L1:;;;;;;
 5358                                           .DSABL  LSB
 5359 004724  012737  000002  002106              MOV     #BIT1,CPUBIT            ;SET ID BIT
 5360 004732                                    SUBTST  <<SIZE FOR A HARDWARE SWITCH REGISTER>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       SIZE FOR A HARDWARE SWITCH REGISTER
                                        ;*****************************************************************************
 5361                                           ;;IF NOT FOUND OR IT IS
 5362                                           ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
 5363                                           .ENABL  LSB
 5364 004732                                    SET4    #3$             ;TRAPS TO 4 GOTO 3$
      004732  012737  004766  000004            MOV     #3$,4
                                                .DSABL  CRF
 5365 004740  012737  177570  002636            MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWITCH REGISTER
 5366 004746  012737  177570  002640            MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
 5367 004754                                    IF #-1 EQ @SWR          ;IF NO TRAP FROM REFERENCE TO @SWR AND @SWR = #-1
      004754  022777  177777  175654                                                      CMP #-1,@SWR
      004762  001023                                                                      BNE L2
 5368 004764  000403                              BR    2$              ;;BRANCH IF NO TIMEOUT
 5369 004766  012716  004774              3$:     MOV   #2$,(SP)        ;;SET UP FOR TRAP RETURN
 5370 004772  000002                              RTI
 5371 004774                              2$:     RES4                  ;RESET TRAPS TO 4 TO DEFAULT
      004774  012737  034114  000004            MOV     #TIMEOUT,4
      005002  022737  000005  004010            CMP     #5,PROTYP       ;IS THIS AN 11/83/84 ?
      005010  001002                            BNE     101$            ;BRANCH IF NOT
      005012  005037  177766                    CLR     CPUERR          ;CLEAR OUT THE CPU ERROR REGISTER BITS
      005016                            101$:
                                                                        ;THAT A EXPECTED TRAP COULD HAVE SET
                                                .DSABL  CRF
 5372 005016  012737  000176  002636              MOV   #SWREG,SWR      ;;POINT TO SOFTWARE SWR
 5373 005024  012737  000174  002640              MOV   #DISPREG,DISPLAY
 5374 005032                                    END ;OF IF #-1
      005032                                                                    L2:;;;;;;
 5375                                           .DSABL  LSB
```

```
 5378 005032                            SUBAAB: SUBTST  <<SETUP ACT, APT, & XXDP>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       SETUP ACT, APT, & XXDP
                                        ;*****************************************************************************
 5379                                           ;THIS SETS UP A BUNCH OF FLAGS TO TELL THE PROGRAM EVERYTHING
 5380                                           ;IT CARES TO KNOW ABOUT APT, ACT, & XXDP.
 5381 005032  005037  056654                    CLR     $PASS           ;CLEAR PASS COUNT
 5382 005036                                    IFB #BIT5 SET.IN $ENVM
      005036  132737  000040  056667                                                    BITB #BIT5,$ENVM
      005044  001403                                                                    BEQ L3
 5383 005046                                      SET   $TPFLG          ;INDICATE NO TERMINAL
      005046  012737  177777  002360                                                    MOV  #-1,$TPFLG
 5384 005054                                    END ;OF IFB #BIT5
      005054                                                                    L3:::::::
 5385 005054                                    IFB #BIT7 SET.IN $ENVM
      005054  132737  000200  056667                                                    BITB #BIT7,$ENVM
      005062  001403                                                                    BEQ L4
 5386 005064                                      SET   APTSIZE
      005064  012737  177777  002444                                                    MOV  #-1,APTSIZE
 5387 005072                                    END ;OF IFB #BIT7
      005072                                                                    L4:::::::
 5388 005072                                    IFB $ENV EQ #1
      005072  123727  056666  000001                                                    CMPB $ENV,#1
      005100  001023                                                                   BNE L5
 5389 005102                                      SET   APTFLAG,QVFLAG,$AUTO,QUICK
      005102  012737  177777  002352                                                    MOV  #-1,APTFLAG
      005110  012737  177777  002346                                                    MOV  #-1,QVFLAG
      005116  012737  177777  002062                                                    MOV  #-1,$AUTO
      005124  012737  177777  002436                                                    MOV  #-1,QUICK
 5390 005132  012737  040720  000024              MOV   @APTDOWN,PWRVEC
 5391 005140  012737  056670  002636              MOV   #$SWREG,SWR       ;USE APT SWR
```

```
5392 005146                                    ELSE
     005146  000430                                                    BR L6
     005150                                L5:;;;;;;
5393 005150                                      IF 42 NE #STACK AND 42 NE #0
     005150  023727  000042  002000                                    CMP 42,#STACK
     005156  001424                                                    BEQ L7
     005160  005737  000042                                           TST 42
     005164  001421                                                    BEQ L7
5394 005166                                        SET QVFLAG,$AUTO
     005166  012737  177777  002346                                    MOV  #-1,QVFLAG
     005174  012737  177777  002062                                    MOV  #-1,$AUTO
5395 005202                                        IF 42 EQ #$ENDAD
     005202  023727  000042  014042                                    CMP 42,#$ENDAD
     005210  001004                                                    BNE L10
5396 005212                                          SET       ACTFLAG
     005212  012737  177777  002350                                    MOV  #-1,ACTFLAG
5397 005220                                        ELSE
     005220  000403                                                    BR L11
     005222                                L10:;;;;;;
5398 005222                                          SET       XXDPCHAIN
     005222  012737  177777  002354                                    MOV  #-1,XXDPCHAIN
5399 005230                                        END ;OF IF 42
     005230                                L11:;;;;;;
5400 005230                                      END ;OF IF 42
     005230                                L7:;;;;;;
5401 005230                                    END ;OF IFB $ENV
     005230                                L6:;;;;;;
```

```
 5403 005230                            SUBTST  <<PROTECT PROGRAM & LOADERS>:
                                ;*********************************************************************
                                ;*SUBTEST       PROTECT PROGRAM & LOADERS
                                ;*********************************************************************
 5404 005230  052737  000200  002664    BIS     #BIT7,CONFIG            ;PROTECT PROGRAM SPACE (BANK 0)
 5405 005236  052737  000200  002670    BIS     #BIT7,CONFIG+4          ;PROTECT LOADER SPACE (BANK 1)
 5406 005244                            IF #$ENDAD NE 42                ;NOT ACT-11?
      005244  022737  014042  000042                                                    CMP #$ENDAD,42
      005252  001412                                                                   BEQ L12
 5407 005254                              IF NO22BIT NE #0              ;
      005254  005737  002454                                                           TST NO22BIT
      005260  001405                                                                   BEQ L13
 5408 005262                                 SET     MONFLG             ;RETURN TO XXDP MONITOR
      005262  012737  .77777  002276                                                   MOV  #-1,MONFLG
 5409 005270  104064                         ERROR +64                  ;ILLEGAL PROCESSOR
 5410 005272                              ELSE                          ;
      005272  000402                                                                   BR L14
      005274                                                                  L13:;;;;;;;
 5411 005274                                 TYPE    MSG000             ;TYPE PROGRAM TITLE
      005274  104401  071422                TYPEIT  ,MSG000
                                           .DSABL  CRF
 5412 005300                                 END                        ;
      005300                                                                  L14:;;;;;;;
 5413 005300                            END ;OF IF #$ENDAD
      005300                                                                  L12:;;;;;;;
 5414
 5415 005300                            SUBTST  <<CHECK FOR CACHE AND MEMORY MANAGEMENT>>
                                ;*********************************************************************
                                ;*SUBTEST       CHECK FOR CACHE AND MEMORY MANAGEMENT
                                ;*********************************************************************
 5416                                   ;* THIS FIGURES OUT IF THERE IS A CACHE AND MEMORY MANAGEMENT
 5417                                   ;* ON THE SYSTEM, AND WHETHER IT IS ENABLED OR DISABLED.
 5418 005300                            SET4    #3$
      005300  012737  005500  000004    MOV     #3$,4
                                        .DSABL  CRF
 5419 005306  005737  177746            TST     CONTRL                  ;IS THERE A CONTROL REGISTER?
 5420 005312                            SET4    #1$
      005312  012737  005412  000004    MOV     #1$,4
                                        .DSABL  CRF
 5421 005320  005737  172516            TST     MMR3                    ;IS THERE A MMR3 REGISTER?
 5422 005324  013746  000004            MOV     4,-(SP)                 ;;V SAVE OLD TIME OUT
 5423 005330  012737  005400  000004    MOV     #14$,4                  ;;V PASS ON KTJ11
 5424 005336  032737  001000  177750    BIT     #BIT9,@#177750          ;;V TEST FOR 1184
 5425 005344  001415                    BEQ     14$                     ;;V ELSE REPORT 1183
 5426 005346                            TYPE    M1184                   ;;V REPORT 1184
      005346  104401  071100            TYPEIT  ,M1184
                                        .DSABL  CRF
 5427 005352  052737  000400  177730  12$:  BIS     #BIT8,@#177730      ;;V SET ABILITY TO CLEAR
 5428 005360  042737  000077  177734        BIC     #77,@#177734        ;;V UNIBUS MEMORY ACCESS
 5429 005366                            TYPE    NOUBMT                  ;;V TO UNIBUS
      005366  104401  071547            TYPEIT  ,NOUBMT
                                        .DSABL  CRF
 5430 005372  012637  000004            MOV     (SP)+,4                 ;;V AND REPORT NO UNIBUS
 5431 005376  000411                    BR      4$                      ;;V MEMORY ACCESS AND CONTINUE
 5432 00540^  012637  000004          14$:  MOV     (SP)+,4             ;;V ALSO RESTORE OLD TIME OUT
 5433 005404                            TYPE    MSG117                  ; 11/83
      005404  104401  071112            TYPEIT  ,MSG117
```

```
                                                .DSABL  CRF
 5434 005410  000404                            BR      4$
 5435 005412                            1$:     SET     MONFLG                  ;PROCESSOR NOT SUPPORTED BY THIS DIAGNOSTIC
      005412  012737  177777  002276                                                    MOV  #-1,MONFLG
 5436 005420  104064                            ERROR   +64                     ;NO MEMORY MANAGEMENT
 5437 005422  052737  000014  177746    4$:     BIS     #BIT2!BIT3,CONTRL       ;SET CACHE DISABLE BITS
 5438 005430  042737  000014  177746            BIC     #BIT2!BIT3,CONTRL       ;CLEAR CACHE DISABLE BITS
 5439 005436  032737  000004  177746            BIT     #BIT2,CONTRL            ;IS THE BIT SET?
 5440 005444  001004                            BNE     7$                      ;BRANCH IF THE BIT IS SE
 5441 005446  032737  000010  177746            BIT     #BIT3,CONTRL            ;IS THE BIT SET?
 5442 005454  001413                            BEQ     6$                      ;BRANCH IF THE BIT IS SET
 5443 005456                            7$:     TYPE    MSG121                  ; CACHE BYPASSED
      005456  104401  071154                    TYPEIT  ,MSG121
                                                .DSABL  CRF
 5444 005462  104424                            CACHOFF
 5445 005464  013737  002544  002546            MOV     CACHKN,CACHKN+2         ;SAVE INFO ABOUT CACHE
 5446 005472  005037  002544                    CLR     CACHKN                  ;CACHE CANNOT BE USED - IT'S BYPASSED
 5447 005476  000404                            BR      8$                      ;
 5448 005500                            3$:     TYPE    MSG119                  ;       NO
      005500  104401  071124                    TYPEIT  ,MSG119
                                                .DSABL  CRF
 5449 005504                            6$:     TYPE    MSG120                  ;CACHE AVAILABLE
      005504  104401  071133                    TYPEIT  ,MSG120
                                                .DSABL  CRF
```

```
5451 005510                                    SUBTST  <<SETUP USER & SUPERVISOR STACK>>
                                       ;*****************************************************************
                                       ;*SUBTEST       SETUP USER & SUPERVISOR STACK
                                       ;*****************************************************************
5452 005510  104421                    8$:     DEENERGIZE              ;TURN OFF MEMORY MANAGEMENT
5453 005512  005737  002456                    TST     NOSUPER         ;IS THERE A SUPERVISOR MODE?
5454 005516  001011                            BNE     5$              ;NO-SKIP SUPERVISOR SETUP.
5455
5456                                           ;SET PREVIOUS MODE TO SUPERVISOR
5457 005520  042737  030000  177776            BIC     #BIT13!BIT12,PSW
5458 005526  052737  010000  177776            BIS     #BIT12,PSW
5459
5460 005534                                    PUSH    #SUPSTK
     005534  012746  000740                                                  MOV #SUPSTK,-(SP)
5461 005540  006606                            MTPI    SSP
5462
5463                                           ;SET PREVIOUS MODE TO USER
5464 005542  052737  030000  177776  5$:       BIS     #BIT13!BIT12,PSW
5465
5466 005550                                    PUSH    #USESTK
     005550  012746  000700                                                  MOV #USESTK,-(SP)
5467 005554  006606                            MTPI    USP
5468
5469 005556                                    SUBTST  <<GET SOFTWARE SWITCH REGISTER IF NECESSARY>>
                                       ;*****************************************************************
                                       ;*SUBTEST       GET SOFTWARE SWITCH REGISTER IF NECESSARY
                                       ;*****************************************************************
5470 005556                                    IF $AUTO IS FALSE                       ;IF NOT(APT OR ACT)
     005556  005737  002062                                                          TST $AUTO
     005562  001012                                                                  BNE L15
5471 005564                                      IF SWR EQ #SWREG              ;IF SOFTWARE SWITCH REG SELECTED
     005564  023727  002636  000176                                                  CMP SWR,#SWREG
     005572  001006                                                                  BNE L16
5472 005574                                        SET  SWRFLG                 ;;SET FLG TO BUMP STACK
     005574  012737  177777  002566                                                  MOV  #-1,SWRFLG
5473 005602  104407                                GTSWR                       ;;GET SOFT-SWR SETTINGS
5474 005604  005037  002566                        CLR  SWRFLG                 ;;CLEAR IT FOR REST OF PROGRAM
5475 005610                                      END ;OF IF SWR
     005610                                                                         L16:;;;;;;
5476 005610                                    END ;OF IF $AUTO
     005610                                                                         L15:;;;;;;
5477
5478 005610                                    SUBTST  <<GET MEMORY MANAGEMENT READY>>
                                       ;*****************************************************************
                                       ;*SUBTEST       GET MEMORY MANAGEMENT READY
                                       ;*****************************************************************
5479 005610  104422                            KMAP                    ;MAP KERNEL SPACE 1 TO 1
5480 005612                                    MAP                     ;MAP SUPERVISOR SPACE (TEST AREA) 1 TO 1
     005612  010346                                                                 MOV R3,-(SP)
     005614  012703  000200                    MOV     #200,R3
     005620  004737  035716                    CALL    MAPPER
                                               .DSABL  CRF
     005624  012603                                                                 MOV (SP)+,R3
5481 005626  104420                            ENERGIZE                ;TURN ON MEMORY MANAGEMENT
```

```
 5484 005630                            NEWTST  <<BIT TEST OF ALL CSR'S>>
                                ;*************************************************************************
                                ;*TEST 1        BIT TEST OF ALL CSR'S
                                ;*************************************************************************
      005630  000004            TST1:   SCOPE
 5485                           ;* THE FIRST PART OF THE CONFIGURATION ANALYSIS DOES THE FOLLOWING:
 5486                           ;*      1) FINDS WHICH CSR'S RESPOND, AND PUTS THEM INTO THE CSR INFORMATION
 5487                           ;*         TABLE, AND STORES ANOTHER BIT FOR "TOTCSRS".
 5488                           ;*      2) TESTS THE CSR BITS COMMON TO ALL CSR'S.
 5489                           ;*      3) FIGURES OUT IF THE MODULE IS A ECC, OR PARITY MEMORY
 5490                           ;*      4) TESTS THE BITS PARTICULAR TO THAT TYPE OF CSR.
 5491                           ;*      5) IF ANY BITS TEST BAD IN THE CSR UNDER TEST, THE CSR OK BIT IN THE
 5492                           ;*           CSR INFORMATION TABLE IS CLEARED.
 5493                           ;* THE INFORMATION BITS ONE THROUGH THREE FORM A CODE WHICH GIVES THE TYPE
 5494                           ;* OF CSR:
 5495                           ;*                      ECC
 5496                           ;*       TYPE           BIT0
 5497                           ;*
 5498                           ;*      MSV11-L/P        0             PARITY
 5499                           ;*      MSV11-J          1             ECC
 5500                           ;*
 5501                           ;* THIS MEMORY CODE WILL BE USED IN THE SECOND PART OF THIS ANALYSIS
 5502                           ;*
 5503 005632  005005                    CLR     R5              ;R5 IS THE TOTAL CSR NUMBER
 5504 005634  005000                    CLR     R0              ;R0 IS A TABLE INDEX
 5505 005636  012703  172100            MOV     #CSRADD,R3      ;R3 HAS THE CSR ADDRESS
 5506 005642  012737  000001  002076    MOV     #1,NOPAR        ;IGNORE PARITY ERRORS
 5507 005650                            SET4    #CSRBMP
      005650  012737  006024  000004    MOV     #CSRBMP,4
                                        .DSABL  CRF
 5508 005656                            REPEAT
      005656                                                                    B1:;;;;;;
 5509 005656  005713                       TST (R3)             ;DOES THIS CSR RESPOND???
 5510 005660  052705  000001               BIS  #1,R5           ;MARK IT IN CSR MAP
 5511 005664  005004                       CLR  R4              ;CLEAR THE LAST CSR INDICATOR
 5512 005666  042760  000006  002462       BIC  #6,CSRINFO(R0)  ;CLEAR UNUSED BITS
 5513 005674  052760  000030  002462       BIS  #BIT4!BIT3,CSRINFO(R0) ;YES-MARK IT IN CSR INFORMATION TABLE
 5514 005702  005013                       CLR  (R3)            ;CLEAR THE CSR UNDER TEST
 5515 005704                               LET (R3) := #BIT13   ;IS THIS AN ECC MEMORY???
      005704  012713  020000                                                    MOV #BIT13,(R3)
 5516 005710                               IF #BIT13 SET.IN (R3);IS BIT 13 SET
      005710  032713  020000                                                    BIT #BIT13,(R3)
      005714  001403                                                           BEQ L17
 5517 005716  052760  000001  002462        BIS #BIT0,CSRINFO(R0);MARK IT IN THE TABLE AS BEING A ECC MEMORY
 5518 005724                               END                  ;
      005724                                                                L17:;;;;;;
 5519 005724  005013                       CLR (R3)             ;CLEAR CSR UNDER TEST
 5520 005726  004737  006220               CALL RWCSR           ;BIT TEST OF ALL BITS IN CSR'S
 5521 005732                               IF CSRINFO(R0) MI #30 ;DO WE HAVE A LEGAL CONFIGURATION?
      005732  026027  002462  000030                                            CMP CSRINFO(R0),#30
      005740  100004                                                           BPL L20
 5522 005742  016037  002462  002052          MOV CSRINFO(R0),BAD ;MOVE IN BAD DATA
 5523 005750  104021                          ERROR +21            ;
 5524 005752                               END                  ;
      005752                                                                L20:;;;;;;
 5525 005752  062700  000002        NXTCSR:    ADD #2,R0            ;GO TO NEXT CSR
 5526 005756  062703  000002                   ADD #2,R3            ;GO TO NEXT CSR
```

```
 5527 005762  006305                    ASL   R5              ;SHIFT CSR MAP
 5528 005764                            ON.ERROR              ;IS THERE A CSR 0
      005764  103001                                                    BCC L21
 5529 005766  005204                      INC R4              ;YES SET CSR PRESENT FLAG
 5530 005770                            END                   ;
      005770                                                  L21:;;;;;;
 5531 005770                          UNTIL R0 EQ #40         ;UNTIL ALL CSR'S ARE DONE
      005770  020027  000040                                             CMP R0,#40
      005774  001330                                                    BNE B1
      005776                                                 E1:;;;;;;
 5532 005776  006005                  ROR     R5              ;RESYNC R5
 5533 006000  005704                  TST     R4              ;WAS THERE A CSR 0?
 5534 006002                          RNE     22$             ;BRANCH IF NOT EQUAL
      006002  001402                                                    BEQ 22$
 5535 006004  052705  100000          BIS     #BIT15,R5       ;YES SET IT IN CSR TABLE
 5536 006010                  22$:    LET TOTCSRS := R5       ;STORE CSR MAP IN TOTCSRS
      006010  010537  002224                                            MOV R5,TOTCSRS
 5537 006014  004737  006034          CALL CSRMAP             ;PRINT CSR MAP
 5538 006020                          JUMPTO  CTEST           ;
      006020  000137  006714                                             JMP CTEST
 5539
 5540 006024  062706  000004  CSRBMP: ADD     #4,SP           ;FIX STACK POINTER FOR NON-EXISTANT CSR TRAP
 5541 006030  000137  005752          JMP     NXTCSR          ;GO ON TO NEXT CSR
 5542
```

```
 5544 006034                        CSRMAP: SUBTST  <<PRINT CSR REGISTER MAP>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       PRINT CSR REGISTER MAP
                                    ;*****************************************************************************
 5545 006034  005000                        CLR     R0              ;CLEAR CSR INFO POINTER
 5546 006036                                TYPE    MSG008          ;PRINT TITLE
      006036  104401  071370                TYPEIT  ,MSG008
                                            .DSABL  CRF
 5547 006042                                TYPE    MSG016          ;PRINT CSR NUMBERS
      006042  104401  066064                TYPEIT  ,MSG016
                                            .DSABL  CRF
 5548 006046  005001                        CLR     R1              ;
 5549 006050                                REPEAT                  ;
      006050                                                                    B2:;;;;;;
 5550 006050  010102                           MOV  R1,R2           ;
 5551 006052  022702  000011                   CMP  #9.,R2          ;
 5552 006056  100002                           BPL  1$              ;JUMP AROUND NEXT INSTRUCTION
 5553 006060  062702  000007                   ADD  #7,R2           ;
 5554 006064  062702  000060           1$:     ADD  #60,R2          ;MAKE IT ASCII
 5555 006070  110237  066062                   MOVB R2,MSG015       ;
 5556 006074                                   TYPE MSG015          ;
      006074  104401  066062                TYPEIT  ,MSG015
                                            .DSABL  CRF
 5557 006100                                   TYPE MSG014          ;TYPE SINGLE SPACE
      006100  104401  066060                TYPEIT  ,MSG014
                                            .DSABL  CRF
 5558 006104  005201                           INC  R1              ;
 5559 006106                                UNTIL R1 EQ #16.        ;
      006106  020127  000020                                                    CMP R1,#16.
      006112  001356                                                            BNE B2
      006114                                                            E2:;;;;;;
 5560 006114                                TYPE  MSG009            ;TYPE MEMTYPE
      006114  104401  065544                TYPEIT  ,MSG009
                                            .DSABL  CRF
 5561 006120                                REPEAT                  ;
      006120                                                            B3:;;;;;;
 5562 006120                                   IF CSRINFO(R0) NE #0 ;IS CSR NONEXSISTANT????
      006120  005760  002462                                                    TST CSRINFO(R0)
      006124  001414                                                            BEQ L24
 5563 006126                                      IF #BIT0 SET.IN CSRINFO(R0)
      006126  032760  000001  002462                                            BIT #BIT0,CSRINFO(R0)
      006134  001404                                                            BEQ L25
 5564 006136  112737  000105  066062                  MOVB  #'E,MSG015 ;IT IS A MSV11-J
 5565 006144                                       ELSE
      006144  000403                                                            BR L26
      006146                                                            L25:;;;;;;
 5566 006146  112737  000120  066062                  MOVB  #'P,MSG015 ;IT IS A MSV11-L/P
 5567 006154                                       END
      006154                                                            L26:;;;;;;
 5568 006154                                   ELSE
      006154  000403                                                            BR L27
      006156                                                            L24:;;;;;;
 5569 006156  112737  000040  066062                MOVB #' ,MSG015
 5570 006164                                   END
      006164                                                            L27:;;;;;;
 5571 006164                                   TYPE MSG015                  ;TYPE MEMORY TYPE
      006164  104401  066062                TYPEIT  ,MSG015
```

```
                                        .DSABL  CRF
 5572 006170                               TYPE MSG014                ;TYPE SPACE
      006170  104401  066060             TYPEIT  ,MSG014
                                        .DSABL  CRF
 5573 006174  000240                       NOP                        ;
 5574 006176  062700  000002               ADD  #2,R0                 ;POINT TO NEXT ENTRY
 5575 006202                            UNTIL R0 EQ #40                ;
      006202  020027  000040                                                    CMP R0,#40
      006206  001344                                                            BNE B3
      006210                                                          E3:;;;;;;;
 5576 006210                            TYPE   MSG129                  ;
      006210  104401  071471            TYPEIT  ,MSG129
                                        .DSABL  CRF
 5577 006214  000207                    RETURN                         ;
 5578 006216  000000             TRACE: .WORD   0
```

```
5580 006220                             SUBTST  <<READ AND WRITE ALL CSR BITS>>
                                ;*******************************************************************************
                                ;*SUBTEST       READ AND WRITE ALL CSR BITS
                                ;*******************************************************************************
5581                            ;
5582                            ; THIS ROUTINE "RWCSR" CHECK TO SEE THAT THE CSR CAN BEWRITTEN ON CORRECTLY
5583                            ; BY WRITING AND CHECKING FOR THE FOLLOWING PATTERNS:
5584                            ;
5585                            ;               1-ZEROS
5586                            ;               2-ONES
5587                            ;               3-SHIFTING A ONE THROUGH A FIELD OF ZEROS
5588                            ;               4-SHIFTING A ZEROS THROUGH A FIELD OF ONES
5589                            ;
5590 006220                    RWCSR:
5591 006220                             PUSH R4,R5,UIPAR0       ;SAVE R4,R5, AND UIPAR0 ON STACK
     006220  010446                                                             MOV R4, (SP)
     006222  010546                                                             MOV R5, (SP)
     006224  013746  177640                                                     MOV UIPAR0,-(SP)
5592 006230                             LET R5 := R0            ;GET CSR NUMBER FOR POSSIBLE ERROR
     006230  010005                                                             MOV R0,R5
5593 006232  006205                     ASR R5                  ;
5594 006234                             LET CSRNO := R5         ;
     006234  010537  002152                                                     MOV R5,CSRNO
5595 006240                             LET ADDRESS := R3       ;GET ADDRESS FOR POSSIBLE ERROR
     006240  010337  002034                                                     MOV R3,ADDRESS
5596 006244                             IF #BIT0 SET.IN CSRINFO(R0) ;WHAT KIND OF MEMORY IS THIS???     ;GET BIT MASKS FOR D
     006244  032760  000001  002462                                             BIT #BIT0,CSRINFO(R0)
     006252  001403                                                             BEQ L31
5597 006254                                LET R5 := #017740    ;MASK FOR MSV11-J
     006254  012705  017740                                                     MOV #017740,R5
5598 006260                             ELSE                    ;IT IS A MSV11-L/P
     006260  000402                                                             BR L32
     006262                                                             L31:;;;;;;;
5599 006262                                LET R5 := #070032    ;MASK FOR MSV11-L/P
     006262  012705  070032                                                     MOV #070032,R5
5600 006266                             END                     ;
     006266                                                             L32:;;;;;;;
5601 006266                             LET CSR1S := #177777    ;SET CSR1S TO ALL ONES
     006266  012737  177777  002322                                             MOV #177777,CSR1S
5602 006274  040537  002322             BIC R5,CSR1S            ;CLEAR BITS FOR GOOD DATA
5603 006300                             LET (R3) := #0          ;0 ---->CSR
     006300  005013                                                             CLR (R3)
5604 006302                             LET R4 := (R3)          ;MASK OUT UNWANTED BITS
     006302  011304                                                             MOV (R3),R4
5605 006304  040504                     BIC R5,R4               ;
5606 006306                             IF R4 NE #0             ;DO WE HAVE A CORRECT READ
     006306  005704                                                             TST R4
     006310  001410                                                             BEQ L33
5607 006312                               LET GOOD := #0        ;GOOD DATA=0'S
     006312  005037  002044                                                     CLR GOOD
5608 006316                               LET CSR := R4         ;BAD DATA=CSR
     006316  010437  002150                                                     MOV R4,CSR
5609 006322  104035                       ERROR +35             ;BIT SET ERROR
5610 006324  042760  000010  002462       BIC #BIT3,CSRINFO(R0) ;CLEAR CSR OK BIT
5611 006332                             END
     006332                                                             L33:;;;;;;;
5612 006332                             LET (R3) := CSR1S       ;ONES   >(R3)
```

```
      006332  013713  002322                                                    MOV CSR1S,(R3)
 5613 006336                        LET R4 := (R3)          ;MASK OUT CORRECT FIELD
      006336  011304                                                            MOV (R3),R4
 5614 006340  005013                CLR     (R3)            ;CLEAR OUT CSR
 5615 006342  040504                BIC R5,R4               ;
 5616 006344                        IF R4 NE CSR1S          ;WAS PATTERN WRITTEN CORRECTLY?
      006344  020437  002322                                                    CMP R4,CSR1S
      006350  001411                                                           BEQ L34
 5617 006352                            LET GOOD := CSR1S   ;GOOD DATA = ALL LEGAL BITS SET IN CSR
      006352  013737  002322  002044                                            MOV CSR1S,GOOD
 5618 006360                            LET CSR := R4       ;BAD DATA=CSR
      006360  010437  002150                                                    MOV R4,CSR
 5619 006364  104010                    ERROR +10           ;BIT CLEAR ERROR
 5620 006366  042760  000010  002462    BIC #BIT3,CSRINFO(R0) ;CLEAR CSR OK BIT
 5621 006374                        END                     ;
      006374                                                            L34:;;;;;;;
 5622 006374                        LET PASFLG := #0        ;SET UP LOOP COUNTER
      006374  005037  002264                                                    CLR PASFLG
 5623 006400                        REPEAT                  ;REPEAT WITH A FIELD OF 1'S THROUGH 0'S
      006400                                                            B4:;;;;;;;
 5624                                                                   ;       0'S THROUGH 1'S
 5625 006400  005237  002264            INC PASFLG          ;INCREMENT LOOP COUNTER
 5626 006404                            LET UIPAR0 := #-1   ;USE USER PAR FOR BIT COUNTER
      006404  012737  177777  177640                                            MOV #-1,UIPAR0
 5627 006412                            IF PASFLG EQ #1     ;PASS 1
      006412  023727  002264  000001                                            CMP PASFLG,#1
      006420  001003                                                            BNE L35
 5628 006422                              LET R2 := #1      ;1-- -->FIELD OF ZEROS
      006422  012702  000001                                                    MOV #1,R2
 5629 006426                            ELSE                ;PASS 2
      006426  000402                                                            BR L36
      006430                                                            L35:;;;;;;;
 5630 006430                              LET R2 := #177776 ;0----->FIELD OF ONES
      006430  012702  177776                                                    MOV #177776,R2
 5631 006434                            END                 ;
      006434                                                            L36:;;;;;;;
 5632 006434                            REPEAT              ;DO BITS 0-4 AND 13-15
      006434                                                            B5:;;;;;;;
 5633 006434  005237  177640              INC UIPAR0        ;INCREMENT BIT POINTER
 5634 006440                              IF PASFLG EQ #1 AND #BIT0 OFF.IN CSRINFO(R0) ;
      006440  023727  002264  000001                                            CMP PASFLG,#1
      006446  001006                                                            BNE L37
      006450  032760  000001  002462                                            BIT #BIT0,CSRINFO(R0)
      006456  001002                                                            BNE L37
 5635 006460  042702  040000                BIC #BIT14,R2   ;IF THIS IS PASS 1 ON A MSV11-L/P,CLEAR BIT 14
 5636 006464                              END               ;
      006464                                                            L37:;;;;;;;
 5637 006464                              IF PASFLG EQ #2 AND #BIT0 OFF.IN CSRINFO(R0) ;
      006464  023727  002264  000002                                            CMP PASFLG,#2
      006472  001006                                                            BNE L40
      006474  032760  000001  002462                                            BIT #BIT0,CSRINFO(R0)
      006502  001002                                                            BNE L40
 5638 006504  042702  040004                BIC #BIT14!BIT2,R2  ;IF THIS IS PASS 2 ON A MSV11-L/P, CLEAR ECRSRD BIT AND
 5639 006510                              END               ;
      006510                                                            L40:;;;;;;;
 5640 006510                              LET (R3) := R2    ;WRITE DATA
      006510  010213                                                            MOV R2,(R3)
```

```
5641 006512                                    LET R1 := R2       ;GET GOOD DATA AND MASK IT OUT
     006512  010201                                                MOV R2,R1
5642 006514  040501                            BIC R5,R1          ;GET GOOD DATA
5643 006516                                    LET R4 := (R3)     ;GET DATA THAT IS READ
     006516  011304                                                MOV (R3),R4
5644 006520  040504                            BIC R5,R4          ;MASK OUT CSR BITS
5645 006522                                    IF R1 NE R4        ;IS DATA CORRECT???
     006522  020104                                                CMP R1,R4
     006524  001416                                                BEQ L41
5646 006526                                       LET GOOD := R1  ;BAD DATA = CSR CONTENTS
     006526  010137  002044                                        MOV R1,GOOD
5647 006532                                       LET CSR := R4   ;GET GOOD DATA
     006532  010437  002150                                        MOV R4,CSR
5648 006536                                       IF PASFLG EQ #1 ;SELECT ERROR DEPENDING ON PASS
     006536  023727  002264  000001                                CMP PASFLG,#1
     006544  001002                                                BNE L42
5649 006546  104035                                  ERROR +35    ;BIT SET ERROR
5650 006550                                       ELSE            ;PASS 2
     006550  000401                                                BR L43
     006552                                                     L42:;;;;;;
5651 006552  104010                                  ERROR +10    ;BIT CLEAR ERROR
5652 006554                                       END
     006554                                                     L43:;;;;;;
5653 006554  042760  000010  002462                BIC #BIT3,CSRINFO(R0) ;CLEAR CSR OK BIT
5654 006562                                    END                ;
     006562                                                     L41:;;;;;;
5655 006562                                    IF PASFLG EQ #1    ;GET DATA FOR NEXT LOOP
     006562  023727  002264  000001                                CMP PASFLG,#1
     006570  001002                                                BNE L44
5656 006572  006302                               ASL  R2         ;SHIFT 1 ACROSS 0'S
5657 006574                                    ELSE               ;
     006574  000402                                                BR L45
     006576                                                     L44:;;;;;;
5658 006576  000261                               SEC             ;SET CARRY
5659 006600  006102                               ROL R2          ;ROTATE A 0 ACROSS A FIELD OF ONES
5660 006602                                    END                ;
     006602                                                     L45:;;;;;;
5661 006602                                 UNTIL UIPAR0 EQ #15. ;UNTIL ALL BITS ARE DONE
     006602  023727  177640  000017                                CMP UIPAR0,#15.
     006610  001311                                                BNE B5
     006612                                                     E5:;;;;;;
5662 006612                             UNTIL PASFLG EQ #2        ;DONE WITH 2 PASSES
     006612  023727  002264  000002                                CMP PASFLG,#2
     006620  001267                                                BNE B4
     006622                                                     E4:;;;;;;
5663 006622                             IF #BIT0 SET.IN CSRINFO(R0) THEN JUMPTO DONE ;IF MSV11-L/P DO ONE LAST WRITE
     006622  032760  000001  002462                                BIT #BIT0,CSRINFO(R0)
     006630  001402                                                BEQ L50
     006632  000137  006700                                        JMP DONE
     006636                                                     L50:;;;;;;
5664 006636                             LET (R3) := #140005       ;WRITE ONES TO CSR WITH ECSRRD BIT ENABLED
     006636  012713  140005                                        MOV #140005,(R3)
5665 006642                             LET R2 := (R3)            ;READ CSR FOR CORRECT BITS
     006642  011302                                                MOV (R3),R2
5666 006644  042702  037772             BIC #37772,R2             ;CLEAR UNWANTED BITS
5667 006650                             IF R2 NE #140005          ;WAS WRITE CORRECT
     006650  020227  140005                                        CMP R2,#140005
```

```
      006654  001411                                                    BEQ L51
 5668 006656                          LET GOOD := #140005  ;GOOD DATA
      006656  012737  140005  002044                                    MOV #140005,GOOD
 5669 006664                          LET CSR := R2        ;BAD DATA
      006664  010237  002150                                           MOV R2,CSR
 5670 006670  104010                  ERROR +10            ;BIT CLEAR ERROR
 5671 006672  042760  000010  002462  BIC #BIT3,CSRINFO(R0) ;CLEAR CSR OK BIT!
 5672 006700                    END                        ;
      006700                                                      L51:;;;;;;
 5673 006700                DONE:    LET (R3) := #0       ;CLEAR OUT CSR
      006700  005013                                                   CLR (R3)
 5674 006702                          POP UIPAR0,R5,R4     ;RESTORE UIPAR0,R4, AND R5
      006702  012637  177640                                           MOV (SP)+,UIPAR0
      006706  012605                                                   MOV (SP)+,R5
      006710  012604                                                   MOV (SP)+,R4
 5675 006712  000207                    RETURN
```

```
5678                                    ;THE FOLLOWING ROUTINE DETERMINES WHICH CSR CONTROLS PROGRAM SPACE
5679                                    ;
5680 006714  104424                     CTEST:  CACHOFF
5681 006716  012737  177777  002532             MOV     #177777,PGMCSR
5682 006724  012737  002000  172350             MOV     #2000,KIPAR4            ;SET UP MAP REGISTER
5683 006732  012701  002412                     MOV     #TESTADD,R1
5684 006736  012737  100000  002412             MOV     #100000,TESTADD
5685 006744  012737  100002  002414             MOV     #100002,TESTADD+2
5686 006752  005000                            CLR     R0                      ;CLEAR CSR COUNTER
5687 006754  005037  002152                     CLR     CSRNO
5688 006760  013703  002224                     MOV     TOTCSRS,R3              ;OBTAIN CSR MAP
5689 006764  000240                            NOP                             ;DEBUG AID
5690 006766  006303                     4$:     ASL     R3                      ;PUT HIGH ORDER BIT INTO C BIT
5691 006770  103407                            BCS     2$                      ;BRANCH IF CSR EXISTS
5692 006772  062700  000002             1$:     ADD     #2,R0                   ;UPDATE CSR COUNTER
5693 006776  010037  002152                     MOV     R0,CSRNO
5694 007002  005703                            TST     R3                      ;IS MAP EMPTY?
5695 007004  001465                            BEQ     3$                      ;BRANCH IF SO
5696 007006  000767                            BR      4$
5697 007010  000240                     2$:     NOP                             ;DEBUG AID
5698 007012  000241                            CLC                             ;CLEAR CARRY
5699 007014  032760  000001  002462             BIT     #BIT0,CSRINFO(R0)       ;IS THIS PARITY MEMORY?
5700 007022  001014                            BNE     5$                      ;BRACH IF NOT
5701 007024  052760  000004  172100             BIS     #BIT2,CSRADD(R0)        ;SET WRITE WRONG PARITY
5702 007032  012771  123456  000000             MOV     #123456,@(R1)           ;WRITE DATA
5703 007040  012771  123456  000002             MOV     #123456,@2(R1)
5704 007046  005060  172100                     CLR     CSRADD(R0)              ;RESTORE CSR
5705 007052  000414                            BR      6$
5706 007054  012760  000000  172100     5$:     MOV     #0,CSRADD(R0)           ;CLEAR THE CSR UNDER TEST
5707 007062  012771  123456  000000             MOV     #123456,@(R1)           ;WRITE DATA
5708 007070  012771  123456  000002             MOV     #123456,@2(R1)
5709 007076  012760  020006  172100             MOV     #20006,CSRADD(R0)       ;SET DIAG CHECK MODE
5710 007104  005771  000000             6$:     TST     @(R1)                   ;WRITE CHECKBITS TO CSR
5711 007110  016004  172100                     MOV     CSRADD(R0),R4           ;WRITE CSR TO R4
5712 007114  032760  000001  002462             BIT     #BIT0,CSRINFO(R0)       ;PARITY MEMORY?
5713 007122  001003                            BNE     7$                      ;BRANCH IF NOT
5714 007124  005704                            TST     R4                      ;PARITY ERROR?
5715 007126  100412                            BMI     8$                      ;BRACH IF SO
5716 007130  000720                            BR      1$                      ;TRY NEXT CSR
```

```
 5717 007132  000240                    7$:     NOP                             ;DEBUG AID
 5718 007134  072427  177773                    ASH     #5,R4
 5719 007140  042704  177700                    BIC     #^C77,R4
 5720 007144  012702  000040                    MOV     #40,R2                  ;LOAD IN CORRECT CHECK BITS FOR MSV11-J
 5721 007150  020204                            CMP     R2,R4                   ;CORRECT CHECKBITS?
 5722 007152  001307                            BNE     1$                      ;BRANCH IF NOT
 5723 007154  010037  002532              8$:   MOV     R0,PGMCSR
 5724 007160  000240                    3$:     NOP                             ;DEBUG AID
 5725 007162  104502                            CLRCSR                          ;CLEAR ALL CSR'S
 5726 007164  012771  000000  000000            MOV     #0,@(R1)                ;RESTORE TEST LOCATIONS
 5727 007172  012771  000000  000002            MOV     #0,@2(R1)
 5728 007200  023727  002532  177777            CMP     PGMCSR,#177777
 5729 007206  001402                            BEQ     FINT$                   ;IF PROGRAM CSR NOT FOUND GO TO FINT
 5730 007210  000137  007232                    JMP     CLRMEM                  ;GO TO SIZING ROUTINE IF FOUND
 5731 007214  012737  001000  172350  FINT$:   MOV     #1000,KIPAR4            ;
 5732 007222                                    TYPE    MSG126                  ;ERROR - PROGRAM CSR NOT FOUND!
      007222  104401  071264                    TYPEIT  ,MSG126
                                                .DSABL  CRF
 5733 007226  005037  002532                    CLR     PGMCSR                  ;SET TO DEFAULT OF 0
```

```
5735 007232                                    SUBTST  <<CLEAR ALL MEMORY SPACE FROM BANK 2 ON>>
                                               ;*****************************************************************************
                                               ;*SUBTEST       CLEAR ALL MEMORY SPACE FROM BANK 2 ON
                                               ;*****************************************************************************
5736                                           ;
5737                                           ;THIS ROUTINE CLEARS ALL MEMORY SPACE BEGINNING AT ADDRESS 200,000 AND
5738                                           ;CONTINUES UNTIL THERE IS NO MEMORY LEFT. IT SHOULD CLEAR ANY PARITY ERRORS
5739                                           ;CREATED BY THE LAST ROUTINE, AND CLEAN UP ANY JUNK LEFT HANGING AROUND IN
5740                                           ;HIGHER MEMORY.
5741                                           ;
5742 007232                                    CLRMEM: SET4    #CLREX          ;NONEM TRAPS GO TO CLREX
     007232  012737  007342  000004                    MOV     #CLREX,4
                                                       .DSABL  CRF
5743 007240  005037  006216                            CLR     TRACE
5744 007244  012737  000001  002076                    MOV     #1,NOPAR        ;IGNORE PARITY ERRORS
5745 007252  012737  002000  172350                    MOV     #2000,KIPAR4    ;SET UP MAP TO START AT BANK 2
5746 007260  012701  100000                            MOV     #100000,R1      ;R1 MAPS TO KIPAR4
5747 007264  020127  117776            1$:             CMP     R1,#117776      ;WHOLE 16K BANK DONE?
5748 007270  001003                                    BNE     2$              ;KEEP GOING IF NOT
5749 007272  012737  177777  006216                    MOV     #-1,TRACE       ;USE TRACE FLAG TO FLAG END OF BANK
5750 007300  005021                    2$:             CLR     (R1)+           ;CLEAR CONTENTS & INCREMENT
5751 007302  005737  006216                            TST     TRACE           ;EOB FLAG SET?
5752 007306  001001                                    BNE     3$              ;GO TO NEXT BANK IF SO
5753 007310  000765                                    BR      1$
5754 007312  062737  000200  172350    3$:             ADD     #200,KIPAR4     ;SET MAP FOR NEXT BANK
5755 007320  022737  177600  172350                    CMP     #177600,KIPAR4  ;ARE WE AT THE PERPHERIAL PAGE
5756 007326  001405                                    BEQ     CLREX           ;YES-GO ON
5757 007330  005037  006216                            CLR     TRACE           ;RESET FLAG
5758 007334  012701  100000                            MOV     #100000,R1      ;RESET R1
5759 007340  000751                                    BR      1$              ;CLEAR NEXT BANK
5760 007342  000240                    CLREX:  NOP
5761 007344  005037  006216                            CLR     TRACE
5762 007350                                            RES4
     007350  012737  034114  000004                    MOV     #TIMEOUT,4
     007356  022737  000005  004010                    CMP     #5,PROTYP       ;IS THIS AN 11/83/84 ?
     007364  001002                                    BNE     101$            ;BRANCH IF NOT
     007366  005037  177766                            CLR     CPUERR          ;CLEAR OUT THE CPU ERROR REGISTER BITS
     007372                                 101$:
                                                                               ;THAT A EXPECTED TRAP COULD HAVE SET
                                                       .DSABL  CRF
```

```
 5765 007372                            ANA2:   SUBTST  <<MATCH ALL CSR'S WITH MEMORY>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MATCH ALL CSR'S WITH MEMORY
                                        ;*****************************************************************************
 5766                                   ;* THE SECOND PART OF THE ANALYSIS MATCHES UP THE CSR'S WITH THE MEMORY, AND
 5767                                   ;* INSTALLS ALL THE INFORMATION FOUND IN THE CONFIGURATION TABLE.  FOR ECC,
 5768                                   ;* THIS IS DONE BY TAKING EACH CSR FOUND IN THE PREVIOUS SECTION SEQUENTIALLY
 5769                                   ;* AND CHECKING THROUGH ALL OF MEMORY, ONE BANK AT AT TIME, TO SEE WHICH BANKS
 5770                                   ;* RESPOND TO THE CSR IN QUESTION. THE FIRST DOUBLE WORD PAIR IN EACH BANK IS
 5771                                   ;* WRITTEN WITH DATA AND DIAGNOSTIC CHECK MODE SET IN THE CSR AND ARE CHECKED
 5772                                   ;* FOR EACH BANK THROUGH USE OF TESTADD AND KERNEL INSTRUCTION PAGE ADDRESS
 5773                                   ;* REGISTERS 4 AND 5. IF WE GET THE PROPER CHECKBITS BACK, WE HAVE A MATCH.
 5774                                   ;* IF NOT, THE ROUTINE CHECKS FOR SINGLE OR DOUBLE BIT ERRORS.
 5775                                   ;* IF ONE OR THE OTHER IS FOUND, THE ERROR ADDRESS IS CHECKED
 5776                                   ;* TO SEE IF IT IS THAT BANK.  IF IT IS, WE HAVE A MATCH.  AT THE END OF EACH
 5777                                   ;* BANK PASS, FOR EACH CSR PASS, THE PROGRAM COMES UP WITH A NUMBER, STORED IN
 5778                                   ;* "I", WHICH DENOTES THE FOLLOWING:
 5779                                   ;*
 5780                                   ;*      I       MEMORY DESCRIPTION
 5781                                   ;*      -       -----------------
 5782                                   ;*      0       NON-EXISTANT MEMORY
 5783                                   ;*      1       MSV11-L/P MEMORY
 5784                                   ;*      2       MSV11-J MEMORY
 5785                                   ;*
 5786                                   ;*
 5787                                   ;* NOTE THAT PARITY MEMORY WRITES WRONG PARITY TO THE DOUBLE WORDS, THEN LOOKS
 5788                                   ;* FOR THE PARITY ERROR BIT TO BE SET.  IF THE BIT IS SET, WE HAVE A MATCH.
 5789                                   ;*
 5790 007372                                    SET4    #100$                   ;NE MEMORY TRAPS GO TO 100$
      007372  012737  010444  000004            MOV     #100$,4
                                                .DSABL  CRF
 5791 007400  005037  002314                    CLR     CHECK                   ;CLEAR CHECK
 5792 007404  012701  002412                    MOV     #TESTADD,R1             ;SET UP THE VIRTUAL ADDR. POINTER
 5793 007410  013703  002224                    MOV     TOTCSRS,R3              ;MOVE CSR MAP INTO R3
 5794 007414  005000                            CLR     R0                      ;CLEAR THE CSR POINTER
 5795 007416  005005                            CLR     R5                      ;CLEAR THE PROGRAM CSR STATUS POINTER
 5796 007420  005737  002454                    TST     NO22BIT                 ;DO WE HAVE 22 BIT ADDRESSING ?
 5797 007424  001403                            BEQ     7$                      ;BRANCH IF WE DO
 5798 007426  005037  002560                    CLR     LASTBLOCK               ;ADJUST LASTBLOCK INDICATOR FOR 124K MACHINE
 5799 007432  000413                            BR      1$                      ;BRANCH OVER NEXT PIECE OF CODE
 5800 007434  022737  000177  002556    7$:     CMP     #177,LASTBANK           ;IS THERE Q-BUS MEMORY ABOVE 17776000?
 5801 007442  001407                            BEQ     1$                      ;BRANCH IF NOT
 5802 007444  013702  002556                    MOV     LASTBANK,R2             ;SET UP A NEW LAST BLOCK INDICATOR
 5803 007450  005202                            INC     R2
 5804 007452  072227  000011                    ASH     #9.,R2
 5805 007456  010237  002560                    MOV     R2,LASTBLOCK
 5806 007462  012702  000004            1$:     MOV     #4,R2                   ;R2 IS INDEX FOR CONFIG TABLE
 5807 007466  005037  002564                    CLR     ENDFLG                  ;CLEAR END OF MEMORY FLAG
 5808 007472  012737  001000  172350            MOV     #1000,KIPAR4            ;SET KIPAR4 FOR BANK 1
 5809 007500  012737  001000  172352            MOV     #1000,KIPAR5            ;SET KIPAR5 FOR BANK 1
 5810 007506  006303                    2$:     ASL     R3                      ;DOES THIS CSR EXIST?
 5811 007510  103420                            BCS     3$                      ;BRANCH IF IT DOES EXIST
 5812 007512  062700  000002                    ADD     #2,R0                   ;INCREMENT THE CSR POINTER
 5813 007516  010037  002152                    MOV     R0,CSRNO                ;STORE IT IN CSRNO ALSO
 5814 007522  005703                            TST     R3                      ;ARE THERE ANY MORE CSR'S TO DO?
 5815 007524  001370                            BNE     2$                      ;BRANCH IF ALL CSRS NOT DONE
 5816 007526  012737  001000  172350            MOV     #1000,KIPAR4            ;RESTORE KIPAR4
```

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 5817 007534  012737  001200  172352          MOV     #1200,KIPAR5            ;RESTORE KIPAR5
 5818 007542  013706  002574                  MOV     KSTACK,SP               ;RESTORE STACK
 5819 007546  000137  010454                  JMP     SUBAAS                  ;JUMP TO SUBAAS IF ALL CSR'S ARE DONE
 5820 007552  010037  002152          3$:     MOV     R0,CSRNO                ;MAKE SURE CSRNO IS UPDATED
 5821 007556  104424                  13$:    CACHOFF                         ;TURN THE CACHE OFF
 5822 007560  000240                          NOP
 5823 007562  012737  100000  002412  45$:    MOV     #100000,TESTADD         ;SET UP VIRTUAL ADDRESS TO KIPAR4
 5824 007570  012737  120002  002414          MOV     #120002,TESTADD+2       ;SET UP VIRTUAL ADDRESS TO KIPAR5
 5825 007576  032762  000040  002664          BIT     #BIT5,CONFIG(R2)        ;IS THIS A BANK TO SKIP ECC/LOGIC TESTS?
 5826 007604  001402                          BEQ     43$                     ;NO - BRANCH AROUND NEXT INSTRUCTION
 5827 007606  000137  010342                  JMP     6$                      ;YES - GO TO END OF BANK
 5828 007612  005037  002452          43$:    CLR     I                       ;CLEAR THE MEMORY CONFIGURATION COUNTER
 5829 007616  005771  000000          4$:     TST     @(R1)                   ;TEST TO SEE THAT THERE IS MEMORY PRESENT
 5830 007622  005237  002452                  INC     I                       ;MEMORY PRESENT
 5831 007626                                  PUSH    @(R1),@2(R1)            ;SAVE THE LOCATIONS UNDER TEST
      007626  017146  000000                                                          MOV @(R1),-(SP)
      007632  017146  000002                                                          MOV @2(R1),-(SP)
 5832 007636  032760  000001  002462          BIT     #BIT0,CSRINFO(R0)       ;IS THIS PARITY MEMORY?
 5833 007644  001014                          BNE     34$                     ;NO - BRANCH
 5834 007646  052760  000004  172100          BIS     #BIT2,CSRADD(R0)        ;SET WRITE WRONG PARITY
 5835 007654  012771  123456  000000          MOV     #123456,@(R1)           ;SET THE FIRST LOCATION UNDER TEST
 5836 007662  012771  123456  000002          MOV     #123456,@2(R1)          ;SET THE SECOND LUT
 5837 007670  005060  172100                  CLR     CSRADD(R0)              ;CLEAR THE CSR
 5838 007674  000411                          BR      41$                     ;TEST LOCATIONS
 5839 007676  012771  123456  000000  34$:    MOV     #123456,@(R1)           ;SET THE FIRST LOCATION UNDER TEST
 5840 007704  012771  123456  000002          MOV     #123456,@2(R1)          ;SET THE SECOND LUT
 5841 007712  104503                          CLR1CSR                         ;RESET CSR
 5842 007714  104475                          CB1CSR                          ;SET DIAG. CHECK MODE IN CSR UNDER TEST
 5843 007716  000240                          NOP                             ;DEBUG AID
 5844 007720  005771  000000          41$:    TST     @(R1)                   ;READ THE FIRST LUT TO WRITE CKBITS. INTO CSR
 5845 007724  104426                          READCSR                         ;READ THE CSR UNDER TEST
 5846 007726  000240                          NOP                             ;DEBUG AID
 5847 007730  013704  002150                  MOV     CSR,R4                  ;GET THE CHECKBITS FROM THE CSR
 5848 007734  000240                          NOP                             ;DEBUG AID
 5849 007736  010437  002434                  MOV     R4,TEMP                 ;SAVE IN TEMP FOR LATER
 5850 007742  104503                          CLR1CSR                         ;RESET CSR
 5851 007744                                  POP     @2(R1),@(R1)            ;RESTORE LOCATIONS UNDER TEST
      007744  012671  000002                                                          MOV (SP)+,@2(R1)
      007750  012671  000000                                                          MOV (SP)+,@(R1)
 5852 007754  032760  000001  002462          BIT     #BIT0,CSRINFO(R0)       ;IS THIS PARITY MEMORY?
 5853 007762  001004                          BNE     42$                     ;NO - BRANCH
 5854 007764  005704                          TST     R4                      ;DID WE GET A PARITY ERROR?
 5855 007766  100420                          BMI     25$                     ;YES - FILL IN CONFIG TABLE
 5856 007770  000137  010342                  JMP     6$                      ;NO - JUMP TO END OF BANK
 5857 007774  072427  177773          42$:    ASH     #-5,R4                  ;MANIPULATE THE CSR BITS
 5858 010000  042704  177700                  BIC     #^C77,R4                ;INTO A USABLE FORM.
 5859 010004  012737  000040  002316          MOV     #40,CBITS               ;MSV11-J CHECK BITS
 5860 010012  000240                          NOP                             ;DEBBUGGING AIDE
 5861 010014  023704  002316          77$:    CMP     CBITS,R4                ;DO THE CHECKBITS COMPARE TO WHAT WAS WRITTEN?
 5862 010020  000240                          NOP                             ;DEBBUG AIDE
 5863 010022  001402                          BEQ     25$                     ;BRANCH IF THERE IS A MATCH
 5864 010024  000137  010170                  JMP     22$                     ;ELSE BRANCH IF NOT THE SAME
 5865                                          ;*
 5866                                          ;* WE COME HERE IF THERE IS A MATCH
 5867                                          ;*
 5868 010030  010004          25$:    MOV     R0,R4                   ;GET THE CSR NUMBER
 5869 010032  000240                  NOP                             ;
```

```
5870 010034  006204                        ASR     R4                      ;SET IT UP FOR USE IN THE
5871 010036  000304                        SWAB    R4                      ;CONFIGURATION TABLE.
5872 010040  042704  170377                BIC     #170377,R4              ;CLEAR OFF EXTRANEOUS BITS
5873 010044  050462  002664          15$:  BIS     R4,CONFIG(R2)           ;PUT CSR NUMBER IN CONFIG. TABLE
5874 010050  016004  002462                MOV     CSRINFO(R0),R4          ;GET MEMORY TYPE
5875 010054  042704  177770                BIC     #^C7,R4                 ;CLEAR OFF THE EXTRANEOUS BITS
5876 010060  000304                        SWAB    R4                      ;MOVE INTO PROPER POSITION
5877 010062  050462  002666                BIS     R4,CONFIG+2(R2)         ;SET IT INTO THE CONFIG TABLE
5878                                       ;*
5879                                       ;* THIS SECTION IS EXECUTED ONLY WHEN THE BANK=1
5880                                       ;*
5881 010066  022737  001000  172350  24$:  CMP     #1000,KIPAR4            ;IS THIS BANK 1 ?
5882 010074  001402                        BEQ     30$                     ;BRANCH IF TRUE
5883 010076  000137  010342                JMP     6$                      ;ELSE JUMP TO END OF THIS BANK
5884 010102  032737  100020  002434  30$:  BIT     #BIT15!BIT4,TEMP        ;WAS THERE A SBE OR DBE?
5885 010110  001417                        BEQ     10$                     ;BRANCH IF NOT
5886 010112  013704  002434                MOV     TEMP,R4                 ;GET CSR CONTENTS
5887 010116  072427  177767                ASH     #-9.,R4                 ;MAKE ERROR ADDRESS INTO BANK #
5888 010122  022704  000001                CMP     #1,R4                   ;ERROR IN BANKS 0 OR 1?
5889 010126  003010                        BGT     10$                     ;BRANCH IF NOT
5890 010130  052762  000001  002664        BIS     #BIT0,CONFIG(R2)        ;SET ERROR FLAG IN CONFIG TABLE
5891 010136  105262  002666                INCB    CONFIG+2(R2)            ;ADD ONE TO BANK ERROR COUNT
5892 010142                                SET     CONFGERROR              ;PRINT CONFIG TABLE
     010142  012737  177777  002450                                                  MOV  # 1,CONFGERROR
5893 010150  053737  002670  002664  10$:  BIS     CONFIG+4,CONFIG         ;SET UP INFORMATION IN BANK ZERO
5894 010156  053737  002672  002666        BIS     CONFIG+6,CONFIG+2
5895 010164  000240                        NOP                             ;DEBUG AID
5896 010166  000465                        BR      6$                      ;BRANCH
5897                                       ;*
5898                                       ;* IF CHECKBITS DID NOT MATCH, WE COME HERE
5899                                       ;*
5900 010170  032737  100020  002150  22$:  BIT     #BIT15!BIT4,CSR         ;SBE OR DBE FLAGS SET?
5901 010176  001001                        BNE     8$                      ;BRANCH IF TRUE
5902 010200  000460                        BR      6$                      ;CHECK TO SEE IF IT IS MSV11 J
5903 010202  013704  002152          8$:   MOV     CSRNO,R4                ;GET CSRNO
5904 010206  042764  000006  172100        BIC     #6,CSRADD(R4)           ;TURN OFF DIAG CHECK & ECC DISABLE
5905 010214                                PUSH    R0,R1                   ;SAVE R0 & R1
     010214  010046                                                                 MOV R0, (SP)
     010216  010146                                                                 MOV R1,-(SP)
5906 010220  016401  172100                MOV     CSRADD(R4),R1           ;GET CSR INFORMATION
5907 010224  072127  177773                ASH     #-5,R1                  ;SET UP ERROR ADDRESS
5908 010230  042701  177600                BIC     #^C177,R1
5909 010234  052764  040000  172100        BIS     #BIT14,CSRADD(R4)       ;GET EXTENDED ERROR ADDRESS BITS
5910 010242  016400  172100                MOV     CSRADD(R4),R0           ;READ FROM CSR
5911 010246  042764  040000  172100        BIC     #BIT14,CSRADD(R4)       ;TURN OFF EQB BIT
5912 010254  042700  177037                BIC     #^C740,R0               ;SET UP EXTENDED BITS
5913 010260  006300                        ASL     R0
5914 010262  006300                        ASL     R0
5915 010264  060001                        ADD     R0,R1                   ;SET UP TOTAL ERROR ADDRESS
5916 010266  010104                  27$:  MOV     R1,R4                   ;SAVE IN R4
5917 010270                                POP     R1,R0                   ;RESTORE R0 & R1
     010270  012601                                                                 MOV (SP)+,R1
     010272  012600                                                                 MOV (SP)+,R0
5918 010274  072427  000005                ASH     #5,R4                   ;SET ERROR ADDRESS UP IN PAR NOTATION
5919 010300  020437  172350                CMP     R4,KIPAR4               ;DOES IT EQUAL KIPAR4?
5920 010304  001001                        BNE     28$                     ;BRANCH IF FALSE
5921 010306  000403                        BR      35$                     ;YES - MARK INFO IN CONFIG TABLE
```

```
 5922 010310  020437  172352          28$:   CMP     R4,KIPAR5              ;DOES IT EQUAL KIPAR5?
 5923 010314  001012                         BNE     6$                     ;BRANCH IF FALSE
 5924 010316  052762  000001  002664  35$:   BIS     #BIT0,CONFIG(R2)       ;SET BANK ERROR FLAG
 5925 010324  105262  002666                 INCB    CONFIG+2(R2)           ;INCREMENT BANK ERROR COUNTER
 5926 010330                                 SET     CONFGERROR             ;PRINT CONFIG TABLE
      010330  012737  177777  002450                                                 MOV  #-1,CONFGERROR
 5927 010336  000137  010030                 JMP     25$                    ;YES   MARK INFO IN CONFIG TABLE
 5928                                        ;*
 5929                                        ;*END OF BANK ROUTINE
 5930                                        ;*
 5931 010342  104503                  6$:    CLR1CSR                        ;CLEAR THE CSR UNDER TEST
 5932 010344  005737  002564                 TST     ENDFLG                 ;ARE WE AT TOP OF MEMORY?
 5933 010350  001021                         BNE     70$                    ;IF SO THEN EXIT
 5934 010352  062702  000004                 ADD     #4,R2                  ;UPDATE CONFIGURATION POINTER
 5935 010356  062737  001000  172350         ADD     #1000,KIPAR4           ;UPDATE KIPAR4 TO NEXT BANK
 5936 010364  013737  172350  172352         MOV     KIPAR4,KIPAR5          ;AND UPDATE KIPAR4
 5937 010372  022737  177000  172350         CMP     #177000,KIPAR4         ;ARE WE AT BANK 177
 5938 010400  001005                         BNE     70$                    ;BRANCH IF NOT
 5939 010402                                 SET     ENDFLG                 ;WERE AT LAST BANK
      010402  012737  177777  002564                                                 MOV  #-1,ENDFLG
 5940 010410  000137  007562                 JMP     45$                    ;
 5941 010414  023737  002560  172350  70$:   CMP     LASTBLOCK,KIPAR4       ;HAVE WE DONE THE WHOLE MEMORY SPACE?
 5942 010422  101402                         BLOS    19$                    ;BRANCH IF DONE                    ;R-C
 5943 010424  000137  007562                 JMP     45$                    ;JUMP IF NOT DONE
 5944 010430  062700  000002          19$:   ADD     #2,R0                  ;INCREMENT CSR POINTER
 5945 010434  000240                         NOP                            ;DEBUG AID
 5946 010436  104423                         CACHON                         ;TURN ON THE CACHE
 5947 010440  000137  007462                 JMP     1$                     ;JUMP TO TRY NEXT CSR
 5948                                        ;
 5949 010444  062706  000004          100$:  ADD     #4,SP                  ;RESTORE STACK                     ;R-C
 5950 010450  000137  010342                 JMP     6$                     ;GO TO END OF BANK ROUTINE         ;R-C
```

```
 5952 010454  104423                SUBAAS: CACHON          ;MAKE SURE THE CACHE IS ON
 5953 010456  104472                        ECCINIT         ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
 5954 010460                                NEWTST  <<TEST BANK 0 ACCESSES>>
                                    ;*******************************************************************************
                                    ;*TEST 2        TEST BANK 0 ACCESSES
                                    ;*******************************************************************************
      010460  000004                TST2:   SCOPE
 5955                               ;THIS DOES A "TST" INSTRUCTION ON EVERY LOCATION IN BANK #0 TO SEE
 5956                               ;IF IT GETS ANY PARITY TRAPS.
 5957                               ;SINCE EVERY LOCATION IS EITHER LOADED OR WRITTEN INTO BY THE PROGRAM
 5958                               ;PRIOR TO THIS POINT - THEN A PARITY ERROR IMPLIES THAT THERE IS A
 5959                               ;HARDWARE FAILURE IN THE MEMORY.
 5960                               ;THESE ERRORS ARE COUNTED AND A FATAL ACTION IS TAKEN
 5961 010462  005037  002072        CLR     PARCNT                  ;CLEAR PARITY ERROR COUNTER
 5962 010466  012737  000001  002076 MOV     #1,NOPAR                ;SET THE NO PARITY ERROR FLAG
 5963 010474  005037  002070        CLR     NEMCNT                  ;CLEAR NON-EXISTANT MEMORY ERROR COUNTER
 5964 010500  012737  000001  002100 MOV     #1,NONEM                ;SET THE NON-EXISTANT MEMORY ERROR MODE TO COUNT
 5965 010506                        SET4    #NONEXIST               ;TRAPS TO 4 GOTO NONEXIST
      010506  012737  034050  000004 MOV     #NONEXIST,4
                                    .DSABL  CRF
 5966 010514  005000                CLR     R0
 5967 010516  012701  040000        MOV     #SIZE,R1
 5968 010522  104424                CACHOFF                         ;TURN CACHE OFF
 5969 010524  005720                1$:     TST     (R0)+           ;SEE IF I CAN DO A READ ACCESS WITHOUT A PARITY TRAP
 5970 010526  077102                SOB     R1,1$
 5971 010530  104423                CACHON                          ;TURN CACHE ON
 5972                               ;SEE IF ANY FAILURES
 5973 010532  005737  002072        TST     PARCNT                  ;ANY PARITY ERRORS?
 5974 010536  001403                BEQ     2$                      ;NO - SKIP
 5975 010540                        FATAL   3
      010540  005237  002064        INC     FATAL$                  ;SET FATAL INDICATOR
      010544  104003                ERROR   +3
                                    .DSABL  CRF
 5976 010546  005737  002070        2$:     TST     NEMCNT          ;ANY NON EXISTANT MEMORY (HOLES)?
 5977 010552  001406                BEQ     3$                      ;SKIP IF EQUAL
 5978 010554  162737  000002  002034 SUB     #2,ADDRESS              ;UPDATE 1ST ADDRESS FAILURE FROM AUTO INCREMENT #
 5979 010562                        FATAL   4
      010562  005237  002064        INC     FATAL$                  ;SET FATAL INDICATOR
      010566  104004                ERROR   +4
                                    .DSABL  CRF
 5980 010570  053737  002106  002664 3$:     BIS     CPUBIT,CONFIG           ;SET CORRECT ACCESSED BIT ON BANK 0
 5981 010576                        RES4                            ;RESET TRAPS TO 4 TO DEFAULT
      010576  012737  034114  000004 MOV     #TIMEOUT,4
      010604  022737  000005  004010 CMP     #5,PROTYP       ;IS THIS AN 11/83/84 ?
      010612  001002                BNE     101$            ;BRANCH IF NOT
      010614  005037  177766        CLR     CPUERR          ;CLEAR OUT THE CPU ERROR REGISTER BITS
      010620                        101$:
                                                            ;THAT A EXPECTED TRAP COULD HAVE SET
                                    .DSABL  CRF
 5982
 5983 010620                        SUBTST  <<ENABLE ECC FOR CORRECT TRAPS>>
                                    ;*******************************************************************************
                                    ;*SUBTEST       ENABLE ECC FOR CORRECT TRAPS
                                    ;*******************************************************************************
 5984 010620                        IF #SW0 SET.IN @SWR OR ACTFLAG IS TRUE
      010620  032777  000001  172010                                    BIT #SW0,@SWR
      010626  001003                                                    BNE L52
```

```
        010630  005737  002350                                                  TST ACTFLAG
        010634  001402                                                          BEQ L53
        010636                                                          L52:;;;;;;;
   5985 010636  104506                    ENASBE                ;TRAP ON SINGLE BIT ERRORS
   5986 010640                          ELSE
        010640  000401                                                          BR L54
        010642                                                          L53:;;;;;;;
   5987 010642  104472                    ECCINIT               ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
   5988 010644                          END ;OF IF #SWO
        010644                                                          L54:;;;;;;;
```

```
                                        NEWTST  <<TEST BANKS 1 200 (OCTAL) FOR ZEROS & ONES>>
                                ;*****************************************************************************
                                ;*TEST 3         TEST BANKS 1 200 (OCTAL) FOR ZEROS & ONES
                                ;*****************************************************************************
      010644  000004            TST3:   SCOPE
                                        ;EACH BANK IS TESTED FOR EXISTANCE AND IF IT EXISTS
                                        ;THEN IT IS TESTED FOR ZEROS & ONES.
                                        ;EXCEPT -
                                        ;       PROTECTED BANKS (WHERE THE PROGRAM IS) ARE ONLY TESTED BY
                                        ;       "TST" INSTRUCTIONS LIKE BANK #0
                                        ;ANY BAD BANKS ARE LOGGED IN THE CONFIGURATION TABLE.
                                        ;THIS ROUTINE IS ONLY DOING A SMART SIZE   NOT ACTUAL TESTING!
 010646  005037  002102                 CLR     BANK
 010652  012737  000001  002076         MOV     #1,NOPAR                ;SET NO PARITY ERROR FLAG
 010660  012737  000002  002100         MOV     #2,NONEM                ;SET NON-EXISTANT MEMORY MODE TO EXIT TEST LOOP
 010666                                 SET4    #NONEXIST               ;TRAPS TO 4 GOTO NONEXIST
 010666  012737  034050  000004         MOV     #NONEXIST,4
                                        .DSABL  CRF
 010674  012737  011420  002522         MOV     #MTST3+4,LINK1          ;SET UP LINKS
 010702  012737  011422  002524         MOV     #MTST3+6,LINK2
 010710  005237  002102         TAG9$:  INC     BANK
 010714  023737  002556  002102         CMP     LASTBANK,BANK           ;DONE?
 010722  103451                         BLO     TAG2$                   ;YES - SKIP TO NEXT TEST
 010724  013701  002102                 MOV     BANK,R1
 010730  006301                         ASL     R1
 010732  006301                         ASL     R1                      ;BANK * 4
 010734  010137  002104                 MOV     R1,BANKINDEX
 010740  005037  002074                 CLR     PATERR                  ;CLEAR PATTERN ERROR COUNTER
 010744  005037  002072                 CLR     PARCNT                  ;CLEAR PARITY ERROR COUNTER
 010750  005037  002070                 CLR     NEMCNT                  ;CLEAR NON-EXISTANT MEMORY COUNTER (HOLES)
 010754                                 MAP     BANK                    ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
 010754  010346                                                                 MOV R3, (SP)
 010756  013703  002102                 MOV     BANK,R3
 010762  004737  035716                 CALL    MAPPER
                                        .DSABL  CRF
 010766  012603                                                                 MOV (SP)+,R3
 010770  105761  002664                 TSTB    CONFIG(R1)              ;IS THIS BANK PROTECTED?
 010774  100542                         BMI     TSTBANK                 ;YES - GO TEST BANK SPECIAL
 010776  012777  000207  171516 WARN1:  MOV     #207,@LINK1             ;PUT "RETURN" INSTRUCTION AFTER WRITE ROUTINE
 011004  012700  060000                 MOV     #FIRST,R0
 011010  010004                         MOV     R0,R4
 011012  012701  040000                 MOV     #SIZE,R1
 011016  010103                         MOV     R1,R3
 011020  005002                         CLR     R2                      ;DATA IS ZEROS
 011022  104424                         CACHOFF                         ;TURN CACHE OFF
 011024                                 TESTAREA                        ;ENTER SUPERVISOR MODE
 011024  053737  002552  177776         BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                        .DSABL  CRF
 011032  004737  011414                 CALL    MTST3
 011036  104417                 2$:     KERNEL                          ;ENTER KERNEL MODE
 011040  104423                         CACHON                          ;TURN CACHE ON
 011042  000240                         NOP
 011044  000416                         BR      TAG3$                   ;SKIP NEXT INSTRUCTION
 011046  005037  002102         TAG2$:  CLR     BANK
 011052                                 RES4                            ;RESET TRAPS TO 4 TO DEFAULT
 011052  012737  034114  000004         MOV     #TIMEOUT,4
 011060  022737  000005  004010         CMP     #5,PROTYP       ;IS THIS AN 11/83/84 ?
```

```
        011066  001002                          BNE     101$            ;BRANCH IF NOT
        011070  005037  177766                  CLR     CPUERR          ;CLEAR OUT THE CPU ERROR REGISTER BITS
        011074                          101$:                           ;THAT A EXPECTED TRAP COULD HAVE SET
                                                .DSABL  CRF
  6033  011074  005037  002076                  CLR     NOPAR                   ;INDICATE DEFAULT PARITY ACTION
  6034  011100  000557                          BR      SUBAAI
  6035  011102  005737  002070          TAG3$:  TST     NEMCNT                  ;ANY TRAPS?
  6036  011106  001401                          BEQ     1$                      ;NO - SKIP
  6037  011110  000677                          BR      TAG9$                   ;NOW - TRY NEXT BANK
  6038  011112  104424                  1$:     CACHOFF                         ;TURN CACHE OFF
  6039  011114                                  TESTAREA                        ;ENTER SUPERVISOR MODE
        011114  053737  002552  177776          BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                                .DSABL  CRF
  6040  011122  004777  171376                  CALL    @LINK2                  ;FINISH PATTERN
  6041  011126  104417                          KERNEL                          ;ENTER KERNEL MODE
  6042  011130  104423                          CACHON                          ;TURN CACHE ON
  6043  011132  000240                          NOP                             ;DEBUG AID
  6044  011134  005737  002074                  TST     PATERR                  ;ANY PATTERN ERRORS
  6045  011140  001032                          BNE     2$                      ;YES - SKIP
  6046  011142  005737  002072                  TST     PARCNT                  ;ANY PARITY ERRORS
  6047  011146  001027                          BNE     2$                      ;YES - SKIP
  6048  011150  005737  002070                  TST     NEMCNT                  ;ANY NON EXISTANT MEMORY
  6049  011154  001024                          BNE     2$                      ;YES - SKIP
  6050  011156  012700  060000                  MOV     #FIRST,R0
  6051  011162  010004                          MOV     R0,R4
  6052  011164  012701  040000                  MOV     #SIZE,R1
  6053  011170  010103                          MOV     R1,R3
  6054  011172  013702  002614                  MOV     ONES,R2                 ;DATA IS ONES
  6055  011176  012777  000240  171316          MOV     #000240,@LINK1          ;PUT "NOP" INSTRUCTION BACK IN SUBROUTINE
  6056  C11204  104424                          CACHOFF                         ;TURN CACHE OFF
  6057  011206                                  TESTAREA                        ;ENTER TEST MODE
        011206  053737  002552  177776          BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                                .DSABL  CRF
  6058  011214  004737  011414                  CALL    MTST3                   ;DO IN MEMORY IF NOT
  6059  011220  104417                          KERNEL                          ;ENTER KERNEL MODE
  6060  011222  104423                          CACHON                          ;TURN CACHE ON
  6061  011224  000240                          NOP                             ;DEBUG AID
  6062  011226  013700  002104          2$:     MOV     BANKINDEX,R0
  6063  011232  005737  002074                  TST     PATERR                  ;ANY PATTERN ERRORS?
  6064  011236  001006                          BNE     3$                      ;YES   SKIP
  6065  011240  005737  002072                  TST     PARCNT                  ;ANY PARITY ERRORS?
  6066  011244  001003                          BNE     3$                      ;YES - SKIP
  6067  011246  005737  002070                  TST     NEMCNT                  ;ANY HOLES?
  6068  011252  001406                          BEQ     4$                      ;NONE - SKIP
  6069  011254  052760  000001  002664  3$·     BIS     #BIT0,CONFIG(R0)        ;SET ERROR BIT IN THIS BANK
  6070  011262                                  SET     CONFGERROR              ;FORCE PRINTING OF CONFIGURATION TABLE
        011262  012737  177777  002450                                                  MOV  # 1,CONFGERROR
  6071  011270  053760  002106  002664  4$:     BIS     CPUBIT,CONFIG(R0)       ;SET ACCESSED BIT
  6072  011276  000137  010710                  JMP     TAG9$
  6073
  6074                                          ;TEST A PROTECTED BANK
  6075  011302                          TSTBANK:PUSH    R1                                      MOV R1,-(SP)
        011302  010146
  6076  011304  012737  000001  002100          MOV     #1,NONEM                ;SET NON-EXISTANT MEMORY TO COUNT
  6077  011312  012700  060000                  MOV     #FIRST,R0
  6078  011316  012701  020000                  MOV     #20000,R1
```

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 6079 011322  104424                          CACHOFF                         ;TURN CACHE OFF
 6080 011324                                  TESTAREA                        ;ENTER TEST MODE
      011324  053737  002552  177776          BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                               .DSABL  CRF
 6081 011332  005720                  4$:     TST     (R0)+
 6082 011334  077102                          SOB     R1,4$
 6083 011336  104417                          KERNEL                          ;ENTER KERNEL MODE
 6084 011340  104423                          CACHON                          ;TURN CACHE ON
 6085 011342  012737  000002  002100          MOV     #2,NONEM                ;RESET NON-EXISTANT MEMORY TO EXIT TEST LOOP
 6086 011350                                  POP     R1
      011350  012601                                                                  MOV (SP)+,R1
 6087 011352                                  IF PARCNT NE #0
      011352  005737  002072                                                          TST PARCNT
      011356  001406                                                                  BEQ L55
 6088 011360  052761  000001  002664            BIS   #BIT0,CONFIG(R1)        ;ERROR BANK
 6089 011366                                    SET   CONFGERROR
      011366  012737  177777  002450                                                  MOV  #-1,CONFGERROR
 6090 011374                                  END ;OF IF PARCNT
      011374                                                                  L55:;;;;;;
 6091 011374                                  IF NEMCNT EQ #0
      011374  005737  002070                                                          TST NEMCNT
      011400  001003                                                                 BNE L56
 6092 011402  053761  002106  002664            BIS   CPUBIT,CONFIG(R1)       ;ACCESSED BANK
 6093 011410                                  END ;OF IF NEMCNT
      011410                                                                  L56:;;;;;;
 6094 011410  000137  010710                  JMP     TAG9$
 6095 011414  010220                  MTST3:  MOV     R2,(R0)+                ;WRITE MEMORY TO PATTERN
 6096 011416  077102                          SOB     R1,MTST3                ;DO TILL DONE
 6097 011420  000240                          NOP                             ;THIS IS EITHER A NOP OR RETURN
 6098 011422  012401                  2$:     MOV     (R4)+,R1                ;READ DATA
 6099 011424  020102                          CMP     R1,R2                   ;DOES IT MATCH ?
 6100 011426  001402                          BEQ     3$                      ;
 6101 011430  005237  002074                  INC     PATERR                  ;IF NOT COUNT ERRORS
 6102 011434  077306                  3$:     SOB     R3,2$                   ;ANY WAY DO ALL MEMORY
 6103 011436  000207                          RETURN                          ;DONE....RETURN
```

```
 6105 011440                        SUBAAI: SUBTST  <<FIND SHADOW INHIBIT MODE POINTERS>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       FIND SHADOW INHIBIT MODE POINTERS
                                    ;*****************************************************************************
 6106                               ;* THIS SECTION LOOKS FOR INTERLEAVED MSV11-J MEMORIES AND FIGURES OUT
 6107                               ;* WHERE THE SHADOW INHIBIT MODE POINTERS ARE LOCATED.  THESE AREAS
 6108                               ;* ARE THEN MARKED AS PROGRAM SPACE.
 6109 011440  005037  002102              CLR     BANK                    ;RESET BANK TO ZERO
 6110 011444  004737  040052       SHADL1: CALL    EXBANK                  ;SET BANK PARAMETERS
 6111 011450  013700  002104              MOV     BANKINDEX,R0
 6112 011454                              IF ACFLAG IS TRUE AND INTFLAG IS TRUE
      011454  005737  002116                                                      TST ACFLAG
      011460  001414                                                             BEQ L57
      011462  005737  002136                                                     TST INTFLAG
      011466  001411                                                             BEQ L57
 6113 011470  062702  000040                ADD   #40,R2                    ;POINT TO BANKINDEX + 8
 6114 011474  062737  000020  002102        ADD   #20,BANK                  ;POINT TO BANK + 16
 6115 011502  052760  000200  002664        BIS   #BIT7,CONFIG(R0)          ;MAKE NEW BANK PROGRAM SPACE
 6116 011510                              ELSE
      011510  000402                                                             BR L60
      011512                                                            L57:;;;;;;;
 6117 011512  005237  002102                INC   BANK                      ;GO TO NEXT BANK
 6118 011516                              END; OF IF ACFLAG
      011516                                                            L60:;;;;;;;
 6119 011516  023737  002556  002102        CMP     LASTBANK,BANK           ;HAVE WE DONE ALL THE BANKS?
 6120 011524  002347                      BGE     SHADL1                  ;BRANCH IF NOT
```

```
 6123 011526                                    NEWTST  <<ECC INHIBIT MODE POINTER TEST>>
                                        ;*****************************************************************************
                                        ;*TEST 4        ECC INHIBIT MODE POINTER TEST
                                        ;*****************************************************************************
      011526  000004                    TST4:   SCOPE
 6124                                           ;THE MSV11-J OR MF11S-K INHIBIT ECC DISABLE AND DIAGNOSTIC CHECK MODE
 6125                                           ;ON THE BOTTOM  FIRST OR SECOND 16K WORDS CONTROLLED BY A CSR.  THIS
 6126                                           ;IS CONSIDERED  TO BE A  PROTECTED BANK  BY THE  PROGRAM.  IT MAY BE
 6127                                           ;QUITE  COMPLEX TO DETERMINE ON A  GIVEN SYSTEM  CONFIGURATION WHICH
 6128                                           ;BANKS CAN BE PROTECTED;
 6129                                           ;SO
 6130                                           ;THIS ROUTINE ATTEMPS TO  CREATE A DOUBLE BIT ERROR IN ADDRESS 0 & 2
 6131                                           ;OF  EVERY ECC BANK.  ECC HARDWARE WILL PREVENT THIS  FROM HAPPENING
 6132                                           ;IN  PROTECTED BANKS  WHICH SHOULD ALWAYS  INCLUDE BANK ZERO - WHERE
 6133                                           ;THE PROGRAM IS.
 6134                                           ;
 6135                                           ;
 6136                                           ;WARNING:!!!!!!!!!!
 6137                                           ;  IN CASE OF HARDWARE FAILURE IT IS COMMON  THAT A DOUBLE BIT ERROR
 6138                                           ;  WILL BE  CREATED ON  THE KERNEL  STACK & "CRASH"  THE  DIAGNOSTIC
 6139                                           ;DURING  THIS ROUTINE.  YOUR ONLY CLUE IS THAT YOU CAN GET AS FAR AS
 6140                                           ;THIS ROUTINE BUT NOT PAST IT!
 6141 011530  104424                           CACHOFF                                 ;TURN CACHE OFF
 6142 011532  012737  177777  002156           MOV     #-1,OLDCSR
 6143 011540                                    FOR BANK := #0 TO LASTBANK
      011540  005037  002102                                                            CLR BANK
      011544                                                                    B6:;;;;;;;
 6144 011544  012701  060000                      MOV   #FIRST,R1                     ;SET UP VIRT ADDR POINTER
 6145 011550  004737  040052                      CALL  EXBANK
 6146 011554  013700  002104                      MOV   BANKINDEX,R0
 6147 011560                                      IF ACFLAG IS TRUE
      011560  005737  002116                                                            TST ACFLAG
      011564  001436                                                                    BEQ L61
 6148 011566                                        IF MKFLAG IS TRUE
      011566  005737  002120                                                            TST MKFLAG
      011572  001433                                                                    BEQ L62
 6149 011574                                        IF SKIPMK IS FALSE
      011574  005737  002342                                                            TST SKIPMK
      011600  001030                                                                    BNE L63
 6150 011602  012703  000002                          MOV       #2,R3                 ;SET INDEX COUNTER
 6151 011606  116002  002665                          MOVB      CONFIG+1(R0),R2
 6152 011612  006302                                  ASL       R2
 6153 011614  042702  177741                          BIC       #^C36,R2
 6154 011620  010237  002152                          MOV       R2,CSRNO
 6155 011624                                          IF CSRNO NE OLDCSR
      011624  023737  002152  002156                                                    CMP CSRNO,OLDCSR
      011632  001413                                                                    BEQ L64
 6156 011634  013737  002152  002156                    MOV     CSRNO,OLDCSR
 6157 011642                                            IF PFLAG IS FALSE
      011642  005737  002122                                                            TST PFLAG
      011646  001003                                                                    BNE L65
 6158 011650  052760  000100  002664                      BIS  #BIT6,CONFIG(R0)
 6159 011656                                            END; OF IF PFLAG
      011656                                                                    L65:;;;;;;
 6160 011656  004737  011750                            CALL    IMPTEST
 6161 011662                                          END; OF IF CSRNO
      011662                                                                    L64:;;;;;;
```

```
 6162 011662                                    END; OF IF SKIPMK
      011662                                                                    L63:;;;;;;
 6163 011662                                    END; OF IF MKFLAG
      011662                                                                    L62:;;;;;;
 6164 011662                                  END; OF IF ACFLAG
      011662                                                                    L61:;;;;;;
 6165 011662                                END; OF FOR BANK
      011662  005237  002102                                                   INC BANK
      011666  023737  002102  002556                                           CMP BANK,LASTBANK
      011674  003723                                                          BLE B6
      011676                                                                    E6:;;;;;;;
 6166 011676                                MAP                     ;MAP TEST SPACE TO BANK 0
      011676  010346                                                           MOV R3,-(SP)
      011700  012703  000200                MOV     #200,R3
      011704  004737  035716                CALL    MAPPER
                                            .DSABL  CRF
      011710  012603                                                           MOV (SP)+,R3
 6167 011712  005037  002102                CLR     BANK
 6168 011716                                IF #SW0 SET.IN @SWR OR ACTFLAG IS TRUE
      011716  032777  000001  170712                                           BIT #SW0,@SWR
      011724  001003                                                           BNE L66
      011726  005737  002350                                                   TST ACTFLAG
      011732  001402                                                           BEQ L67
      011734                                                                    L66:;;;;;;
 6169 011734  104506                          ENASBE                  ;TRAP ON SINGLE BIT ERRORS
 6170 011736                                ELSE
      011736  000401                                                           BR L70
      011740                                                                    L67:;;;;;;
 6171 011740  104472                          ECCINIT                 ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
 6172 011742                                END; OF IF #SW0
      011742                                                                    L70:;;;;;;
 6173 011742  104423                        CACHON                  ;TURN THE CACHE BACK ON
 6174 011744  000137  012172                JMP     SUBAAR          ;JUMP OVER THE SUBROUTINE
```

```
 6176 011750  005004                    IMPTEST:CLR     R4
 6177 011752                                    MAP BANK                                ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
      011752  010346                                                                            MOV R3, (SP)
      011754  013703  002102                    MOV     BANK,R3
      011760  004737  035716                    CALL    MAPPER
                                                .DSABL  CRF
      011764  012603                                                                           MOV (SP)+,R3
 6178 011766  005005                            CLR     R5
 6179 011770  012737  020000  002150            MOV     #BIT13,CSR
 6180 011776                                    TESTAREA                                ;ENTER TEST MODE
      011776  053737  002552  177776            BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                                .DSABL  CRF
 6181 012004                                    PUSH    (R1)                            ;SAVE TEST LOCATION
      012004  011146                                                                            MOV (R1),-(SP)
 6182 012006  060301                            ADD     R3,R1                   ;INDEX TO NEXT LOCATION
 6183 012010                                    PUSH    (R1)                    ;SAVE TEST LOCATION
      012010  011146                                                                            MOV (R1),-(SP)
 6184 012012  104505                            CHK1DIS                         ;DISABLE ECC & WRITE CHECKBITS FOR 1 CSR
 6185 012014  010411                            MOV     R4,(R1)                 ;WRITE CHECKBITS (ALL ZEROS)
 6186 012016  160301                            SUB     R3,R1
 6187 012020  010411                            MOV     R4,(R1)
 6188 012022  104503                            CLR1CSR                                 ;CLEAR CSR
 6189 012024  005711                            TST     (R1)                            ;READ CHECKBITS INTO REAL CSR
 6190 012026  104501                            WAS1DBE                                 ;WAS THERE A DOUBLE BIT ERROR
 6191
 6192                                           ;THIS MAKES SURE THAT SBE'S DON'T LOOK LIKE PROTECTED AREAS
 6193
 6194 012030                                    ON.NOERROR :1
      012030  103435                                                                           BCS L71
 6195 012032  012737  020000  002150              MOV   #BIT13,CSR
 6196 012040  104505                              CHK1DIS                               ;DISABLE ECC & WRITE CHECKBITS FOR 1 CSR
 6197 012042  013711  002614                      MOV   ONES,(R1)
 6198 012046  104503                              CLR1CSR                               ;CLEAR CSR
 6199 012050  005711                              TST   (R1)
 6200 012052  104501                              WAS1DBE                               ;WAS THERE A DOUBLE BIT ERROR
 6201 012054                                      ON.NOERROR ;2
      012054  103423                                                                           BCS L72
 6202 012056  104513                                CBREG                         ;ENABLE CHECK/SYNDROME BIT REGISTER
 6203 012060  012737  023140  002150                MOV #23140,CSR                ;WRITE DBE'S IN CSR
 6204 012066  104505                                CHK1DIS                       ;DISABLE ECC & WRITE CHECKBITS FOR 1 CSR
 6205 012070  010411                                MOV R4,(R1)
 6206 012072  104503                                CLR1CSR                               ;CLEAR CSR
 6207 012074  005711                                TST (R1)
 6208 012076  104501                                WAS1DBE                               ;WAS THERE A DOUBLE BIT ERROR
 6209 012100                                        ON.NOERROR ;3
      012100  103411                                                                           BCS L73
 6210 012102  104513                                  CBREG                       ;ENABLE CHECK/SYNDROME BIT REGISTER
 6211 012104  012737  023604  002150                  MOV #23604,CSR              ;WRITE DBE'S IN CSR
 6212 012112  104505                                  CHK1DIS                     ;DISABLE ECC & WRITE CHECKBITS FOR 1 CSR
 6213 012114  010411                                  MOV       R4,(R1)
 6214 012116  104503                                  CLR1CSR                             ;CLEAR CSR
 6215 012120  005711                                  TST       (R1)
 6216 012122  104501                                  WAS1DBE                             ;WAS THERE A DOUBLE BIT ERROR
 6217 012124                                        END ;OF ON.NOERROR ;3
      012124                                                                                    L73:;;;;;;
 6218 012124                                    END ;OF ON.NOERROR ;2
      012124                                                                                    L72:;;;;;;
```

```
 6219 012124                                END ;OF ON.NOERROR ;1
      012124                                                          L71:;;;;;;
 6220 012124                                ON.ERROR
      012124  103001                                                      BCC L74
 6221 012126  005205                          INC   R5                ;IDENTIFY AS BAD BANK
 6222 012130                                END ;OF ON.ERROR
      012130                                                          L74:;;;;;;
 6223 012130  104471                        ECC1DIS                 ;DISABLE ERROR CORRECTION
 6224 012132  010411                        MOV     R4,(R1)         ;CLEAR OUT DOUBLE BIT ERROR!
 6225 012134  060301                        ADD     R3,R1           ;INDEX TO SECOND WORD
 6226 012136  010411                        MOV     R4,(R1)         ;CLEAR OUT DOUBLE BIT ERROR!
 6227 012140  104503                        CLR1CSR
 6228 012142  005705                        TST     R5
 6229 012144  001405                        BEQ     1$
 6230 012146  050560  002664                BIS     R5,CONFIG(R0)
 6231 012152  105260  002666                INCB    CONFIG+2(R0)
 6232 012156  104036                        ERROR   +36
 6233 012160                          1$:   POP     (R1)            ;RESTORE TEST LOCATION (2ND WORD)
      012160  012611                                                     MOV (SP)+,(R1)
 6234 012162  160301                        SUB     R3,R1           ;GO BACK TO FIRST WORD
 6235 012164                                POP     (R1)            ;RESTORE TEST LOCATION (1ST WORD)
      012164  012611                                                     MOV (SP)+,(R1)
 6236 012166  104417                        KERNEL
 6237 012170  000207                        RETURN
 6238
 6239 012172                          SUBAAR: SET     STOPOK          ;PROGRAM CAN NOW BE HALTED
      012172  012737  177777  002420                                     MOV  #-1,STOPOK
```

```
                                        SUBTST  <<LEGAL CONFIGURATION CHECK>>
                                ;*****************************************************************************
                                ;*SUBTEST        LEGAL CONFIGURATION CHECK
                                ;*****************************************************************************
012200  012700  000020          MOV     #16.,R0
012204  012701  002462          MOV     #CSRINFO,R1
012210  005021          1$:     CLR     (R1)+
012212  077002                  SOB     R0,1$
012214                            FOR BANK := #0 TO LASTBANK
012214  005037  002102                                                  CLR BANK
012220                                                          B7:;;;;;;;
012220  004737  040052              CALL        EXBANK
012224  013700  002104              MOV BANKINDEX,R0

012230                              IF ACFLAG IS TRUE
012230  005737  002116                                                  TST ACFLAG
012234  001444                                                          BEQ L75
012236  116003  002665                MOVB        CONFIG+1(R0),R3
012242  042703  177760                BIC         #^C17,R3
012246  006303                      ASL         R3
012250  005263  002462                INC         CSRINFO(R3)
012254                              IF MKFLAG IS TRUE
012254  005737  002120                                                  TST MKFLAG
012260  001432                                                          BEQ L76

                                  ;MAKE SURE THAT EACH BANK HAS NO MORE THAN 2 CSRS
012262                              BEGIN   LEGALCSR
012262                                                          B10:;;;;;;;
012262                                IF INTFLAG IS TRUE
012262  005737  002136                                                  TST INTFLAG
012266  001423                                                          BEQ L77
012270  116003  002665                  MOVB        CONFIG+1(R0),R3
012274  010304                        MOV R3,R4
012276  042703  177760                BIC #^C17,R3
012302  072427  177774                ASH #-4,R4
012306  042704  177760                BIC #^C17,R4
012312                                IF R3 EQ R4
012312  020304                                                          CMP R3,R4
012314  001007                                                          BNE L100
012316  042760  014000  002666            BIC       #BIT11!BIT12,CONFIG+2(R0)
012324  042760  170000  002664            BIC       #170000,CONFIG(R0)
012332                                    LEAVE LEGALCSR
012332  000405                                                          BR E10
012334                                  END; OF IF R3
012334                                                          L100:;;;;;;;
012334                                ELSE
012334  000401                                                          BR L101
012336                                                          L77:;;;;;;;
012336                                  LEAVE       LEGALCSR
012336  000403                                                          BR E10
012340                                END; OF IF INTFLAG
012340                                                          L101:;;;;;;;
012340                              SET     CONFGERROR
012340  012737  177777  002450                                          MOV  #-1,CONFGERROR
012346                              END     LEGALCSR
012346                                                          E10:;;;;;;;
012346                            END ;OF IF MKFLAG
012346                                                          L76:;;;;;;;
```

```
6276 012346                                         END ;OF IF ACFLAG
     012346                                                                              L75:;;;;;;
6277 012346                                       END; OF FOR BANK
     012346  005237  002102                                                                    INC BANK
     012352  023737  002102  002556                                                            CMP BANK,LASTBANK
     012360  003717                                                                            BLE B7
     012362                                                                              E7:;;;;;;;;
6278 012362                                     PUSH    R5,R0                          ;SAVE CONTENTS OF R5, R0
     012362  010546                                                                            MOV R5,-(SP)
     012364  010046                                                                            MOV R0,-(SP)
6279 012366  005000                             CLR     R0                             ;CLEAR REGISTERS
6280 012370  005001                             CLR     R1
6281 012372  005005                             CLR     R5
6282 012374  005037  012602                     CLR     MBERR                          ;CLEAR ERROR INDICATOR
6283 012400  022761  000177  002462     2$:     CMP     #177,CSRINFO(R1)               ;IS CURRENT CSR <= 177
6284 012406  002043                             BGE     5$                             ;BRANCH IF SO
6285 012410  022761  000010  002462             CMP     #10,CSRINFO(R1)                ;IS CURRENT CSR < 10
6286 012416  002003                             BGE     3$                             ;BRANCH IF SO
6287 012420  004737  012724                     CALL    ILLCSR                         ;CALL ERROR ROUTINE
6288 012424  000434                             BR      5$                             ;TRY NEXT CSR
6289 012426  016005  002664             3$:     MOV     CONFIG(R0),R5                  ;MOVE LOW WORD TO R5
6290 012432  032705  000002                     BIT     #BIT1,R5                       ;DOES MEMORY EXIST HERE?
6291 012436  001415                             BEQ     4$                             ;BRANCH IF NOT
6292 012440  042705  170377                     BIC     #↑C7400,R5                     ;ISOLATE CSR NUMBER IN
6293 012444  072527  177771                     ASH     #-7,R5                         ;REGISTER 5
6294 012450  020501                             CMP     R5,R1                          ;IS IT THE CURRENT CSR?
6295 012452  001007                             BNE     4$                             ;TRY NEXT WORD OF CONFIG IF NOT
6296 012454  032760  010000  002666             BIT     #BIT12,CONFIG+2(R0)            ;IS IT INTERLEAVED?
6297 012462  001003                             BNE     4$                             ;BRANCH IF SO
6298 012464  012737  000001  012602             MOV     #1,MBERR                       ;SET ERROR INDICATOR
6299 012472  062700  000004             4$:     ADD     #4,R0                          ;UPDATE CONFIG COUNTER
6300 012476  022700  000340                     CMP     #340,R0                        ;CONFIG TABLE ALL DONE?
6301 012502  001351                             BNE     3$                             ;BRANCH IF NOT
6302 012504  005737  012602                     TST     MBERR                          ;ERRORS FOUND?
6303 012510  001402                             BEQ     5$                             ;TRY NEXT CSR IF NOT
6304 012512  004737  012724                     CALL    ILLCSR                         ;CALL ERROR ROUTINE
6305 012516  005000                     5$:     CLR     R0                             ;REINITIALIZE CONFIG COUNTER
6306 012520  005037  012602                     CLR     MBERR                          ;CLEAR ERROR INDICATOR
6307 012524  062701  000002                     ADD     #2,R1                          ;UPDATE CSR COUNTER
6308 012530  022701  000040                     CMP     #40,R1                         ;ALL CSR'S DONE?
6309 012534  001321                             BNE     2$                             ;BRANCH IF NOT
6310 012536                                     POP     R0,R5                          ;RESTORE REGISTERS
     012536  012600                                                                            MOV (SP)+,R0
     012540  012605                                                                            MOV (SP)+,R5
6311 012542  005037  012602                     CLR     MBERR                          ;RESET ERROR INDICATOR
6312 012546  012700  000774                     MOV     #774,R0                ;INDEX TO TOP OF CONFIG TABLE   ;R-C
6313 012552  032760  000002  002664     6$:     BIT     #BIT1,CONFIG(R0)       ;MEMORY PRESENT?                ;R-C
6314 012560  001003                             BNE     7$                     ;BRANCH IF SO                   ;R-C
6315 012562  162700  000004                     SUB     #4,R0                  ;TRY NEXT LOWER ENTRY IN CONFIG TABLE   ;R-C
6316 012566  000771                             BR      6$                                                     ;R-C
6317 012570  006200                     7$:     ASR     R0                                                     ;R C
6318 012572  006200                             ASR     R0                     ;DIVIDE INDEX BY 4 TO GET BANK #;R-C
6319 012574  010037  002556                     MOV     R0,LASTBANK            ;STORE IN LASTBANK              ;R-C
6320 012600  000402                             BR      SKUJ
6321 012602  000000                 MBERR:      .WORD 0                        ;SAVE SPACE FOR ERROR INDICATOR
6322 012604  000000                 PHEBE:      .WORD 0                        ;SAVE SPACE FOR ODD BOUNDARY INTERLEAVED INDICATOR
6323 012606  005000                 SKUJ:       CLR     R0                     ;CLEAR CONFIG COUNTER
```

```
 6324 012610  005037  012604                CLR     PHEBE                   ;CLEAR COUNTER
 6325 012614  032760  000002  002664  1$:   BIT     #BIT1,CONFIG(R0)        ;IS THERE MEMORY PRESENT?
 6326 012622  001431                       BEQ     3$                      ;BRANCH IF NOT
 6327 012624  032760  010000  002666       BIT     #BIT12,CONFIG+2(R0)     ;IS IT INTERLEAVED?
 6328 012632  001005                       BNE     2$                      ;BRANCH IF SO
 6329 012634  005237  012604               INC     PHEBE                   ;INCREMENT COUNTER
 6330 012640  062700  000004               ADD     #4,R0                   ;INCREMENT CONFIG COUNTER
 6331 012644  000763                       BR      1$                      ;TRY NEXT BANK
 6332 012646  023727  012604  000010  2$:   CMP     PHEBE,#10               ;IS THE COUNTER EQUAL TO...
 6333 012654  001417                       BEQ     4$                      ;ONE OF THE SPECIAL VALUES.
 6334 012656  023727  012604  000030       CMP     PHEBE,#30               ;IF IT IS...
 6335 012664  001413                       BEQ     4$                      ;BRANCH TO 4$
 6336 012666  023727  012604  000050       CMP     PHEBE,#50
 6337 012674  001407                       BEQ     4$
 6338 012676  023727  012604  000070       CMP     PHEBE,#70
 6339 012704  001403                       BEQ     4$
 6340 012706  005037  012604          3$:   CLR     PHEBE                   ;CLEAR INDICATOR
 6341 012712  000403                       BR      5$
 6342 012714  012737  000001  012604  4$:   MOV     #1,PHEBE                ;SET INDICATOR
 6343 012722  000421                  5$:   BR      SUBAAP          ;BRANCH TO NEXT SUBTEST
 6344 012724  010102                  ILLCSR: MOV   R1,R2           ;R2 HAS CSR NUMBER
 6345 012726  006202                       ASR     R2              ;MAKE ACCEPTABLE FOR PRINTING
 6346 012730  022702  000012               CMP     #10.,R2
 6347 012734  100002                       BPL     1$
 6348 012736  062702  000007               ADD     #7,R2
 6349 012742  062702  000060          1$:   ADD     #60,R2
 6350 012746  110237  071210               MOVB    R2,MSGA122      ;PUT NUMBER INTO ERROR MESSAGE
 6351 012752                               TYPE    MSG122
      012752  104401  071174               TYPEIT  ,MSG122
                                           .DSABL  CRF
 6352 012756                               SET     CONFGERROR
      012756  012737  177777  002450                                                   MOV  #-1,CONFGERROR
 6353 012764  000207                       RETURN
```

```
 6356 012766                            SUBAAP: SUBTST  <<PRINT CONFIGURATION DETAILS>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       PRINT CONFIGURATION DETAILS
                                        ;*****************************************************************************
 6357 012766                                    CLEAR   LSIZE,MSIZE                                     CLR  LSIZE
      012766  005037  002400                                                                            CLR  MSIZE
      012772  005037  002402
 6358 012776  013702  002556                    MOV     LASTBANK,R2
 6359 013002  006302                            ASL     R2
 6360 013004  006302                            ASL     R2
 6361 013006                                    FOR R1 := #0 TO R2 BY #4
      013006  005001                                                                                    CLR R1
      013010                                                                                    B11:;;;;;;
 6362 013010                                     IF CPUBIT SET.IN CONFIG(R1)
      013010  033761  002106  002664                                                                    BIT CPUBIT,CONFIG(R1)
      013016  001411                                                                                   BEQ L102
 6363 013020                                       IF #BIT8 SET.IN CONFIG+2(R1)
      013020  032761  000400  002666                                                                    BIT #BIT8,CONFIG+2(R1)
      013026  001403                                                                                   BEQ L103
 6364 013030                                           LET MSIZE := MSIZE + #1
      013030  005237  002402                                                                            INC MSIZE
 6365 013034                                       ELSE
      013034  000402                                                                                   BR L104
      013036                                                                                    L103:;;;;;;
 6366 013036                                           LET LSIZE := LSIZE + #
      013036  005237  002400                                                                            INC LSIZE
 6367 013042                                       END;IF BIT8
      013042                                                                                    L104:;;;;;;
 6368 013042                                     END; OF IF CPUBIT
      013042                                                                                    L102:;;;;;;
 6369 013042                                    END ;OF FOR ALL BANKS IN TABLE
      013042  062701  000004                                                                            ADD #4,R1
      013046  020102                                                                                   CMP R1,R2
      013050  003757                                                                                   BLE B11
      013052                                                                                    E11:;;;;;;;
 6370
 6371 013052  005037  002452                    CLR     I
 6372 013056                                    FOR R1 := #0 TO #10 BY #2
      013056  005001                                                                                    CLR R1
      013060                                                                                    B12:;;;;;;
 6373 013060  006361  002374                       ASL   BSIZE(R1)
 6374 013064  006361  002374                       ASL   BSIZE(R1)
 6375 013070  006361  002374                       ASL   BSIZE(R1)
 6376 013074  006361  002374                       ASL   BSIZE(R1)             ;BSIZE(R1) := BSIZE(R1) * 16.
 6377 013100  066137  002374  002452               ADD   BSIZE(R1),I           ;I <- I + BSIZE(R1)
 6378 013106                                    END; FOR R1
      013106  062701  000002                                                                            ADD #2,R1
      013112  020127  000010                                                                            CMP R1,#10
      013116  003760                                                                                    BLE B12
      013120                                                                                    E12:;;;;;;;
 6379 013120                                    FOR R1 := #0 TO #200 BY #4
      013120  005001                                                                                    CLR R1
      013122                                                                                    B13:;;;;;;
 6380 013122                                       IF CPUBIT SET.IN CONFIG(R1)
      013122  033761  002106  002664                                                                    BIT CPUBIT,CONFIG(R1)
      013130  001402                                                                                   BEQ L105
 6381 013132                                           LET UNITOP := UNITOP + #1
```

```
                013132  005237  002416                                                          INC UNITOP
 6382           013136                          END; OF IF CPUBIT
                013136                                                                  L105:;;;;;;
 6383           013136                          END; OF FOR R1
                013136  062701  000004                                                          ADD #4,R1
                013142  020127  000200                                                          CMP R1,#200
                013146  003765                                                                  BLE B13
                013150                                                                  E13:;;;;;;;
 6384           013150  006337  002416          ASL     UNITOP
 6385           013154  006337  002416          ASL     UNITOP
 6386           013160  006337  002416          ASL     UNITOP
 6387           013164  006337  002416          ASL     UNITOP          ;UNITOP := UNITOP * 16.
 6388           013170                          IF I LT UNITOP THEN LET I := UNITOP
                013170  023737  002452  002416                                                  CMP I,UNITOP
                013176  002003                                                                  BGE L106
                013200  013737  002416  002452                                                  MOV UNITOP,I
                013206                                                                  L106:;;;;;;
 6389           013206                          TYPE    $CRLF
                013206  104401  002660          TYPEIT  ,$CRLF
                                                .DSABL  CRF
 6390           013212  005737  002400  2$:     TST     LSIZE
 6391           013216  001414                  BEQ     3$
 6392           013220  022737  004000  002400  CMP     #2048.,LSIZE
 6393           013226  001003                  BNE     12$
 6394           013230  162737  000004  002400  SUB     #4,LSIZE        ; SUBTRACT 4K FOR THE I/O PAGE
 6395           013236                  12$:    TYPDEC  LSIZE
                013236  013746  002400          MOV     LSIZE,-(SP)     ;;SAVE LSIZE FOR TYPEOUT
                013242  104405                  TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
                                                .DSABL  CRF
 6396           013244                          TYPE    MSG112
                013244  104401  071025          TYPEIT  ,MSG112
                                                .DSABL  CRF
 6397           013250  005737  002402  3$:     TST     MSIZE
 6398           013254  001414                  BEQ     5$
 6399           013256  022737  004000  002402  CMP     #2048.,MSIZE
 6400           013264  001003                  BNE     13$
```

```
6401 013266  162737  000004  002402          SUB     #4,MSIZE        ; SUBTRACT 4K FOR THE I/O PAGE
6402 013274                          13$:     TYPDEC  MSIZE
     013274  013746  002402                  MOV     MSIZE,-(SP)     ;;SAVE MSIZE FOR TYPEOUT
     013300  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
                                              .DSABL  CRF
6403 013302                                   TYPE    MSG113
     013302  104401  071057                  TYPEIT  ,MSG113
                                              .DSABL  CRF
6404 013306  022737  004000  002452  5$:     CMP     #2048.,I
6405 013314  001003                          BNE     6$
6406 013316  162737  000004  002452          SUB     #4,I            ; SUBTRACT 4K FOR THE I/O PAGE
6407 013324                          6$:      TYPDEC  I
     013324  013746  002452                  MOV     I,-(SP) ;;SAVE I FOR TYPEOUT
     013330  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
                                              .DSABL  CRF
6408 013332                                   TYPE    MSG070
     013332  104401  070127                  TYPEIT  ,MSG070
                                              .DSABL  CRF
6409 013336                                   IF #SW6 OFF.IN @SWR
     013336  032777  000100  167272                                          BIT #SW6,@SWR
     013344  001002                                                         BNE L107
6410 013346  004737  032722                    CALL  PCONFIG
6411 013352                                   END; OF IF #SW6
     013352                                                        L107:;;;;;;
```

```
                                        SUBTST  <<CHECK APT SIZING>>
                                ;*****************************************************************************
                                ;*SUBTEST       CHECK APT SIZING
                                ;*****************************************************************************
                                        IF APTFLAG IS TRUE AND APTSIZE IS TRUE
6415 013352                                                                             TST APTFLAG
     013352  005737  002352                                                            BEQ L110
     013356  001475                                                                    TST APTSIZE
     013360  005737  002444                                                            BEQ L110
     013364  001472
6416 013366  005037  002434                  CLR   TEMP
6417 013372  012700  056676                  MOV   #$MAMS1,R0
6418 013376                                  FOR R2 := #0 TO #4
     013376  005002                                                                    CLR R2
     013400                                                                     B14:::::::
6419 013400                                    IFB 1(R0) NE #0
     013400  105760  000001                                                            TSTB 1(R0)
     013404  001441                                                                    BEQ L111
6420 013406  111001                            MOVB      (R0),R1
6421 013410  042701  177400                    BIC       #177400,R1
6422 013414                                    IF 2(R0) LT #0
     013414  005760  000002                                                            TST 2(R0)
     013420  002002                                                                    BGE L112
6423 013422  000261                              SEC
6424 013424                                    ELSE
     013424  000401                                                                    BR L113
     013426                                                                     L112:::::::
6425 013426  000241                              CLC
6426 013430                                    END ;OF IF 2(R0)
     013430                                                                     L113:::::::
6427 013430  006101                            ROL       R1
6428 013432  005201                            INC       R1                ;TO COMPENSATE FOR 4 BANKS BEING (0-3)
6429 013434  006301                            ASL       R1
6430 013436  006301                            ASL       R1
6431 013440  006301                            ASL       R1
6432 013442  006301                            ASL       R1
6433 013444  163701  002434                  SUB       TEMP,R1
6434 013450  010137  002434                  MOV       R1,TEMP
6435 013454                                    IFB 1(R0) EQ #3
     013454  126027  000001  000003                                                    CMPB 1(R0),#3
     013462  001002                                                                    BNE L114
6436 013464  060137  002422                      ADD     R1,APTPAR
6437 013470                                    END ;OF IFB 1(R0)
     013470                                                                     L114:::::::
6438 013470                                    IFB 1(R0) EQ #4
     013470  126027  000001  000004                                                    CMPB 1(R0),#4
     013476  001002                                                                    BNE L115
6439 013500  060137  002424                      ADD     R1,APTECC
6440 013504                                    END ;OF IFB 1(R0)
     013504                                                                     L115:::::::
6441 013504  062700  000004                    ADD       #4,R0
6442 013510                                  END ;OF IFB 1(R0)
     013510                                                                     L111:::::::
6443 013510                                END ;OF FOR R2
     013510  005202                                                                    INC R2
     013512  020227  000004                                                            CMP R2,#4
     013516  003730                                                                    BLE B14
     013520                                                                     E14:::::::
```

SEQ 0167

```
 6444 013520                                IF APTPAR NE LSIZE OR APTECC NE MSIZE OR APTECC NE PSIZE
      013520  023737  002422  002400                                                  CMP APTPAR,LSIZE
      013526  001010                                                                  BNE L116
      013530  023737  002424  002402                                                  CMP APTECC,MSIZE
      013536  001004                                                                  BNE L116
      013540  023737  002424  002404                                                  CMP APTECC,PSIZE
      013546  001401                                                                  BEQ L117
      013550                                                                  L116:;;;;;;;
 6445 013550  104046                        ERROR       +46
 6446 013552                              END ;OF IF APTPAR
      013552                                                                  L117:;;;;;;;
 6447 013552                            END ;OF IF APTFLAG
      013552                                                                  L110:;;;;;;;
```

```
 6449 013552                            LOOP:   NEWTST  <<DIAGNOSTIC MODE DISPATCH ROUTINE>>
                                        ;*******************************************************************************
                                        ;*TEST 5        DIAGNOSTIC MODE DISPATCH ROUTINE
                                        ;*******************************************************************************
      013552  000004                    TST5:   SCOPE
 6450 013554  005037  002222                    CLR     CONTFLAG
 6451 013560  017700  167052                    MOV     @SWR,R0         ;GET SWITCHES
 6452 013564  042700  177761                    BIC     #^C16,R0        ;MASK TO ONLY MODE BITS
 6453 013570  004770  013600                    CALL    @DISPTBL(R0)    ;DISPATCH TO ROUTINE THROUGH NEXT TABLE
 6454 013574  000137  013620                    JMP     MEMDONE         ;GO TO NEXT TEST
 6455 013600  014262                DISPTBL:BAFPAF  ;MODE 0;BANKS FORWARD, PATTERNS FORWARD
 6456 013602  014370                        BAFPAR  ;MODE 1;BANKS FORWARD, PATTERNS REVERSE
 6457 013604  014476                        BAWPAF  ;MODE 2;BANKS WORST FIRST, PATTERNS FORWARD
 6458 013606  014626                        BAWPAR  ;MODE 3;BANKS WORST FIRST, PATTERNS REVERSE
 6459 013610  014756                        PAFBAF  ;MODE 4;PATTERNS FORWARD, BANKS FORWARD
 6460 013612  015106                        PAFBAW  ;MODE 5;PATTERNS FORWARD, BANKS WORST FIRST
 6461 013614  015260                        PARBAF  ;MODE 6;PATTERNS REVERSE, BANKS FORWARD
 6462 013616  015410                        PARBAW  ;MODE 7;PATTERNS REVERSE, BANKS WORST FIRST
 6463
 6464 013620  004737  014162        MEMDONE:CALL    DOBACK                          ;CHECK BACKGROUND PATTERN
 6465
 6466 013624                                NEWTST<<UNIQUE BANK TEST>>
                                        ;*******************************************************************************
                                        ;*TEST 6        UNIQUE BANK TEST
                                        ;*******************************************************************************
      013624  000004                    TST6:   SCOPE
 6467                                           ;MAKE SURE THAT EACH BANK CAN HAVE UNIQUE DATA
 6468                                           ;WRITE AND READ THE BANK NUMBER IN EACH BANK (EXCEPT WHERE THE PROGRAM IS)
 6469 013626                                    IF SELONLY IS FALSE
      013626  005737  002002                                                            TST SELONLY
      013632  001015                                                                    BNE L120
 6470 013634                                      SET   HEADER,MUT
      013634  012737  177777  002612                                                    MOV  #-1,HEADER
      013642  012737  177777  002110                                                    MOV  #-1,MUT
 6471 013650  004737  021610                      CALL  MT0027
 6472 013654                                      SET   HEADER
      013654  012737  177777  002612                                                    MOV  #-1,HEADER
 6473 013662  005037  002110                      CLR   MUT
 6474 013666                                    END ;OF IF SELONLY
      013666                                                                  L120:;;;;;;
 6475 013666  004737  014162                    CALL    DOBACK          ;RESTORE BACKROUND PATTERN
 6479
 6480 013672                            FLUSH:  SUBTST  <<FLUSH OUT DBE'S>>
                                        ;*******************************************************************************
                                        ;*SUBTEST       FLUSH OUT DBE'S
                                        ;*******************************************************************************
 6481 013672  004737  022200                    CALL    MT0030
```

```
                                        .SBTTL  END OF PASS ROUTINE
                                ;*******************************************************************************
                                ;*INCREMENT THE PASS NUMBER ($PASS)
                                ;*INDICATE END-OF-PROGRAM AFTER EACH PASSES THRU THE PROGRAM
                                ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
                                ;*IF THERES A MONITOR GO TO IT
                                ;*IF THERE ISN'T JUMP TO LOOP
013676  005037  002442          $EOP:   CLR     FSINFLAG
013702  012700  002666                  MOV     #CONFIG+2,R0    ;MOVE 2ND WORD OF CONFIG TO R0
013706  042710  020000          1$:     BIC     #BIT13,(R0)     ;CLEAR BACKGROUND VALID BIT
013712  062700  000004                  ADD     #4,R0           ;INCREMENT TO NEXT BANK
013716  020027  003620                  CMP     R0,#3620        ;DONE?
013722  003771                          BLE     1$              ;NO - BRANCH
013724  013737  002630  002016          MOV     $ERTTL,LASTERROR
013732  005237  056654                  INC     $PASS           ;;INCREMENT THE PASS NUMBER
013736  042737  100000  056654          BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
013744                                  TYPE    MSG077          ;;TYPE "END PASS #"
013744  104401  070251                  TYPEIT  ,MSG077
                                        .DSABL  CRF
013750                                  IF #SW11 SET.IN @SWR OR QVFLAG IS TRUE OR $PASS EQ #1
013750  032777  004000  166660                                                  BIT #SW11,@SWR
013756  001007                                                                  BNE L121
013760  005737  002346                                                          TST QVFLAG
013764  001004                                                                  BNE L121
013766  023727  056654  000001                                                  CMP $PASS,#1
013774  001004                                                                  BNE L122
013776                                                                  L121:;;;;;;
013776                                    TYPE  MSG035          ;QV
013776  104401  067273                  TYPEIT  ,MSG035
                                        .DSABL  CRF
014002  005037  002346                    CLR   QVFLAG
014006                                  END ;OF IF SW11
014006                                                                  L122:;;;;;;
014006                                  TYPDEC  $PASS
014006  013746  056654                  MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
014012  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
                                        .DSABL  CRF
014014  013700  000042                  MOV     42,R0           ;;GET MONITOR ADDRESS
014020  001456                          BEQ     $DOAGAIN        ;;BRANCH IF NO MONITOR
014022  022700  002000          $ZAP42: CMP     #STACK,R0       ;ARE WE UNDER RT11
014026  001453                          BEQ     $DOAGAIN        ;YES - BRANCH
                                        ;WE ARE UNDER (HEAVEN HELP US) XXDP!
014030                                  PUSH    R0
014030  010046                                                          MOV R0,-(SP)
014032  004737  040636                  CALL    SHUTUP
014036                                  POP     R0
014036  012600                                                          MOV (SP)+,R0
014040  000005                          RESET                   ;;CLEAR THE WORLD
014042  004710                  $ENDAD: CALL    (R0)            ;;GO TO MONITOR
014044  000240                          NOP                     ;;SAVE ROOM
014046  000240                          NOP                     ;;FOR
014050  000240                          NOP                     ;;ACT11
014052                          $DOAGN: ;UNDO SHUTUP STUFF
                                        ;       RESTORE STACK
                                        ;       ENERGIZE Q-BUS MAP & 22 BIT ADDRESSING
                                        ;       ENERGIZE MEMORY MANAGEMENT
                                        ;       PUT LOADERS BACK HOME
```

```
 6524 014052  013706  002574                    MOV     KSTACK,SP
 6525 014056  005737  002454                    TST     NO22BIT                 ;IS THIS AN 11/83,11/23 B OR 11/23?
 6526 014062  001003                            BNE     1$
 6527 014064  052737  000060  172516            BIS     @BIT5!BIT4,MMR3
 6528 014072  104420                    1$:     ENERGIZE                        ;TURN ON MEMORY MANAGEMENT
 6529 014074  013700  002576                    MOV     LOADHOME,R0             ;DESTINATION BANK
 6530 014100  012701  000001                    MOV     @1,R1                   ;SOURCE BANK
 6531 014104  004737  037442                    CALL    BANKMOV
 6532 014110                                    IF APTFLAG IS TRUE
      014110  005737  002352                                                            TST APTFLAG
      014114  001420                                                                    BEQ L123
 6533 014116                                      IF $USWR EQ $PASS
      014116  023737  056672  056654                                                    CMP $USWR,$PASS
      014124  001014                                                                    BNE L124
 6534 014126  012701  000050            APTHANG:    MOV @50,R1
 6535 014132  077001                    2$:         SOB R0,2$
 6536 014134  062737  000001  056656              ADD @1,$DEVCT
 6537 014142  005537  056660                      ADC $UNIT
 6538 014146  077107                              SOB R1,2$
 6539 014150  005237  056654                      INC $PASS
 6540 014154  000764                              BR  APTHANG
 6541 014156                                    END ;OF IF $USWR
      014156                                                                L124:;;;;;;
 6542 014156                                  END ;OF IF APTFLAG
      014156                                                                L123:;;;;;;
 6543 014156  000137  013552            $DOAGAIN: JMP   LOOP              ;RETURN
```

```
 6546 014162                            DOBACK: SUBTST  <<WRITE BACKGROUND PATTERNS>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       WRITE BACKGROUND PATTERNS
                                        ;*****************************************************************************
 6547 014162  005037  002112                    CLR     PATTERN
 6548 014166                                    FOR BANK := #0 TO LASTBANK
      014166  005037  002102                                                          CLR BANK
      014172                                                                  B15:;;;;;;
 6549 014172  004737  040052                      CALL  EXBANK
 6550 014176                                      IF ACFLAG IS TRUE AND RRFLAG IS FALSE
      014176  005737  002116                                                          TST ACFLAG
      014202  001420                                                                 BEQ L125
      014204  005737  002124                                                          TST RRFLAG
      014210  001015                                                                 BNE L125
 6551 014212                                        SET         HEADER,MUT
      014212  012737  177777  002612                                                 MOV  #-1,HEADER
      014220  012737  177777  002110                                                 MOV  #-1,MUT
 6552 014226  004737  017104                        CALL        MKTEST          ;CALL   MJTEST WOULD ALSO WORK
 6553 014232  005037  002110                        CLR         MUT
 6554 014236                                        SET         HEADER
      014236  012737  177777  002612                                                 MOV  #-1,HEADER
 6555 014244                                      END ;OF IF ACFLAG
      014244                                                                  L125:;;;;;;
 6556 014244                                    END ;OF FOR BANK
      014244  005237  002102                                                          INC BANK
      014250  023737  002102  002556                                                 CMP BANK,LASTBANK
      014256  003745                                                                 BLE B15
      014260                                                                  E15:;;;;;;;
 6557 014260  000207                            RETURN
```

```
                                        .SBTTL  MTEST MODES

                                BAFPAF: SUBTST  <<BANKS FORWARD,PATTERNS FORWARD      **RECURSIVE**>>
                                ;*********************************************************************
                                ;*SUBTEST        BANKS FORWARD,PATTERNS FORWARD      **RECURSIVE**
                                ;*********************************************************************
 6563 014262  005037  002102            CLR     BANK            ;SET BANK TO 0
 6564                                   ;START OF BANK LOOP
 6565 014266  004737  040052    1$:     CALL    EXBANK          ;EXAMINE BANK
 6566 014272  005737  002116            TST     ACFLAG          ;CAN WE ACCESS THIS BANK?
 6567 014276  001412                    BEQ     4$              ;NO - GO TO BANK LOOP TERMINATION
 6568 014300  005737  002124            TST     RRFLAG          ;RELOCATION REQUIRED?
 6569 014304  001007                    BNE     4$              ;YES - GO TO BANK LOOP TERMINATION
 6570 014306  005037  002112            CLR     PATTERN         ;SET PATTERN TO 0
 6571                                   ;START OF PATTERN LOOP
 6572 014312  004737  015562    2$:     CALL    MTEST           ;GO TEST CORRECT MEMORY
 6573                                   ;TERMINATION OF PATTERN LOOP
 6574 014316  004737  040474            CALL    INCPAT          ;GO SEE IF THIS IS THE LAST PATTERN
 6575 014322  001373                    BNE     2$              ;NO   LOOP ON THIS PATTERN
 6576                                   ;TERMINATION OF BANK LOOP
 6577 014324  005037  002222    4$:     CLR     CONTFLAG
 6578 014330  004737  040520            CALL    INCBNK          ;NEXT HIGHER BANK
 6579 014334  002354                    BGE     1$              ;IF NOT DONE - LOOP ON THIS BANK
 6580                                   ;END OF LOOPS
 6581 014336  005737  002126            TST     RLFLAG          ;HAVE WE BEEN RELOCATED?
 6582 014342  001401                    BEQ     5$              ;NO   SKIP
 6583 014344  000207                    RETURN                  ;YES - RETURN
 6584 014346  004737  036402    5$:     CALL    RELOCATE        ;MOVE & MAP PROGRAM
 6585 014352                            ON.ERROR THEN $RETURN
      014352  103001                                                           BCC L126
      014354  000207                                                           RTS PC
      014356                                                          L126:;;;;;;
 6586                                   ;**NOTE** RECURSIVE CALL
 6587 014356  004737  014262            CALL    BAFPAF          ;CALL SELF
 6588 014362  004737  037214            CALL    UNRELOCATE      ;UNMOVE & UNMAP PROGRAM
 6589 014366  000207                    RETURN
```

```
 6592 014370                        BAFPAR: SUBTST  <<BANKS FORWARD,PATTERNS REVERSE      **RECURSIVE**>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       BANKS FORWARD,PATTERNS REVERSE      **RECURSIVE**
                                    ;*****************************************************************************
 6593 014370  005037  002102               CLR     BANK            ;SET BANK TO 0
 6594                                       ;START OF BANK LOOP
 6595 014374  004737  040052        1$:     CALL    EXBANK          ;EXAMINE BANK
 6596 014400  005737  002116               TST     ACFLAG          ;CAN WE ACCESS THIS BANK?
 6597 014404  001412                       BEQ     4$              ;NO   GO TO BANK LOOP TERMINATION
 6598 014406  005737  002124               TST     RRFLAG          ;RELOCATION REQUIRED?
 6599 014412  001007                       BNE     4$              ;YES - GO TO BANK LOOP TERMINATION
 6600 014414  004737  040510               CALL    SETPAT          ;SET HIGH PATTERN FOR CORRECT MEMORY
 6601                                       ;START OF PATTERN LOOP
 6602 014420  004737  015562        2$:     CALL    MTEST           ;GO TEST CORRECT MEMORY
 6603                                       ;TERMINATION OF PATTERN LOOP
 6604 014424  005337  002112               DEC     PATTERN         ;IS THIS THE LAST PATTERN?
 6605 014430  100373                       BPL     2$              ;NO   LOOP ON THIS PATTERN
 6606                                       ;TERMINATION OF BANK LOOP
 6607 014432  005037  002222        4$:     CLR     CONTFLAG
 6608 014436  004737  040520               CALL    INCBNK          ;NEXT HIGHER BANK
 6609 014442  002354                       BGE     1$              ;IF NOT DONE - LOOP ON THIS BANK
 6610                                       ;END OF LOOPS
 6611 014444  005737  002126               TST     RLFLAG          ;HAVE WE BEEN RELOCATED?
 6612 014450  001401                       BEQ     5$              ;NO - SKIP
 6613 014452  000207                       RETURN                  ;YES - RETURN
 6614 014454  004737  036402        5$:     CALL    RELOCATE        ;MOVE & MAP PROGRAM
 6615 014460                                ON.ERROR THEN $RETURN
      014460  103001                                                                  BCC L127
      014462  000207                                                                  RTS PC
      014464                                                                L127:::::::
 6616                                       ;**NOTE** RECURSIVE CALL
 6617 014464  004737  014370               CALL    BAFPAR          ;CALL SELF
 6618 014470  004737  037214               CALL    UNRELOCATE      ;UNMOVE & UNMAP PROGRAM
 6619 014474  000207                       RETURN
```

```
 6622 014476                    BAWPAF: SUBTST  <<BANKS WORST FIRST,PATTERNS FORWARD  **RECURSIVE**>>
                                ;*****************************************************************************
                                ;*SUBTEST       BANKS WORST FIRST,PATTERNS FORWARD  **RECURSIVE**
                                ;*****************************************************************************
 6623 014476  005037  002102           CLR     BANK            ;SET BANK TO 0
 6624                                   ;START OF BANK LOOP
 6625 014502  004737  040052    1$:     CALL    EXBANK          ;EXAMINE BANK
 6626 014506  005737  002116            TST     ACFLAG          ;CAN WE ACCESS THIS BANK?
 6627 014512  001415                    BEQ     4$              ;NO - GO TO BANK LOOP TERMINATION
 6628 014514  005737  002130            TST     BMFLAG          ;IS THIS BAD MEMORY (WORST FIRST)?
 6629 014520  001412                    BEQ     4$              ;NO - GO TO BANK LOOP TERMINATION
 6630 014522  005737  002124            TST     RRFLAG          ;RELOCATION REQUIRED?
 6631 014526  001007                    BNE     4$              ;YES - GO TO BANK LOOP TERMINATION
 6632 014530  005037  002112            CLR     PATTERN         ;SET PATTERN TO 0
 6633                                   ;START OF PATTERN LOOP
 6634 014534  004737  015562    2$:     CALL    MTEST           ;GO TEST CORRECT MEMORY
 6635                                   ;TERMINATION OF PATTERN LOOP
 6636 014540  004737  040474            CALL    INCPAT          ;GO SEE IF THIS IS THE LAST PATTERN
 6637 014544  001373                    BNE     2$              ;NO - LOOP ON THIS PATTERN
 6638                                   ;TERMINATION OF BANK LOOP
 6639 014546  005037  002222    4$:     CLR     CONTFLAG
 6640 014552  004737  040520            CALL    INCBNK          ;NEXT HIGHER BANK
 6641 014556  002351                    BGE     1$              ;IF NOT DONE - LOOP ON THIS BANK
 6642                                   ;END OF LOOPS
 6643 014560  005137  002600            COM     WORST           ;IS THIS AN EVEN NUMBERED PASS?
 6644 014564  001003                    BNE     5$              ;YES - SKIP
 6645                                   ;**NOTE** RECURSIVE CALL
 6646 014566  004737  014476            CALL    BAWPAF          ;CALL SELF
 6647 014572  000207                    RETURN
 6648 014574  005737  002126    5$:     TST     RLFLAG          ;HAVE WE BEEN RELOCATED?
 6649 014600  001401                    BEQ     6$              ;NO - SKIP
 6650 014602  000207                    RETURN                  ;YES - RETURN
 6651 014604  004737  036402    6$:     CALL    RELOCATE        ;MOVE & MAP PROGRAM
 6652 014610                            ON.ERROR THEN $RETURN
      014610  103001                                                            BCC L130
      014612  000207                                                            RTS PC
      014614                                                          L130:;;;;;;
 6653                                   ;**NOTE** RECURSIVE CALL
 6654 014614  004737  014476            CALL    BAWPAF          ;CALL SELF
 6655 014620  004737  037214            CALL    UNRELOCATE      ;UNMOVE & UNMAP PROGRAM
 6656 014624  000207                    RETURN
```

```
 6659 014626                        BAWPAR: SUBTST  <<BANKS WORST FIRST,PATTERNS REVERSE  **RECURSIVE**>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       BANKS WORST FIRST,PATTERNS REVERSE  **RECURSIVE**
                                    ;*****************************************************************************
 6660 014626  005037  002102               CLR     BANK            ;SET BANK TO 0
 6661                                       ;START OF BANK LOOP
 6662 014632  004737  040052        1$:     CALL    EXBANK          ;EXAMINE BANK
 6663 014636  005737  002116               TST     ACFLAG          ;CAN WE ACCESS THIS BANK?
 6664 014642  001415                       BEQ     4$              ;NO - GO TO BANK LOOP TERMINATION
 6665 014644  005737  002130               TST     BMFLAG          ;IS THIS BAD MEMORY (WORST FIRST)
 6666 014650  001412                       BEQ     4$              ;NO - GO TO BANK LOOP TERMINATION
 6667 014652  005737  002124               TST     RRFLAG          ;RELOCATION REQUIRED?
 6668 014656  001007                       BNE     4$              ;YES - GO TO BANK LOOP TERMINATION
 6669 014660  004737  040510               CALL    SETPAT          ;SET HIGH PATTERN FOR CORRECT MEMORY
 6670                                       ;START OF PATTERN LOOP
 6671 014664  004737  015562        2$:     CALL    MTEST           ;GO TEST CORRECT MEMORY
 6672                                       ;TERMINATION OF PATTERN LOOP
 6673 014670  005337  002112               DEC     PATTERN         ;IS THIS THE LAST PATTERN?
 6674 014674  100373                       BPL     2$              ;NO - LOOP ON THIS PATTERN
 6675                                       ;TERMINATION OF BANK LOOP
 6676 014676  005037  002222        4$:     CLR     CONTFLAG
 6677 014702  004737  040520               CALL    INCBNK          ;NEXT HIGHER BANK
 6678 014706  002351                       BGE     1$              ;IF NOT DONE - LOOP ON THIS BANK
 6679                                       ;END OF LOOPS
 6680 014710  005137  002600               COM     WORST           ;IS THIS AN EVEN NUMBERED PASS?
 6681 014714  001003                       BNE     5$              ;YES - SKIP
 6682                                       ;**NOTE** RECURSIVE CALL
 6683 014716  004737  014626               CALL    BAWPAR          ;CALL SELF
 6684 014722  000207                       RETURN
 6685 014724  005737  002126        5$:     TST     RLFLAG          ;HAVE WE BEEN RELOCATED?
 6686 014730  001401                       BEQ     6$              ;NC   SKIP
 6687 014732  000207                       RETURN                  ;YES - RETURN
 6688 014734  004737  036402        6$:     CALL    RELOCATE        ;MOVE & MAP PROGRAM
 6689 014740                                ON.ERROR THEN $RETURN
      014740  103001                                                                BCC L131
      014742  000207                                                                RTS PC
      014744                                                                 L131:::::::
 6690                                       ;**NOTE** RECURSIVE CALL
 6691 014744  004737  014626               CALL    BAWPAR          ;CALL SELF
 6692 014750  004737  037214               CALL    UNRELOCATE      ;UNMOVE & UNMAP PROGRAM
 6693 014754  000207                       RETURN
```

```
 6696 014756                        PAFBAF: SUBTST  <<PATTERNS FORWARD,BANKS FORWARD      **RECURSIVE**>>
                                    ;*********************************************************************
                                    ;*SUBTEST       PATTERNS FORWARD,BANKS FORWARD      **RECURSIVE**
                                    ;*********************************************************************
 6697 014756  005037  002112               CLR     PATTERN          ;SET PATTERN TO 0
 6698                               ;START OF PATTERN LOOP
 6699 014762  005037  002102        1$:     CLR     BANK             ;SET BANK TO 0
 6700                               ;START OF BANK LOOP
 6701 014766  004737  040052        2$:     CALL    EXBANK           ;EXAMINE BANK
 6702 014772  004737  040456               CALL    BANKOK           ;CORRECT MEMORY FOR THIS BANK?
 6703 014776  001010                       BNE     4$               ;NO - GO TO BANK LOOP TERMINATOR
 6704 015000  005737  002116               TST     ACFLAG           ;CAN WE ACCESS THIS BANK?
 6705 015004  001405                       BEQ     4$               ;NO - GO TO BANK LOOP TERMINATION
 6706 015006  005737  002124               TST     RRFLAG           ;RELOCATION REQUIRED?
 6707 015012  001002                       BNE     4$               ;YES - GO TO BANK LOOP TERMINATION
 6708 015014  004737  015562               CALL    MTEST            ;GO TEST CORRECT MEMORY
 6709                               ;TERMINATION OF BANK LOOP
 6710 015020  005037  002222        4$:     CLR     CONTFLAG
 6711 015024  004737  040520               CALL    INCBNK           ;NEXT HIGHER BANK
 6712 015030  002356                       BGE     2$               ;IF NOT DONE - LOOP ON THIS BANK
 6713                               ;TERMINATION OF PATTERN LOOP
 6714 015032  004737  040474               CALL    INCRPT           ;NEXT HIGHER PATTERN
 6715 015036  001351                       BNE     1$               ;OK - LOOP; ELSE CONTINUE
 6716                               ;END OF LOOPS
 6717 015040  005137  002134               COM     TMFLAG           ;COMPLEMENT TYPE OF MEMORY
 6718                                                                ;IS THIS AN EVEN NUMBER PASS?
 6719 015044  001403                       BEQ     5$               ;YES - SKIP
 6720                               ;**NOTE** RECURSIVE CALL
 6721 015046  004737  014756               CALL    PAFBAF           ;CALL SELF
 6722 015052  000207                       RETURN
 6723 015054  005737  002126        5$:     TST     RLFLAG           ;HAVE WE BEEN RELOCATED?
 6724 015060  001401                       BEQ     6$               ;NO - SKIP
 6725 015062  000207                       RETURN                   ;YES - RETURN
 6726 015064  004737  036402        6$:     CALL    RELOCATE         ;MOVE & MAP PROGRAM
 6727 015070                               ON.ERROR THEN $RETURN
      015070  103001                                                                  BCC L132
      015072  000207                                                                  RTS PC
      015074                                                                L132:;;;;;;
 6728                               ;**NOTE** RECURSIVE CALL
 6729 015074  004737  014756               CALL    PAFBAF           ;CALL SELF
 6730 015100  004737  037214               CALL    UNRELOCATE       ;UNMOVE & UNMAP PROGRAM
 6731 015104  000207                       RETURN
```

```
 6734 015106                    PAFBAW: SUBTST  <<PATTERNS FORWARD,BANKS WORST FIRST  **RECURSIVE**>>
                                ;*****************************************************************************
                                ;*SUBTEST       PATTERNS FORWARD,BANKS WORST FIRST  **RECURSIVE**
                                ;*****************************************************************************
 6735 015106  005037  002112           CLR     PATTERN         ;SET PATTERN TO 0
 6736                                   ;START OF PATTERN LOOP
 6737 015112  005037  002102    1$:     CLR     BANK            ;SET BANK TO 0
 6738                                   ;START OF BANK LOOP
 6739 015116  004737  040052    2$:     CALL    EXBANK          ;EXAMINE BANK
 6740 015122  004737  040456            CALL    BANKOK          ;CORRECT MEMORY FOR THIS BANK?
 6741 015126  001013                    BNE     4$              ;NO - GO TO BANK LOOP TERMINATOR
 6742 015130  005737  002116            TST     ACFLAG          ;CAN WE ACCESS THIS BANK?
 6743 015134  001410                    BEQ     4$              ;NO - GO TO BANK LOOP TERMINATION
 6744 015136  005737  002130            TST     BMFLAG          ;IS THIS BAD MEMORY (WORST FIRST)
 6745 015142  001405                    BEQ     4$              ;NO - GO TO BANK LOOP TERMINATION
 6746 015144  005737  002124            TST     RRFLAG          ;RELOCATION REQUIRED?
 6747 015150  001002                    BNE     4$              ;YES - GO TO BANK LOOP TERMINATION
 6748 015152  004737  015562            CALL    MTEST           ;GO TEST CORRECT MEMORY
 6749                                   ;TERMINATION OF BANK LOOP
 6750 015156  005037  002222    4$:     CLR     CONTFLAG
 6751 015162  004737  040520            CALL    INCBNK          ;NEXT HIGHER BANK
 6752 015166  002353                    BGE     2$              ;IF NOT DONE - LOOP ON THIS BANK
 6753                                   ;TERMINATION OF PATTERN LOOP
 6754 015170  004737  040474            CALL    INCRPT          ;NEXT HIGHER PATTERN
 6755 015174  001346                    BNE     1$              ;OK - LOOP; ELSE CONTINUE
 6756                                   ;END OF LOOPS
 6757 015176  005137  002134            COM     TMFLAG          ;COMPLEMENT TYPE OF MEMORY
 6758                                                           ;IS THIS AN EVEN NUMBER PASS?
 6759 015202  001403                    BEQ     5$              ;YES - SKIP
 6760                                   ;**NOTE** RECURSIVE CALL
 6761 015204  004737  015106            CALL    PAFBAW          ;CALL SELF
 6762 015210  000207                    RETURN
 6763 015212  005137  002600    5$:     COM     WORST           ;4TH PASS?
 6764 015216  001003                    BNE     6$              ;YES - SKIP
 6765                                   ;**NOTE** RECURSIVE CALL
 6766 015220  004737  015106            CALL    PAFBAW          ;CALL SELF
 6767 015224  000207                    RETURN
 6768 015226  005737  002126    6$:     TST     RLFLAG          ;HAVE WE BEEN RELOCATED?
 6769 015232  001401                    BEQ     7$              ;NO - SKIP
 6770 015234  000207                    RETURN                  ;YES - RETURN
 6771 015236  004737  036402    7$:     CALL    RELOCATE        ;MOVE & MAP PROGRAM
 6772 015242                            ON.ERROR THEN $RETURN
      015242  103001                                                            BCC L133
      015244  000207                                                            RTS PC
      015246                                                          L133:;;;;;;;
 6773                                   ;**NOTE** RECURSIVE CALL
 6774 015246  004737  015106            CALL    PAFBAW          ;CALL SELF
 6775 015252  004737  037214            CALL    UNRELOCATE      ;UNMOVE & UNMAP PROGRAM
 6776 015256  000207                    RETURN
```

```
 6779 015260                    PARBAF: SUBTST  <<PATTERNS REVERSE,BANKS FORWARD      **RECURSIVE**>>
                                ;*********************************************************************************
                                ;*SUBTEST       PATTERNS REVERSE,BANKS FORWARD      **RECURSIVE**
                                ;*********************************************************************************
 6780 015260  004737  040510           CALL    HIPAT           ;SET HIGHTEST PATTERNS
 6781                                   ;START OF PATTERN LOOP
 6782 015264  005037  002102    1$:     CLR     BANK            ;SET BANK TO 0
 6783                                   ;START OF BANK LOOP
 6784 015270  004737  040052    2$:     CALL    EXBANK          ;EXAMINE BANK
 6785 015274  004737  040456            CALL    BANKOK          ;CORRECT MEMORY FOR THIS BANK?
 6786 015300  001010                    BNE     4$              ;NO - GO TO BANK LOOP TERMINATOR
 6787 015302  005737  002116            TST     ACFLAG          ;CAN WE ACCESS THIS BANK?
 6788 015306  001405                    BEQ     4$              ;NO - GO TO BANK LOOP TERMINATION
 6789 015310  005737  002124            TST     RRFLAG          ;RELOCATION REQUIRED?
 6790 015314  001002                    BNE     4$              ;YES - GO TO BANK LOOP TERMINATION
 6791 015316  004737  015562            CALL    MTEST           ;GO TEST CORRECT MEMORY
 6792                                   ;TERMINATION OF BANK LOOP
 6793 015322  005037  002222    4$:     CLR     CONTFLAG
 6794 015326  004737  040520            CALL    INCBNK          ;NEXT HIGHER BANK
 6795 015332  002356                    BGE     2$              ;IF NOT DONE - LOOP ON THIS BANK
 6796                                   ;TERMINATION OF PATTERN LOOP
 6797 015334  005337  002112            DEC     PATTERN         ;NEXT LOWER PATTERN
 6798 015340  100351                    BPL     1$              ;OK - LOOP; ELSE CONTINUE
 6799                                   ;END OF LOOPS
 6800 015342  005137  002134            COM     TMFLAG          ;COMPLEMENT TYPE OF MEMORY
 6801                                                           ;IS THIS AN EVEN NUMBER PASS?
 6802 015346  001403                    BEQ     5$              ;YES - SKIP
 6803                                   ;**NOTE** RECURSIVE CALL
 6804 015350  004737  015260            CALL    PARBAF          ;CALL SELF
 6805 015354  000207                    RETURN
 6806 015356  005737  002126    5$:     TST     RLFLAG          ;HAVE WE BEEN RELOCATED?
 6807 015362  001401                    BEQ     6$              ;NO   SKIP
 6808 015364  000207                    RETURN                  ;YES - RETURN
 6809 015366  004737  036402    6$:     CALL    RELOCATE        ;MOVE & MAP PROGRAM
 6810 015372                            ON.ERROR THEN $RETURN
      015372  103001                                                           BCC L134
      015374  000207                                                           RTS PC
      015376                                                          L134:;;;;;;
 6811                                   ;**NOTE** RECURSIVE CALL
 6812 015376  004737  015260            CALL    PARBAF          ;CALL SELF
 6813 015402  004737  037214            CALL    UNRELOCATE      ;UNMOVE & UNMAP PROGRAM
 6814 015406  000207                    RETURN
```

```
 6817 015410                        PARBAW: SUBTST  <<PATTERNS REVERSE,BANKS WORST FIRST  **RECURSIVE**>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       PATTERNS REVERSE,BANKS WORST FIRST  **RECURSIVE**
                                    ;*****************************************************************************
 6818 015410  004737  040510               CALL    HIPAT           ;SET HIGHTEST PATTERN
 6819                                       ;START OF PATTERN LOOP
 6820 015414  005037  002102        1$:     CLR     BANK            ;SET BANK TO 0
 6821                                       ;START OF BANK LOOP
 6822 015420  004737  040052        2$:     CALL    EXBANK          ;EXAMINE BANK
 6823 015424  004737  040456               CALL    BANKOK          ;CORRECT MEMORY FOR THIS BANK?
 6824 015430  001013                       BNE     4$              ;NO - GO TO BANK LOOP TERMINATOR
 6825 015432  005737  002116               TST     ACFLAG          ;CAN WE ACCESS THIS BANK?
 6826 015436  001410                       BEQ     4$              ;NO - GO TO BANK LOOP TERMINATION
 6827 015440  005737  002130               TST     BMFLAG          ;IS THIS BAD MEMORY (WORST FIRST)
 6828 015444  001405                       BEQ     4$              ;NO - GO TO BANK LOOP TERMINATION
 6829 015446  005737  002124               TST     RRFLAG          ;RELOCATION REQUIRED?
 6830 015452  001002                       BNE     4$              ;YES - GO TO BANK LOOP TERMINATION
 6831 015454  004737  015562               CALL    MTEST           ;GO TEST CORRECT MEMORY
 6832                                       ;TERMINATION OF BANK LOOP
 6833 015460  005037  002222        4$:     CLR CONTFLAG
 6834 015464  004737  040520               CALL    INCBNK          ;NEXT HIGHER BANK
 6835 015470  002353                       BGE     2$              ;IF NOT DONE - LOOP ON THIS BANK
 6836                                       ;TERMINATION OF PATTERN LOOP
 6837 015472  005337  002112               DEC     PATTERN         ;NEXT LOWER PATTERN
 6838 015476  100346                       BPL     1$              ;OK - LOOP; ELSE CONTINUE
 6839                                       ;END OF LOOPS
 6840 015500  005137  002134               COM     TMFLAG          ;COMPLEMENT TYPE OF MEMORY
 6841                                                               ;IS THIS AN EVEN NUMBER PASS?
 6842 015504  001403                       BEQ     5$              ;YES - SKIP
 6843                                       ;**NOTE** RECURSIVE CALL
 6844 015506  004737  015410               CALL    PARBAW          ;CALL SELF
 6845 015512  000207                       RETURN
 6846 015514  005137  002600        5$:     COM     WORST           ;4TH PASS?
 6847 015520  001003                       BNE     6$              ;YES - SKIP
 6848                                       ;**NOTE** RECURSIVE CALL
 6849 015522  004737  015410               CALL    PARBAW          ;CALL SELF
 6850 015526  000207                       RETURN
 6851 015530  005737  002126        6$:     TST     RLFLAG          ;HAVE WE BEEN RELOCATED?
 6852 015534  001401                       BEQ     7$              ;NO - SKIP
 6853 015536  000207                       RETURN                  ;YES - RETURN
 6854 015540  004737  036402        7$:     CALL    RELOCATE        ;MOVE & MAP PROGRAM
 6855 015544                                ON.ERROR THEN $RETURN
      015544  103001                                                                BCC L135
      015546  000207                                                                RTS PC
      015550                                                                L135:;;;;;;
 6856                                       ;**NOTE** RECURSIVE CALL
 6857 015550  004737  015410               CALL    PARBAW          ;CALL SELF
 6858 015554  004737  037214               CALL    UNRELOCATE      ;UNMOVE & UNMAP PROGRAM
 6859 015560  000207                       RETURN
```

```
 6862 015562                                MTEST:  SUBTST  <<SUBR  SETUP MEMORY TEST>>
                                            ;*****************************************************************************
                                            ;*SUBTEST       SUBR    SETUP MEMORY TEST
                                            ;*****************************************************************************
 6863 015562                                        SET     HEADER                  ;INITIALIZE HEADER MESSAGE TYPEOUT
      015562  012737  177777  002612                                                          MOV  #-1,HEADER
 6864 015570                                        SET     MUT                     ;INDICATE THERE IS A MEMORY UNDER TEST
      015570  012737  177777  002110                                                          MOV  #-1,MUT
 6865 015576  005037  002264                        CLR     PASFLG
 6866 015602  005737  002120                        TST     MKFLAG                  ;ECC?
 6867 015606  001413                                BEQ     MT1                     ;NO - SKIP
 6868 015610                                        BEGIN   HOLDLOOP
      015610                                                                                B16:;;;;;;
 6869 015610                                          IF CONTFLAG IS TRUE THEN LEAVE HOLDLOOP
      015610  005737  002222                                                                  TST CONTFLAG
      015614  001005                                                                          BNE E16
 6870 015616                                          IF SKIPMK IS FALSE
      015616  005737  002342                                                                  TST SKIPMK
      015622  00100^                                                                          BNE L136
 6871 015624  0047?   015656                            CALL        MKCONTROL
 6872 015630                                        END; OF IF SKIPMK
      015630                                                                                L136:;;;;;;
 6873 015630                                        END     HOLDLOOP
      015630                                                                                E16:;;;;;;
 6874 015630  004737  017104                        CALL    MKTEST                  ;YES - DO ECC TESTS
 6875 015634  000402                                BR      MT2
 6876 015636  004737  017324            MT1:        CALL    MJTEST                  ;DO PARITY TESTS
 6877 015642  005037  002110            MT2:        CLR     MUT                     ;NOW - NO MEMORY UNDER TEST
 6878 015646                                        SET     HEADER                  ;ALLOW HEADERS NORMAL
      015646  012737  177777  002612                                                          MOV  #-1,HEADER
 6879 015654  000207                                RETURN
```

```
 6882 015656                            MKCONTROL:SUBTST        <<SUBR  TEST ECC CSR LOGIC DISPATCH>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       SUBR    TEST ECC CSR LOGIC DISPATCH
                                        ;*****************************************************************************
 6883                                           ;THE NEXT TWO MODULES SOLVE THE PROBLEM OF
 6884                                           ;HOW TO RUN THE CSR TESTS ON EACH ECC MEMORY
 6885                                           ;
 6886 015656                                    IF SELONLY IS TRUE THEN $RETURN
      015656  005737  002002                                                          TST SELONLY
      015662  001401                                                                  BEQ L137
      015664  000207                                                                  RTS PC
      015666                                                                 L137:;;;;;;;
 6887 015666                                    IF INHECC IS TRUE THEN $RETURN
      015666  005737  002536                                                          TST INHECC
      015672  001401                                                                  BEQ L140
      015674  000207                                                                  RTS PC
      015676                                                                 L140:;;;;;;;
 6888 015676                                    PUSH    BANK,R0,R1,R2,R3
      015676  013746  002102                                                          MOV BANK,-(SP)
      015702  010046                                                                  MOV R0,-(SP)
      015704  010146                                                                  MOV R1,-(SP)
      015706  010246                                                                  MOV R2,-(SP)
      015710  010346                                                                  MOV R3,-(SP)
 6889 015712  012737  060000  002232            MOV     #FIRST,CSRFBANK         ;SET FIRST TEST ADDRESS TO FIRST ADDR.
 6890 015720  012737  157776  002234            MOV     #LAST,CSRLBANK
 6891 015726  005037  002236                    CLR     CSRINT
 6892 015732  005037  002240                    CLR     SPLTCSR
 6893 015736  005037  002332                    CLR     CSRLOOP                 ; AND ZERO THE LOOP COUNTER
 6894 015742  013700  002104                    MOV     BANKINDEX,R0            ;GET THE BANK INDEX
 6895 015746  016001  002664                    MOV     CONFIG(R0),R1           ;GET CSR NUMBER
 6896 015752  000301                            SWAB    R1
 6897 015754  042701  177760                    BIC     #^C17,R1
 6898 015760  006301                            ASL     R1
 6899 015762  010137  002526                    MOV     R1,CSRHOLD              ;STORE IN THE LOW BYTE
 6900 015766  005737  002136                    TST     INTFLAG                 ;IS THIS BANK INTERLEAVED?
 6901 015772  001421                            BEQ     1$                      ;BRANCH IF NOT INTERLEAVED
 6902 015774  005237  002240                    INC     SPLTCSR
 6903 016000  012737  120000  002234            MOV     #120000,CSRLBANK
 6904 016006  005237  002332                    INC     CSRLOOP                 ;WE MUST LOOP TWICE FOR AN INTERLEAVED BANK
 6905 016012  005237  002236                    INC     CSRINT
 6906 016016  016001  002664                    MOV     CONFIG(R0),R1           ;GET THE INTERLEAVE CSR NUMBER
 6907 016022  072127  177775                    ASH     #-3,R1
 6908 016026  042701  160777                    BIC     #^C17000,R1
 6909 016032  050137  002526                    BIS     R1,CSRHOLD              ;STORE IT IN CSRHOLD'S UPPER BYTE
 6910 016036  005003                    1$:     CLR     R3
 6911 016040  116337  002526  002152  MKLOOP:   MOVB    CSRHOLD(R3),CSRNO
 6912 016046  042737  177741  002152            BIC     #^C36,CSRNO             ;CLEAR ANY UNNECESSARY BITS
 6913 016054                                      FOR MKCNT := #0 TO CSRINT
      016054  005037  016476                                                          CLR MKCNT
      016060                                                                 B17:;;;;;;;
 6914 016060                                        FOR CSRFIRST := CSRFBANK TO CSRLBANK BY #4000
      016060  013737  002232  002226                                                  MOV CSRFBANK,CSRFIRST
      016066                                                                 B20:;;;;;;;
 6915 016066                                        MAP BANK                    ;MAP TEST SPACE TO BANK
      016066  010346                                                                  MOV R3, (SP)
      016070  013703  002102                MOV     BANK,R3
      016074  004737  035716                CALL    MAPPER
```

```
                                        .DSABL  CRF

      016100  012603                                                    MOV (SP)+,R3
 6916 016102  104511                        INVALIDATE                 ;INVALIDATE BACKROUND PATTERN
 6917 016104                                 BEGIN CSRSTUFF
      016104                                                          B21:;;;;;;
 6918 016104  005037  002334                 CLR       SUCCESS
 6919 016110                                   IF ACFLAG IS TRUE AND RRFLAG IS FALSE
      016110  005737  002116                                                    TST ACFLAG
      016114  001503                                                           BEQ L141
      016116  005737  002124                                                    TST RRFLAG
      016122  001100                                                           BNE L141
 6920 016124  013737  002226  002230            MOV   CSRFIRST,CSRLAST
 6921 016132  062737  004000  002230            ADD   #4000,CSRLAST
 6922 016140                                     FOR TESTADD := CSRFIRST TO CSRLAST BY #4
      016140  013737  002226  002412                                            MOV CSRFIRST,TESTADD
      016146                                                          B22:;;;;;;
 6923 016146  013737  002412  002414                MOV       TESTADD,TESTADD+2
 6924 016154  005737  002240                       TST       SPLTCSR
 6925 016160  001404                               BEQ       1$
 6926 016162  062737  040000  002414               ADD       #40000,TESTADD+2
 6927 016170  000403                               BR        2$
 6928 016172  062737  000002  002414         1$:   ADD       #2,TESTADD+2
 6929 016200  004737  016500               2$:    CALL      SBETEST
 6930 016204                                       ON.NOERROR
      016204  103440                                                           BCS L142
 6931 016206  104424                                 CACHOFF                 ;TURN CACHE OFF
 6932 016210  005037  002076                         CLR     NOPAR           ;INDICATE PARITY ACTION
 6933 016214                                         FOR I := #0 TO #27
      016214  005037  002452                                                    CLR I
      016220                                                          B23:;;;;;;
 6934 016220                                         SET   HEADER
      016220  012737  177777  002612                                            MOV  #-1,HEADER
 6935 016226  005037  002264                         CLR   PASFLG
 6936 016232                                         LET R0 := I
      016232  013700  002452                                                    MOV I,R0
 6937 016236                                         PUSH  R3                ;SAVE LOOP COUNTER
      016236  010346                                                           MOV R3,-(SP)
 6938 016240  010637  002146                         MOV   SP,CTLKVEC        ;SAVE VECTOR IN CSR OF TK
 6939 016244  162737  000002  002146                 SUB   #2,CTLKVEC
 6940 016252  004737  017004                         CALL CSRCASE
 6941 016256                                         POP   R3                ;RESTORE LOOP COUNTER
      016256  012603                                                           MOV (SP)+,R3
 6942 016260                                       END ;OF FOR I
      016260  005237  002452                                                    INC I
      016264  023727  002452  000027                                            CMP I,#27
      016272  003752                                                           BLE B23
      016274                                                          E23:;;;;;;;
 6943 016274  104423                                 CACHON                  ;TURN CACHE ON
 6944 016276                                         SET     SUCCESS
      016276  012737  177777  002334                                            MOV  #-1,SUCCESS
 6945 016304                                         LEAVE CSRSTUFF
      016304  000407                                                           BR E21
 6946 016306                                     END ;OF ON.NOERROR
      016306                                                          L142:;;;;;;
 6947 016306                                   END ;OF FOR TESTADD
      016306  062737  000004  002412                                            ADD #4,TESTADD
      016314  023737  002412  002230                                            CMP TESTADD,CSRLAST
```

```
                016322  003711                                                                  BLE B22
                016324                                                                  E22:::::::::
 6948           016324                          END ;OF IF                              L141:::::::
                016324                                                                  E21:::::::
 6949           016324                        END CSRSTUFF
                016324
 6950           016324                        IF SUCCESS IS FALSE
                016324  005737  002334                                                          TST SUCCESS
                016330  001012                                                                  BNE L143
 6951           016332                          TYPE    MSGA34
                016332  104401  067207       TYPEIT  ,MSGA34
                                             .DSABL  CRF
 6952           016336                          TYPOCS  BANK,<TYPES BANK NUMBER>,3
                016336  013746  002102       MOV     BANK,-(SP)      ;;SAVE BANK FOR TYPEOUT
                                                                     ;;TYPES BANK NUMBER
                016342  104403               TYPOS                   ;;GO TYPE--OCTAL ASCII
                016344     003               .BYTE   3               ;;TYPE 3 DIGIT(S)
                016345     000               .BYTE   0               ;;SUPPRESS LEADING ZEROS
                                             .DSABL  CRF
 6953           016346                          TYPE    MSGB34
                016346  104401  067245       TYPEIT  ,MSGB34
                                             .DSABL  CRF
 6954           016352  004737  050446           CALL    PERBNK
 6955           016356                        END ;OF IF SUCCESS
                016356                                                                  L143:::::::
 6956           016356                      END; OF FOR CSRFIRST
                016356  062737  004000  002226                                                  ADD #4000,CSRFIRST
                016364  023737  002226  002234                                                  CMP CSRFIRST,CSRLBANK
                016372  003635                                                                  BLE B20
                016374                                                                  E20:::::::::
 6957           016374  005237  002240         INC  SPLTCSR
 6958           016400                      END; OF FOR MKCNT
                016400  005237  016476                                                          INC MKCNT
                016404  023737  016476  002236                                                  CMP MKCNT,CSRINT
                016412  003622                                                                  BLE B17
                016414                                                                  E17:::::::::
 6959           016414  062737  000002  002232       ADD     #2,CSRFBANK
 6960           016422  012737  000001  002240       MOV     #1,SPLTCSR
 6961           016430  005203                       I       R3
 6962           016432  020337  002332               CMP     R3,CSRLOOP
 6963           016436  003002                       BGT     1$
 6964           016440  000137  016040               JMP     MKLOOP
 6965           016444  104472               1$:     ECCINIT         ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
 6966           016446                               SET     CONTFLAG
                016446  012737  177777  002222                                                  MOV  #-1,CONTFLAG
 6967           016454  005037  002240               CLR     SPLTCSR
 6968           016460                               POP     R3,R2,R1,R0,BANK
                016460  012603                                                                  MOV (SP)+,R3
                016462  012602                                                                  MOV (SP)+,R2
                016464  012601                                                                  MOV (SP)+,R1
                016466  012600                                                                  MOV (SP)+,R0
                016470  012637  002102                                                          MOV (SP)+,BANK
 6969           016474  000207               RETURN
 6970           016476  000000       MKCNT:  .WORD   0                       ;COUNTER FOR MKLOOP
```

```
 6973 016500                        SBETEST:SUBTST  <<CHECK FOR SBE FREE LOCATIONS>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       CHECK FOR SBE FREE LOCATIONS
                                    ;*****************************************************************************
 6974                                       ;IN ORDER TO DETERMINE IF A LOCATION IS SBE FREE I DO THIS
 6975                                       ;
 6976                                       ;WRITE ZEROS WITH ECC DISABLE
 6977                                       ;READ ZEROS BACK
 6978                                       ;IF NOT ZEROS THEN RETURN ERROR
 6979                                       ;
 6980                                       ;WRITE ZEROS WITH ECC ENABLED BUT TRAPS DISABLED
 6981                                       ;READ ZEROS BACK
 6982                                       ;IF NOT ZEROS THEN RETURN ERROR
 6983                                       ;
 6984                                       ;TEST THE LOCATION FROM THE PAR'S (WITH NO PROGRAM FETCHES)
 6985                                       ;IF THERE WERE ANY SBE'S OR DBE'S THEN RETURN ERROR
 6986                                       ;
 6987                                       ;COMPLIMENT ZEROS TO ONES WITH ECC DISABLE
 6988                                       ;READ ONES BACK
 6989                                       ;IF NOT ONES THEN RETURN ERROR
 6990                                       ;
 6991                                       ;WRITE 100,,100000,00000 (CHECKBITS COMPLIMENT OF BEFORE)
 6992                                       ;  WITH ECC ENABLED BUT TRAPS DISABLED
 6993                                       ;TEST THE LOCATION FROM THE PAR'S (WITH NO PROGRAM FETCHES)
 6994                                       ;IF THERE WERE ANY SBE'S OR DBE'S THEN RETURN ERROR
 6995                                       ;
 6996                                       ;IF NONE OF THE ABOVE FORCES A RETURN ERROR THEN RETURN NO.ERROR
 6997                                       .ENABL  LSB
 6998 016500                                PUSH    R0,R1,R4                ;PUSH R0,R1,R4 ONTO STACK
      016500  010046                                                                    MOV R0,-(SP)
      016502  010146                                                                    MOV R1,-(SP)
      016504  010446                                                                    MOV R4,-(SP)
 6999 016506  013701  002412                MOV     TESTADD,R1
 7000 016512  013704  002414                MOV     TESTADD+2,R4
 7001 016516                                TESTAREA                        ;ENTER TEST MODE
      016516  053737  002552  177776        BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                           .DSABL  CRF
 7002 016524  104424                        CACHOFF                         ;TURN CACHE OFF
 7003 016526  104471                        ECC1DIS                         ;DISABLE ECC ON 1 SELECTED CSR
 7004 016530                                CLEAR   (R1),(R4)
      016530  005011                                                                    CLR  (R1)
      016532  005014                                                                    CLR  (R4)
 7005 016534  005711                        TST     (R1)
 7006 016536  001107                        BNE     SBENT
 7007 016540  005714                        TST     (R4)
 7008 016542  001105                        BNE     SBENT
 7009
 7010 016544  104503                        CLR1CSR                         ;CLEAR 1 SELECTED CSR
 7011 016546                                CLEAR   (R1),(R4)
      016546  005011                                                                    CLR  (R1)
      016550  005014                                                                    CLR  (R4)
 7012 016552  005711                        TST     (R1)
 7013 016554  001100                        BNE     SBENT
 7014 016556  005714                        TST     (R4)
 7015 016560  001076                        BNE     SBENT
 7016
 7017 016562  104510                        TSTREAD                 ;TEST LOC (R1) & TST FOR SBE (WITHOUT FETCHES)
```

```
7018 016564                          IF #BIT15!BIT4 SET.IN CSR
     016564 032737 100020 002150                                  BIT #BIT15!BIT4,CSR
     016572 001415                                                BEQ L144
7019 016574                            SET SKPERR                ;DISABLE ERRGEN'S ERROR PRINTOUT
     016574 012737 177777 002066                                  MOV  #-1,SKPERR
7020 016602 104512                     ERRGEN
7021 016604 013700 002460              MOV   ERRADD,R0
7022 016610 072027 177774              ASH   #-4,R0
7023 016614 042700 177600              BIC   #^C177,R0
7024 016620                            IF BANK EQ R0 THEN GOTO SBENT
     016620 023700 002102                                         CMP BANK,R0
     016624 001454                                                BEQ SBENT
7025 016626                          END; OF IF #BIT15
     016626                                                     L144:;;;;;;
7026 016626 104471                     ECC1DIS                   ;DISABLE ECC ON 1 SELECTED CSR
7027 016630 005111                     COM     (R1)
7028 016632 005114                     COM     (R4)
7029 016634 023711 002614              CMP     ONES,(R1)
7030 016640 001046                     BNE     SBENT
7031 016642 023714 002614              CMP     ONES,(R4)
7032 016646 001043                     BNE     SBENT
7033
7034 016650 104503                     CLR1CSR                   ;CLEAR 1 SELECTED CSR
7035 016652 005011                     CLR     (R1)
7036 016654 012714 100000              MOV     #BIT15,(R4)
7037 016660 005711                     TST     (R1)
7038 016662 001035                     BNE     SBENT
7039 016664 022714 100000              CMP     #BIT15,(R4)
7040 016670 001032                     BNE     SBENT
7041
7042 016672 104510                     TSTREAD                ;TEST LOC (R1) & TST FOR SBE (WITHOUT FETCHES)
7043 016674                            IF #BIT15!BIT4 SET.IN CSR
     016674 032737 100020 002150                                  BIT #BIT15!BIT4,CSR
     016702 001415                                                BEQ L145
7044 016704                            SET SKPERR                ;DISABLE ERRGEN'S ERROR PRINTOUT
     016704 012737 177777 002066                                  MOV  #-1,SKPERR
7045 016712 104512                     ERRGEN
7046 016714 013700 002460              MOV   ERRADD,R0
7047 016720 072027 177774              ASH   #-4,R0
7048 016724 042700 177600              BIC   #^C177,R0
7049 016730                            IF BANK EQ R0 THEN GOTO SBENT
     016730 023700 002102                                         CMP BANK,R0
     016734 001410                                                BEQ SBENT
7050 016736                          END; OF IF #BIT15
     016736                                                     L145:;;;;;;
7051
7052 016736 104417                     KERNEL                    ;ENTER KERNEL MODE
7053 016740 104473                     ECC1INIT                  ;INITIALIZE 1 SELECTED CSR
7054 016742 104423                     CACHON                    ;TURN CACHE ON
7055 016744                            POP     R4,R1,R0          ;POP R0,R1 & R4 FROM STACK
     016744 012604                                                MOV (SP)+,R4
     016746 012601                                                MOV (SP)+,R1
     016750 012600                                                MOV (SP)+,R0
7056 016752                          $RETURN NOERROR
     016752 000241                                                CLC
     016754 000207                                                RTS PC
7057
```

```
7058 016756  104503          SBENT:  CLR1CSR                 ;CLEAR 1 SELECTED CSR
7059 016760                          CLEAR   (R1),(R4)
     016760  005011                                          CLR  (R1)
     016762  005014                                          CLR  (R4)
7060 016764  104417                  KERNEL                  ;ENTER KERNEL MODE
7061 016766  104473                  ECC1INIT                ;INITIALIZE 1 SELECTED CSR
7062 016770  104423                  CACHON                  ;TURN CACHE ON
7063 016772                          POP     R4,R1,R0        ;POP R0,R1 & R4 FROM STACK
     016772  012604                                          MOV (SP)+,R4
     016774  012601                                          MOV (SP)+,R1
     016776  012600                                          MOV (SP)+,R0
7064 017000                          $RETURN ERROR
     017000  000261                                          SEC
     017002  000207                                          RTS PC
7065                                 .DSABL  LSB
```

```
 7068 017004                        CSRCASE:SUBTST  <<CSR PATTERN CASE STATEMENT>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       CSR PATTERN CASE STATEMENT
                                    ;*****************************************************************************
 7069 017004                                CASE R0
      017004  010046                                                                    MOV R0,-(SP)
      017006  006316                                                                    ASL @SP
      017010  004737  017074                                                            JSR PC,L146
 7070                                       ;WARNING IF YOU CHANGE THIS TABLE ALSO
 7071                                       ;CHANGE "$DDW0" - "$DDW5" (THE PATTERN BIT MAP)
 7072
 7073                                       ;PAT            TIME            DESCRIPTION
 7074 017014  020222                MKCSRT: MT0006          ;<1 SEC         INITIAL DATA TEST
 7075
 7076                                       ;
 7077                                       ;               MSV11-J ECC TESTS
 7078                                       ;
 7079 017016  024024                       MT0044          ; 5 SEC         SHIFTING 1/0'S THROUGH CHECK BITS
 7080 017020  020354                       MT0014          ; 1 SEC         BASIC DOUBLE ERROR TEST
 7081 017022  024104                       MT0045          ;<1 SEC         SYNDROMES TO CSR ON DOUBLE BIT ERROR TEST
 7082 017024  023560                       MT0036          ; 1 SEC         CORRECTION CODE TEST
 7083 017026  020456                       MT0020          ; 1 SEC         SYNDROMES TO CSR ON SINGLE BIT ERROR TEST
 7084 017030  023622                       MT0037          ;<1 SEC         ECC DISABLE TEST
 7085 017032  023660                       MT0041          ; 1 SEC         ADDRESS TO CSR ON DOUBLE BIT ERROR
 7086 017034  023740                       MT0042          ;<1 SEC         EXTENDED ADDRESS TO CSR ON ERROR TEST
 7087 017036  023774                       MT0043          ;<1 SEC         WRITE BYTE CLEARS SBE TEST
 7088 017040  024134                       MT0046          ; 1 SEC         CHECK SINGLE BIT ERRORS WITH ECC DISABLED TEST
 7089 017042  024164                       MT0047          ;<1 SEC         NO CSR UPDATE ON SBE WITH EXSISTING DBE
 7090 017044  020320                       MT0010          ;<1 SEC         BYTE ADDRESSING TEST
 7091 017046  024220                       MT0999          ; 0 SEC         NULL TEST
 7092 017050  024220                       MT0999          ; 0 SEC         NULL TEST
 7093 017052  024220                       MT0999          ; 0 SEC         NULL TEST
 7094 017054  024220                       MT0999          ; 0 SEC         NULL TEST
 7095 017056  024220                       MT0999          ; 0 SEC         NULL TEST
 7096 017060  024220                       MT0999          ; 0 SEC         NULL TEST
 7097 017062  024220                       MT0999          ; 0 SEC         NULL TEST
 7098 017064  024220                       MT0999          ; 0 SEC         NULL TEST
 7099 017066  024220                       MT0999          ; 0 SEC         NULL TEST
 7100 017070  024220                       MT0999          ; 0 SEC         NULL TEST
 7101 017072  024220                       MT0999          ; 0 SEC         NULL TEST
 7102 017074                        END ;OF CASE R0
      017074                                                        L146:;;;;;;
      017074  062616                                                        ADD (SP)+,@SP
      017076  013646                                                        MOV @(SP)+,-(SP)
      017100  004736                                                        JSR PC,@(SP)+
 7103 017102  000207                RETURN
```

```
 7106 017104                            MKTEST: SUBTST  <<SUBR  ECC TEST DISPATCH>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       SUBR    ECC TEST DISPATCH
                                        ;*****************************************************************************
 7107 017104                                    IF #SW0 SET.IN @SWR OR ACTFLAG IS TRUE
      017104  032777  000001  163524                                                    BIT #SW0,@SWR
      017112  001003                                                                    BNE L147
      017114  005737  002350                                                            TST ACTFLAG
      017120  001402                                                                    BEQ L150
      017122                                                                  L147:;;;;;;;
 7108 017122  104470                              ECCDIS                    ;DISABLE ERROR CORRECTION
 7109 017124                                    ELSE
      017124  000401                                                                    BR L151
      017126                                                                  L150:;;;;;;;
 7110 017126  104502                              CLRCSR                    ;CLEAR ALL CSR'S
 7111 017130                                    END ;OF IF
      017130                                                                  L151:;;;;;;;
 7112 017130  012737  000002  002076            MOV     #2,NOPAR          ;INDICATE PARITY ACTION
 7113 017136  012737  000002  002326            MOV     #2,PCBUMP         ;TRAPS ADD 2 TO PC
 7114 017144  013700  002112                    MOV     PATTERN,R0        ;GET PATTERN NUMBER
 7115 017150  006300                            ASL     R0                ;MAKE IT A WORD ADDRESS
 7116 017152                                    IF MKPAT(R0) NE #MT0034 AND MKPAT(R0) NE #MT0999
      017152  026027  017244  023346                                                    CMP MKPAT(R0),#MT0034
      017160  001405                                                                    BEQ L152
      017162  026027  017244  024220                                                    CMP MKPAT(R0),#MT0999
      017170  001401                                                                    BEQ L152
 7117 017172  104511                              INVALIDATE          ;INVALIDATE BACKGROUND PATTERN ON "BANK"
 7118 017174                                    END ;OF IF MKPAT(R0)
      017174                                                                  L152:;;;;;;;
 7119 017174  010637  002146                    MOV     SP,CTLKVEC        ;SAVE VECTOR IN CASE OF tK
 7120 017200  162737  000002  002146            SUB     #2,CTLKVEC
 7121 017206  004770  017244                    CALL    @MKPAT(R0)        ;INDEX OFF TABLE
 7122 017212                                    IF #SW0 SET.IN @SWR OR ACTFLAG IS TRUE
      017212  032777  000001  163416                                                    BIT #SW0,@SWR
      017220  001003                                                                    BNE L153
      017222  005737  002350                                                            TST ACTFLAG
      017226  001402                                                                    BEQ L154
      017230                                                                  L153:;;;;;;;
 7123 017230  104506                              ENASBE                    ;TRAP ON SINGLE BIT ERRORS
 7124 017232                                    ELSE
      017232  000401                                                                    BR L155
      017234                                                                  L154:;;;;;;;
 7125 017234  104472                              ECCINIT                   ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
 7126 017236                                    END ;OF IF #SW0
      017236                                                                  L155:;;;;;;;
 7127 017236  005037  002076                    CLR     NOPAR             ;INDICATE PARITY ACTION
 7128 017242  000207                            RETURN
 7129
 7130                                           ;WARNING IF YOU CHANGE THIS TABLE ALSO
 7131                                           ;CHANGE "$DDW0" - "$DDW5" (THE PATTERN BIT MAP)
 7132                                           ;PAT    TIME            DISCRIPTION
 7133 017244                            __MKPAT:;NOTE MT0034 MUST BE FIRST & LAST
 7134 017244  023346                            MT0034  ;<1 SEC         ;SOFT ERROR - BACKGROUND PATTERN TEST
 7135 017246  020434                            MT0017  ;<1 SEC         ;HOLDING 1'S & 0'S TEST
 7136 017250  020256                            MT0007  ;<1 SEC         ;ADDRESS BIT TEST
 7137 017252  017544                            MT0001  ;<1 SEC         ;ADDRESS TEST
 7138 017254  017640                            MT0002  ;<1 SEC         ;COMPLEMENT ADDRESS TEST
```

```
 7139 017256  020070                MT0004  : 1 SEC          ;ROTATING ZEROS TEST
 7140 017260  020140                MT0005  ; 1 SEC          ;ROTATING ONES TEST
 7141 017262  020536                MT0021  ; 1 SEC          ;MARCHING 0'S & 1'S TEST
 7142 017264  021026                MT0022  ;10 SEC          ;REFRESH & SHIFTING DIAGONAL  TEST
 7143 017266  021332                MT0026  ;<1 SEC          ;RANDOM DATA TEST
 7144 017270  021124                MT0024  ;20 SEC          ;FAST GALLOPING PATTERN TEST
 7145 017272  022454                MT0031  ; 3 SEC          ;SOB-A-LONG TEST
 7146 017274  022644                MT0032  ;<1 SEC          ;WRITE RECOVERY TEST
 7147 017276  023160                MT0033  ;35 SEC          ;BRANCH GOBBLE TEST
 7148 017300  023346                MT0034  ;<1 SEC          ;SOFT ERROR - BACKGROUND PATTERN TEST
 7149                               ;NOTE MT0034 MUST BE FIRST & LAST
 7150 017302  024220                MT0999  ; 0 SEC          ;NULL TEST
 7151 017304  024220                MT0999  ; 0 SEC          ;NULL TEST
 7152 017306  024220                MT0999  ; 0 SEC          ;NULL TEST
 7153 017310  024220                MT0999  ; 0 SEC          ;NULL TEST
 7154 017312  024220                MT0999  ; 0 SEC          ;NULL TEST
 7155 017314  024220                MT0999  ; 0 SEC          ;NULL TEST
 7156 017316  024220                MT0999  ; 0 SEC          ;NULL TEST
 7157 017320  024220                MT0999  ; 0 SEC          ;NULL TEST
 7158 017322  024220                MT0999  ; 0 SEC          ;NULL TEST
```

```
 7161 017324                          MJTEST: SUBTST  <<SUBR  PARITY TEST DISPATCH>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       SUBR    PARITY TEST DISPATCH
                                      ;*****************************************************************************
 7162 017324  012737  000002  002076          MOV     #2,NOPAR                ;INDICATE PARITY ACTION
 7163 017332  012737  000002  002326          MOV     #2,PCBUMP               ;TRAPS ADD 2 TO PC
 7164 017340  012737  060000  002412          MOV     #FIRST,TESTADD
 7165 017346  012737  060002  002414          MOV     #FIRST+2,TESTADD+2
 7166 017354  013700  002112                  MOV     PATTERN,R0              ;GET PATTERN NUMBER
 7167 017360  006300                          ASL     R0                      ;MAKE IT A WORD ADDRESS
 7168 017362                                  IF MJPAT(R0) NE #MT0034 AND MJPAT(R0) NE #MT0999
      017362  026027  017430  023346                                                  CMP MJPAT(R0),#MT0034
      017370  001405                                                                  BEQ L156
      017372  026027  017430  024220                                                  CMP MJPAT(R0),#MT0999
      017400  001401                                                                  BEQ L156
 7169 017402  104511                            INVALIDATE              ;INVALIDATE BACKGROUND PATTERN ON "BANK"
 7170 017404                                  END ;OF IF MJPAT(R0)
      017404                                                                  L156:;;;;;;
 7171 017404  010637  002146                  MOV     SP,CTLKVEC              ;SAVE VECTOR IN CASE OF tK
 7172 017410  162737  000002  002146          SUB     #2,CTLKVEC
 7173 017416  004770  017430                  CALL    @MJPAT(R0)              ;INDEX OFF TABLE
 7174 017422  005037  002076                  CLR     NOPAR                   ;INDICATE PARITY ACTION
 7175 017426  000207                          RETURN
 7176
 7177                                         ;WARNING IF YOU CHANGE THIS TABLE ALSO
 7178                                         ;CHANGE '$DDW0" - "$DDW5" (THE PATTERN BIT MAP)
 7179
 7180                                         ;PAT    TIME            DISCRIPTION
 7181 017430                          MJPAT:  ;NOTE MT0034 MUST BE FIRST & LAST
 7182 017430  023346                          MT0034  ;<1 SEC         ;SOFT ERROR - BACKGROUND PATTERN TEST
 7183 017432  020222                          MT0006  ;<1 SEC         ;INITIAL DATA TEST
 7184 017434  020434                          MT0017  ;<1 SEC         ;HOLDING 1'S & 0'S TEST
 7185 017436  020256                          MT0007  ;<1 SEC         ;ADDRESS BIT TEST
 7186 017440  017544                          MT0001  ;<1 SEC         ;ADDRESS TEST
 7187 017442  017640                          MT0002  ;<1 SEC         ;COMPLEMENT ADDRESS TEST
 7188 017444  017754                          MT0003  ; 1 SEC         ;3 XOR 9 WORST CASE NOISE TEST
 7189 017446  020070                          MT0004  ; 1 SEC         ;ROTATING ZEROS TEST
 7190 017450  020140                          MT0005  ; 1 SEC         ;ROTATING ONES TEST
 7191 017452  020536                          MT0021  ; 1 SEC         ;MARCHING 0'S & 1'S TEST
 7192 017454  023446                          MT0035  ;<1 SEC         ;WORSE CASE NOISE PARITY TEST
 7193 017456  021026                          MT0022  ;10 SEC         ;REFRESH TEST
 7194 017460  021060                          MT0023  ;10 SEC         ;SHIFTING DIAGONAL  TEST
 7195 017462  021332                          MT0026  ;<1 SEC         ;RANDOM DATA TEST
 7196 017464  021124                          MT0024  ;20 SEC         ;FAST GALLOPING PATTERN TEST
 7197 017466  022454                          MT0031  ; 3 SEC         ;SOB-A-LONG TEST
 7198 017470  022644                          MT0032  ;<1 SEC         ;WRITE RECOVERY TEST
 7199 017472  023160                          MT0033  ;35 SEC         ;BRANCH GOBBLE TEST
 7200 017474  023346                          MT0034  ;<1 SEC         ;SOFT ERROR - BACKGROUND PATTERN TEST
 7201                                         ;NOTE MT0034 MUST BE FIRST & LAST
 7202 017476  024220                          MT0999  ; 0 SEC         ;NULL TEST
 7203 017500  024220                          MT0999  ; 0 SEC         ;NULL TEST
 7204 017502  024220                          MT0999  ; 0 SEC         ;NULL TEST
 7205 017504  024220                          MT0999  ; 0 SEC         ;NULL TEST
 7206 017506  024220                          MT0999  ; 0 SEC         ;NULL TEST
```

```
                                        .SBTTL  PATTERNS
                                        .SBTTL  MEMORY TEST SETUP ROUTINES
017510                          MT0000: SUBTST  <<MT0000        SETUP DATA PATTERN TEST>>
                                ;*****************************************************************************
                                ;*SUBTEST        MT0000  SETUP DATA PATTERN TEST
                                ;*****************************************************************************
017510  005037  002300                  CLR     REALPAT                 ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
017514  012700  060000                  MOV     #FIRST,R0
017520  012701  040000                  MOV     #SIZE,R1
017524  004737  032470                  CALL    REGCOPY
017530  012737  024640  002262          MOV     #MTP000,SUPDOADD        ;ELSE DO PATTERN IN MAIN MEMORY
017536  004737  024446                  CALL    SUPD03
017542  000207                          RETURN
017544                          MT0001: SUBTST  <<MT0001        SETUP ADDRESS TEST>>
                                ;*****************************************************************************
                                ;*SUBTEST        MT0001  SETUP ADDRESS TEST
                                ;*****************************************************************************
017544  012737  000001  002300          MOV     #1,REALPAT              ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
017552  012700  060000                  MOV     #FIRST,R0
017556  012701  040000                  MOV     #SIZE,R1
017562  005737  002456                  TST     NOSUPER
017566  001005                          BNE     2$
017570  023737  172252  172254          CMP     SIPAR5,SIPAR6
017576  001007                          BNE     4$
017600  000404                          BR      3$
017602  023737  177652  177654  2$:     CMP     UIPAR5,UIPAR6
017610  001002                          BNE     4$
017612  012701  030000          3$:     MOV     #30000,R1
017616  005002                  4$:     CLR     R2
017620  004737  032470                  CALL    REGCOPY
017624  012737  024664  002262          MOV     #MTP001,SUPDOADD        ;SET UP CALLING ADDRESS
017632  004737  024446                  CALL    SUPD03
017636  000207                          RETURN
```

```
 7236 017640                                MT0002: SUBTST  <<MT0002        SETUP COMPLEMENT ADDRESS TEST>>
                                            ;*****************************************************************************
                                            ;*SUBTEST       MT0002  SETUP COMPLEMENT ADDRESS TEST
                                            ;*****************************************************************************
 7237 017640  012737  000002  002300              MOV     #2,REALPAT              ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7238 017646  012700  160000                      MOV     #LAST+2,R0
 7239 017652  012701  040000                      MOV     #SIZE,R1
 7240 017656  012704  060000                      MOV     #FIRST,R4
 7241 017662  012705  100001                      MOV     #100001,R5
 7242 017666  005737  002456                      TST     NOSUPER
 7243 017672  001005                              BNE     2$
 7244 017674  023737  172252  172254              CMP     SIPAR5,SIPAR6
 7245 017702  001013                              BNE     4$
 7246 017704  000404                              BR      3$
 7247 017706  023737  177652  177654  2$:         CMP     UIPAR5,UIPAR6
 7248 017714  001006                              BNE     4$
 7249 017716  012701  030000          3$:         MOV     #30000,R1
 7250 017722  012700  140000                      MOV     #140000,R0
 7251 017726  012705  120001                      MOV     #120001,R5
 7252 017732  012702  000001          4$:         MOV     #1,R2
 7253 ^17736  010103                              MOV     R1,R3
 7254 017740  012737  024716  002262              MOV     #MTP002,SUPDOADD        ;SET UP CALLING ADDRESS
 7255 017746  004737  024446                      CALL    SUPD03
 7256 017752  000207                              RETURN
```

```
 7259 017754                            MT0003: SUBTST  <<MT0003        SETUP 3 XOR 9 WORST CASE NOISE TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MT0003  SETUP 3 XOR 9 WORST CASE NOISE TEST
                                        ;*****************************************************************************
 7260 017754                                    IF EQFLAG IS TRUE THEN $RETURN
      017754  005737  002132                                                        TST EQFLAG
      017760  001401                                                                BEQ L157
      017762  000207                                                                RTS PC
      017764                                                                L157:;;;;;;
 7261 017764  012737  000003  002300            MOV     #3,REALPAT              ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7262 017772  005037  002326                    CLR     PCBUMP                  ;TRAPS DO NOT ADD TO PC
 7263 017776  004737  032500            1$:     CALL    FLIPWARN                ;SETUP WARNING CONSTANTS & R2
 7264 020002  012701  060000            2$:     MOV     #FIRST,R1               ;R1 <-- STARTING ADDRESS
 7265 020006  012703  020000                    MOV     #20000,R3
 7266 020012  072327  177770                    ASH     #-8.,R3                 ;R3 <-- R3 / 256.
 7267 020016  012702  000004                    MOV     #4,R2                   ;SMALL LOOP SIZE
 7268 020022  012705  000100                    MOV     #64.,R5                 ;MEDIUM LOOP SIZE
 7269 020026  104415                            SAVREG
 7270 020030  012737  024750  002262            MOV     #MTPA03,SUPDOADD
 7271 020036  004737  024446                    CALL    SUPD03                  ;DO IT IN MAIN MEMORY
 7272 020042  104416                            RESREG
 7273 020044  012737  025010  002262            MOV     #MTPB03,SUPDOADD
 7274 020052  004737  024462                    CALL    SUPD04
 7275 020056  022737  000003  002616    4$:     CMP     #3,FLIPLOC              ;DONE WITH 4 PATTERNS
 7276                                                                           ;[(0,177777);(177777,0);(401,177777);(177777,401)]?
 7277 020064  001344                            BNE     1$                      ;NO - LOOP
 7278 020066  000207                            RETURN
 7279
 7280 020070                            MT0004: SUBTST  <<MT0004        SETUP ROTATING ZEROS TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MT0004  SETUP ROTATING ZEROS TEST
                                        ;******* *****************************************************************************
 7281 020070  012737  000004  002300            MOV     #4,REALPAT              ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7282 020076  012737  000004  002326            MOV     #4,PCBUMP               ;TRAPS ADD 4 TO PC
 7283 020104  013702  002614                    MOV     ONES,R2
 7284 020110  004737  032630                    CALL    BACKGND                 ;WRITE BACKGROUND OF ONES
 7285 020114  012700  060000                    MOV     #FIRST,R0
 7286 020120  012701  040000                    MOV     #SIZE,R1
 7287 020124  012737  025106  002262            MOV     #MTPA04,SUPDOADD        ;SET UP LINKS
 7288 020132  004737  024462                    CALL    SUPD04
 7289 020136  000207                            RETURN
 7290 020140                            MT0005: SUBTST  <<MT0005        SETUP ROTATING ONES TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MT0005  SETUP ROTATING ONES TEST
                                        ;*****************************************************************************
 7291 020140  012737  000005  002300            MOV     #5,REALPAT              ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7292 020146  012737  000004  002326            MOV     #4,PCBUMP               ;TRAPS ADD 4 TO PC
 7293 020154  005002                            CLR     R2
 7294 020156  004737  032630                    CALL    BACKGND                 ;WRITE BACKGROUND OF ZEROS
 7295 020162  012700  060000                    MOV     #FIRST,R0
 7296 020166  012701  040000                    MOV     #SIZE,R1
 7297 020172  012737  025162  002262            MOV     #MTP005,SUPDOADD        ;SET UP LINKS
 7298 020200  012737  025176  025160            MOV     #MTP005+14,MTPB04+16
 7299 020206  004737  024462                    CALL    SUPD04
 7300 020212  012737  025122  025160            MOV     #MTPA04+14,MTPB04+16    ;RESET TEST'S ORIGINAL VALUE
 7301 020220  000207                            RETURN
```

```
 7304 020222                          MT0006: SUBTST  <<MT0006        SETUP INITIAL DATA TEST>>
                                      ;*****************************************************************************
                                      ;*SUBTEST        MT0006  SETUP INITIAL DATA TEST
                                      ;*****************************************************************************
 7305 020222  012737  000006  002300          MOV     #6,REALPAT              ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7306 020230  012737  000004  002326          MOV     #4,PCBUMP               ;TRAPS ADD 4 TO PC
 7307 020236  012701  002412                  MOV     #TESTADD,R1
 7308 020242  012737  025216  002262          MOV     #MTP006,SUPDOADD
 7309 020250  004737  024446                  CALL    SUPD03                  ;DO IT IN SUPERVISOR MODE
 7310 020254  000207                          RETURN
 7311 020256                          MT0007: SUBTST  <<MT0007        SETUP ADDRESS BIT TEST>>
                                      ;*****************************************************************************
                                      ;*SUBTEST        MT0007  SETUP ADDRESS BIT TEST
                                      ;*****************************************************************************
 7312 020256  012737  000007  002300          MOV     #7,REALPAT              ;SETUP PATTERN NUMBER FOR TYPFOUT & DISPLAY
 7313 020264  005002                          CLR     R2
 7314 020266  004737  032630                  CALL    BACKGND                 ;OF ZEROS
 7315 020272  012701  060000                  MOV     #FIRST,R1
 7316 020276  012702  000001                  MOV     #1,R2
 7317 020302  050201                          BIS     R2,R1
 7318 020304  012737  025416  002262          MOV     #MTP007,SUPDOADD
 7319 020312  004737  024446                  CALL    SUPD03                  ;DO IT IN SUPERVISOR MODE
 7320 020316  000207                          RETURN
 7321 020320                          MT0010: SUBTST  <<MT0010        SETUP BYTE ADDRESSING TEST>>
                                      ;*****************************************************************************
                                      ;*SUBTEST        MT0010  SETUP BYTE ADDRESSING TEST
                                      ;*****************************************************************************
 7322 020320  012737  000010  002300          MOV     #10,REALPAT             ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7323 020326  012737  000004  002326          MOV     #4,PCBUMP               ;TRAPS ADD 4 TO PC
 7324 020334  013704  002412                  MOV     TESTADD,R4
 7325 020340  012737  025516  002262          MOV     #MTP010,SUPDOADD
 7326 020346  004737  024446                  CALL    SUPD03                  ;DO IT IN SUPERVISOR MODE
 7327 020352  000207                          RETURN
```

```
 7330 020354                        MT0014: SUBTST  <<MT0014        SETUP BASIC DOUBLE BIT ERROR TEST>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       MT0014  SETUP BASIC DOUBLE BIT ERROR TEST
                                    ;*****************************************************************************
 7331 020354                                IF ACTFLAG TS TRUE OR APTFLAG IS TRUE
      020354  005737  002350                                                        TST ACTFLAG
      020360  001003                                                                BNE L160
      020362  005737  002352                                                        TST APTFLAG
      020366  001404                                                                BEQ L161
      020370                                                                  L160:;;;;;;
 7332 020370                                  IF $PASS NE #0 THEN $RETURN
      020370  005737  056654                                                        TST $PASS
      020374  001401                                                                BEQ L162
      020376  000207                                                                RTS PC
      020400                                                                  L162:;;;;;;
 7333 020400                                END; OF IF ACTFLAG
      020400                                                                  L161:;;;;;;
 7334 020400  012737  000014  002300         MOV     #14,REALPAT            ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7335 020406  004737  037740                 CALL  MAPKERNAL                ;MAP KERNAL SPACE
 7336 020412                                 LET R1 := #100000              ;SETUP TEST ADDRESS
      020412  012701  100000                                                        MOV #100000,R1
 7337 020416  004737  032674                 CALL GETCSR                    ;GET CSR INFO FROM CONFIGURATION TABLE
 7338 020422  004737  025624                 CALL MTP014                    ;DO BASIC DOUBLE BIT ERROR TEST
 7339 020426  004737  040026                 CALL  UNMAP                    ;UNMAP KERNAL SPACE
 7340 020432  000207                         RETURN
```

```
 7343
 7344 020434                        MT0017: SUBTST  <<MT0017        SETUP HOLDING 1'S & 0'S>>
                                    ;*****************************************************************************
                                    ;*SUBTEST        MT0017  SETUP HOLDING 1'S & 0'S
                                    ;*****************************************************************************
 7345 020434  012737  000017  002300          MOV     #17,REALPAT             ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7346 020442  012737  026050  002262          MOV     #MTP017,SUPDOADD
 7347 020450  004737  024446                  CALL    SUPD03                  ;DO IT IN SUPERVISOR MODE
 7348 020454  000207                          RETURN
```

```
7351 020456                        MT0020: SUBTST  <<MT0020        SETUP SYNDROMES TO CSR ON SINGLE BIT ERROR>>
                                   ;*****************************************************************************
                                   ;*SUBTEST       MT0020  SETUP SYNDROMES TO CSR ON SINGLE BIT ERROR
                                   ;*****************************************************************************
7352 020456                                IF ACTFLAG IS TRUE OR APTFLAG IS TRUE
     020456  005737  002350                                                        TST ACTFLAG
     020462  001003                                                               BNE L163
     020464  005737  002352                                                        TST APTFLAG
     020470  001404                                                               BEQ L164
     020472                                                                 L163.;;;;;;;
7353 020472                                  IF $PASS NE #0 THEN $RETURN
     020472  005737  056654                                                        TST $PASS
     020476  001401                                                               BEQ L165
     020500  000207                                                               RTS PC
     020502                                                                 L165:;;;;;;;
7354 020502                                END; OF IF ACTFLAG
     020502                                                                 L164:;;;;;;;
7355 020502  012737  000020  002300          MOV     #20,REALPAT          ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
7356 020510  004737  037740                CALL  MAPKERNAL              ;MAP KERNAL SPACE
7357 020514                                LET R1 := #100000            ;SETUP TEST ADDRESS
     020514  012701  100000                                                        MOV #100000,R1
7358 020520  004737  032674                CALL GETCSR                  ;GET CSR INFO FROM CONFIGURATION TABLE
7359 020524  004737  026126                CALL MTP020                  ;DO SYNDROMES TO CSR ON SINGLE ERROR TEST
7360 020530  004737  040026                CALL  UNMAP                  ;UNMAP KERNAL SPACE
7361 020534  000207                      RETURN
```

```
                        MT0021: SUBTST  <<MT0021        SETUP MARCHING 0'S & 1'S TEST>>
                        ;*****************************************************************************
                        ;*SUBTEST        MT0021  SETUP MARCHING 0'S & 1'S TEST
                        ;*****************************************************************************
                                SET NOSCOPE
020536  012737  177777  002440                                                    MOV  #-1,NOSCOPE
                                MOV     #21,REALPAT             ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
                                MOV     BAKPAT,R2
                                CALL    BACKGND
                                MOV     R2,R3
                                SWAB    R3
                                MOV     #LAST+2,R1
                                MOV     R1,R5
                                MOV     #FIRST,R4
                                CMP     #5,PROTYP       ;IS THIS AN 11/83
                                BEQ     1$              ;BRANCH IF IT IS
                                CMP     #3,PROTYP       ;IS THIS AN 11/24?
                                BEQ     3$              ;BRANCH IF SO
                                CMP     #7,BANK
                                BNE     3$
                                MOV     #140000,R1
                                MOV     R1,R5
                        3$:     CMP     #177 BANK
                                BNE     5$
                                MOV     #140000,R1
                                MOV     R1,R5
                        5$:     MOV     #MTPA21,SUPDOADD
                                CALL    SUPD03
                                MOV     #MTPB21,SUPDOADD
                                CALL    SUPD04
                                MOV     R4,R1
                                MOV     #MTPC21,SUPDOADD
                                CALL    SUPD04
                                MOV     #MTPD21,SUPDOADD
                                CALL    SUPD04
                                BR      2$
                        1$:     CMP     #177,BANK
                                BNE     4$
                                MOV     #140000,R1
                                MOV     R1,R5
                        4$:     MOV     #MTPA21,SUPDOADD
                                CALL    SUPD03
                                MOV     #MTPB21,SUPDOADD
                                CALL    SUPD04
                                MOV     R4,R1
                                MOV     #MTPC21,SUPDOADD
                                CALL    SUPD04
                                MOV     #MTPD21,SUPDOADD
                                CALL    SUPD04
                        2$:     CLR     NOSCOPE
                                RETURN
```

```
 7411 021026                          MT0022: SUBTST  <<MT0022        SETUP REFRESH & SHIFTING DIAGONAL TEST>>
                                      ;*********************************************************************
                                      ;*SUBTEST        MT0022  SETUP REFRESH & SHIFTING DIAGONAL TEST
                                      ;*********************************************************************
 7412 021026  004737  024234                 CALL    KAMITEST                ;CHECK FOR KAMIKAZE MODE
 7413 021032                                 ON.ERROR THEN $RETURN           ;IF NOT IN KAMIKAZE MODE RETURN
      021032  103001                                                                 BCC L166
      021034  000207                                                                 RTS PC
      021036                                                                L166:;;;;;;
 7414 021036  012737  000022  002300         MOV     #22,REALPAT             ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7415 021044  012737  026612  002262         MOV     #MTP022,SUPDOADD
 7416 021052  004737  024446                 CALL    SUPD03                  ;DO IT IN SUPERVISOR MODE
 7417 021056  000207                         RETURN
 7418
 7419 021060                          MT0023: SUBTST  <<MT0023        SHIFTING DIAGONAL TEST>>
                                      ;*********************************************************************
                                      ;*SUBTEST        MT0023  SHIFTING DIAGONAL TEST
                                      ;*********************************************************************
 7420 021060  004737  024234                 CALL    KAMITEST                ;CHECK FOR KAMIKAZE MODE
 7421 021064                                 ON.ERROR THEN $RETURN           ;IF NOT IN KAMIKAZE MODE RETURN
      021064  103001                                                                 BCC L167
      021066  000207                                                                 RTS PC
      021070                                                                L167:;;;;;;
 7422 021070  012737  000023  002300         MOV     #23,REALPAT             ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7423 021076  012737  026612  002262         MOV     #MTP022,SUPDOADD
 7424 021104                                 SET     DIAGFLAG                ;IDENTIFY DIAGONAL TEST TO MTP022
      021104  012737  177777  002004                                                 MOV  #-1,DIAGFLAG
 7425 021112  004737  024446                 CALL    SUPD03                  ;DO IT IN SUPERVISOR MODE
 7426 021116  005037  002004                 CLR     DIAGFLAG
 7427 021122  000207                         RETURN
```

```
 7429 021124                            MT0024: SUBTST  <<MT0024        SETUP FAST GALLOPING PATTERN TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MT0024  SETUP FAST GALLOPING PATTERN TEST
                                        ;*****************************************************************************
 7430 021124  004737  024234                   CALL    KAMITEST                ;CHECK FOR KAMIKAZE MODE
 7431 021130                                    ON.ERROR THEN $RETURN           ;IF NOT IN KAMIKAZE MODE RETURN
      021130  103001                                                                    BCC L170
      021132  000207                                                                    RTS PC
      021134                                                                    L170:;;;;;;
 7432 021134                                    SET     NOSCOPE
      021134  012737  177777  002440                                                    MOV  #-1,NOSCOPE
 7433 021142  012737  000024  002300           MOV     #24,REALPAT             ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7434 021150  013702  002632                   MOV     BAKPAT,R2
 7435 021154  004737  032630                   CALL    BACKGND
 7436 021160  010203                           MOV     R2,R3
 7437 021162  010304                           MOV     R3,R4
 7438 021164  000304                           SWAB    R4
 7439 021166  012701  060000                   MOV     #FIRST,R1
 7440 021172  012705  157776                   MOV     #LAST,R5
 7441 021176  022737  000005  004010           CMP     #5,PROTYP
 7442 021204  001426                           BEQ     1$
 7443 021206  022737  000003  004010           CMP     #3,PROTYP
 7444 021214  001406                           BEQ     3$
 7445 021216  022737  000007  002102           CMP     #7,BANK
 7446 021224  001002                           BNE     3$
 7447 021226  012705  137776                   MOV     #137776,R5
 7448 021232  022737  000177  002102  3$:      CMP     #177,BANK
 7449 021240  001003                           BNE     7$
 7450 021242  012701  137776                   MOV     #137776,R1
 7451 021246  010105                           MOV     R1,R5
 7452 021250  104415                   7$:     SAVREG
 7453 021252  012737  027326  002262           MOV     #MTPB24,SUPDOADD
 7454 021260  000412                           BR      2$
 7455 021262  022737  000177  002556  1$:      CMP     #177,LASTBANK
 7456 021270  001002                           BNE     4$
 7457 021272  012705  137776                   MOV     #137776,R5
 7458 021276  104415                   4$:     SAVREG
 7459 021300  012737  027326  002262           MOV     #MTPB24,SUPDOADD
 7460 021306  004737  024462           2$:     CALL    SUPD04
 7461                                           ;DO IT AGAIN FOR COMPLEMENT DATA
 7462 021312  104416                           RESREG
 7463 021314  000302                           SWAB    R2
 7464 021316  000303                           SWAB    R3
 7465 021320  004737  024462                   CALL    SUPD04
 7466 021324  005037  002440                   CLR     NOSCOPE
 7467 021330  000207                           RETURN
```

```
 7470 021332                                MT0026: SUBTST  <<MT0026        SETUP RANDOM DATA TEST>>
                                            ;*****************************************************************************
                                            ;*SUBTEST       MT0026  SETUP RANDOM DATA TEST
                                            ;*****************************************************************************
 7471 021332  012737  000026  002300               MOV     #26,REALPAT
 7472 021340  005037  002326                       CLR     PCBUMP                  ;TRAPS DO NOT ADD TO THE PC
 7473 021344  013703  002604                       MOV     SEEDLO,R3               ;INITIALIZE RANDOM NUMBERS
 7474 021350  013702  002602                       MOV     SEEDHI,R2
 7475 021354  010305                               MOV     R3,R5
 7476 021356  010204                               MOV     R2,R4
 7477 021360  012701  060000                       MOV     #FIRST,R1
 7478 021364  012700  020000                       MOV     #SIZE/2,R0
 7479 021370  022737  000005  004010               CMP     #5,PROTYP               ;DO WE HAVE AN 11/83 ?
 7480 021376  001445                               BEQ     1$                      ;BRANCH IF WE DO
 7481 021400  022737  000003  004010               CMP     #3,PROTYP               ;11/24?
 7482 021406  001406                               BEQ     3$                      ;BRANCH IF SO
 7483 021410  022737  000007  002102               CMP     #7,BANK
 7484 021416  001002                               BNE     3$
 7485 021420  012700  014000                       MOV     #14000,R0
 7486 021424  022737  000177  002102  3$:          CMP     #177,BANK
 7487 021432  001002                               BNE     7$
 7488 021434  012700  014000                       MOV     #14000,R0
 7489 021440  104415                       7$:     SAVREG
 7490 021442  012737  027364  027464               MOV     #MTPA26+4,MTPD26+14
 7491 021450  012737  027360  002262               MOV     #MTPA26,SUPDOADD
 7492 021456  004737  024446                       CALL    SUPD03
 7493 021462  005037  027410                       CLR     RANODD                  ;FOR ERROR REPORTING
 7494 021466  012737  027400  027464               MOV     #MTPB26+4,MTPD26+14     ;SET UP NEXT LINK
 7495 021474  012737  027374  002262               MOV     #MTPB26,SUPDOADD
 7496 021502  104416                               RESREG
 7497 021504  004737  024446                       CALL    SUPD03
 7498 021510  000432                               BR      2$
 7499 021512  022737  000177  002102  1$:          CMP     #177,BANK
 7500 021520  001002                               BNE     4$
 7501 021522  012700  014000                       MOV     #14000,R0
 7502 021526  104415                       4$:     SAVREG
 7503 021530  012737  027364  027464               MOV     #MTPA26+4,MTPD26+14
 7504 021536  012737  027360  002262               MOV     #MTPA26,SUPDOADD
 7505 021544  004737  024446                       CALL    SUPD03
 7506 021550  005037  027410                       CLR     RANODD                  ;FOR ERROR REPORTING
 7507 021554  012737  027400  027464               MOV     #MTPB26+4,MTPD26+14     ;SET UP NEXT LINK
 7508 021562  012737  027374  002262               MOV     #MTPB26,SUPDOADD
 7509 021570  104416                               RESREG
 7510 021572  004737  024446                       CALL    SUPD03
 7511 021576  010337  002604               2$:     MOV     R3,SEEDLO               ;UPDATE FOR NEW RANDOM NUMBERS
 7512 021602  010237  002602                       MOV     R2,SEEDHI
 7513 021606  000207                               RETURN
```

```
 7516 021610                            MT0027: SUBTST  <<MT0027        UNIQUE BANK TEST>>
                                        ;*************************************************************************
                                        ;*SUBTEST       MT0027  UNIQUE BANK TEST
                                        ;*************************************************************************
 7517                                           ;MAKE SURE THAT EACH BANK CAN HAVE UNIQUE DATA
 7518                                           ;WRITE AND READ THE BANK NUMBER IN EACH BANK (EXCEPT WHERE THE PROGRAM IS)
 7519 021610  012737  000027  002300            MOV     #27,REALPAT             ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7520 021616  104502                            CLRCSR                  ;CLEAR CSRS
 7521 021620  012737  024446  002522            MOV     #SUPD03,LINK1           ;SET UP LINK
 7522 021626                                    SET NOFSMODE
      021626  012737  177777  002426                                                    MOV  #-1,NOFSMODE
 7523 021634                            STAR27: FOR I := #1 TO #2
      021634  012737  000001  002452                                                    MOV #1,I
      021642                                                                    B24:;;;;;;
 7524 021642                                      FOR BANK := #0 TO LASTBANK
      021642  005037  002102                                                    CLR BANK
      021646                                                                    B25:;;;;;;
 7525 021646  004737  040052                        CALL EXBANK
 7526 021652                                      IF ACFLAG IS TRUE AND RRFLAG IS FALSE
      021652  005737  002116                                                    TST ACFLAG
      021656  001436                                                           BEQ L171
      021660  005737  002124                                                    TST RRFLAG
      021664  001033                                                           BNE L171
 7527 021666  104511                              INVALIDATE                ;INVALIDATE BACKGROUND PATTERN ON "BANK"
 7528 021670                                      LET R2 := BANK
      021670  013702  002102                                                    MOV BANK,R2
 7529 021674  012700  060000                      MOV       #FIRST,R0
 7530 021700  010004                            MOV       R0,R4
 7531 021702  012701  040000                      MOV       #SIZE,R1
 7532 021706  010103                            MOV       R1,R3
 7533 021710                                      IF I EQ #1
      021710  023727  002452  000001                                                    CMP I,#1
      021716  001005                                                           BNE L172
 7534 021720  012737  027704  002262                MOV     #MTP034,SUPDOADD
 7535 021726  004777  160570                      CALL    @LINK1
 7536 021732                                    END ;OF IF
      021732                                                                    L172:;;;;;;
 7537 021732                                      IF I EQ #2
      021732  023727  002452  000002                                                    CMP I,#2
      021740  001005                                                           BNE L173
 7538 021742  012737  027712  002262                MOV     #MTP034+6,SUPDOADD
 7539 021750  004737  024446                      CALL    SUPD03
 7540 021754                                    END ;OF IF
      021754                                                                    L173:;;;;;;
 7541 021754                                  END ;OF IF
      021754                                                                    L171:;;;;;;
 7542 021754                                  END ;OF FOR BANK
      021754  005237  002102                                                    INC BANK
      021760  023737  002102  002556                                           CMP BANK,LASTBANK
      021766  003727                                                           BLE B25
      021770                                                                    E25:;;;;;;;
 7543 021770                            END ;OF FOR I
      021770  005237  002452                                                    INC I
      021774  023727  002452  000002                                           CMP I,#2
      022002  003717                                                           BLE B24
      022004                                                                    E24:;;;;;;;
 7544 022004                            IF FS7FLAG IS TRUE
```

```
        022004  005737  002446
        022010  001403
 7545   022012  005037  002426                  CLR   NOFSMODE
 7546   022016  000207                          RETURN
 7547   022020                                END ;OF IF FS7FLAG
        022020
 7548   022020                                FOR I := #1 TO #2
        022020  012737  000001  002452
        022026
 7549   022026                                  FOR BANK := LASTBANK DOWNTO #0
        022026  013737  002556  002102
        022034
 7550   022034  004737  040052                    CALL EXBANK
 7551   022040                                    IF ACFLAG IS TRUE AND RRFLAG IS FALSE
        022040  005737  002116
        022044  001436
        022046  005737  002124
        022052  001033
 7552   022054                                      LET R2 := BANK
        022054  013702  002102
 7553   022060  005102                              COM       R2
 7554   022062  012700  060000                      MOV       #FIRST,R0
 7555   022066  010004                              MOV       R0,R4
 7556   022070  012701  040000                      MOV       #SIZE,R1
 7557   022074  010103                              MOV       R1,R3
 7558   022076                                      IF I EQ #1
        022076  023727  002452  000001
        022104  001005
 7559   022106  012737  027704  002262                MOV     #MTP034,SUPDOADD
 7560   022114  004777  160402                      CALL    @LINK1
 7561   022120                                    END ;OF IF
        022120
 7562   022120                                    IF I EQ #2
        022120  023727  002452  000002
        022126  001005
 7563   022130  012737  027712  002262                MOV     #MTP034+6,SUPDOADD
 7564   022136  004737  024446                      CALL    SUPD03
 7565   022142                                    END ;OF IF
        022142
 7566   022142                                  END ;OF IF
        022142
 7567   022142                                END ;OF FOR BANK
        022142  005337  002102
        022146  023727  002102  000000
        022154  002327
        022156
 7568   022156                              END ;OF FOR I
        022156  005237  002452
        022162  023727  002452  000002
        022170  003716
        022172
 7569   022172  005037  002426              CLR     NOFSMODE
 7570   022176  000207                      RETURN
```

```
        TST FS7FLAG
        BEQ L174


L174:;;;;;;;

        MOV #1,I
B26:;;;;;;;

        MOV LASTBANK,BANK
B27:;;;;;;;


        TST ACFLAG
        BEQ L175
        TST RRFLAG
        BNE L175

        MOV BANK,R2


        CMP I,#1
        BNE L176


L176:;;;;;;;

        CMP I,#2
        BNE L177


L177:;;;;;;;

L175:;;;;;;;

        DEC BANK
        CMP BANK,#0
        BGE B27
E27:;;;;;;;;

        INC I
        CMP I,#2
        BLE B26
E26:;;;;;;;;
```

```
 7573 022200                        MT0030: SUBTST  <<MT0030        SETUP FLUSH OUT DBE'S TEST>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       MT0030  SETUP FLUSH OUT DBE'S TEST
                                    ;*****************************************************************************
 7574 022200  005037  002264               CLR     PASFLG
 7575 022204                               SET     FULLREL                                         MOV  #-1,FULLREL
      022204  012737  177777  002542
 7576 022212  012737  000030  002300  MTA030: MOV     #30,REALPAT             ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7577 022220  012737  000001  002076          MOV     #1,NOPAR                ;INDICATE COUNT PARITY ERRORS
 7578 022226  012737  024446  002522          MOV     #SUPD03,LINK1
 7579 022234  012737  027466  002262          MOV     #MTP030,SUPDOADD
 7580 022242  104470                          ECCDIS                  ;DISABLE ERROR CORRECTION
 7581 022244                               SET     NOFSMODE,NOSCOPE
      022244  012737  177777  002426                                                              MOV  #-1,NOFSMODE
      022252  012737  177777  002440                                                              MOV  #-1,NOSCOPE
 7582 022260                          FOR BANK := #0 TO LASTBANK
      022260  005037  002102                                                                      CLR BANK
      022264                                                                          B30:;;;;;;
 7583 022264  004737  040052            CALL  EXBANK
 7584 022270                            IF MKFLAG IS TRUE
      022270  005737  002120                                                                      TST MKFLAG
      022274  001414                                                                            BEQ L200
 7585 022276                              IF ACFLAG IS TRUE AND RRFLAG IS FALSE
      022276  005737  002116                                                                      TST ACFLAG
      022302  001411                                                                            BEQ L201
      022304  005737  002124                                                                      TST RRFLAG
      022310  001006                                                                            BNE L201
 7586 022312  012701  040000                MOV       #SIZE,R1
 7587 022316  012700  060000                MOV       #FIRST,R0
 7588 022322  004777  160174                CALL      @LINK1
 7589 022326                              END ;OF IF ACFLAG
      022326                                                                          L201:;;;;;;
 7590 022326                            END ;OF IF MKFLAG
      022326                                                                          L200:;;;;;;
 7591 022326                          END ;OF FOR
      022326  005237  002102                                                                      INC BANK
      022332  023737  002102  002556                                                              CMP BANK,LASTBANK
      022340  003751                                                                            BLE B30
      022342                                                                          E30:;;;;;;;
 7592 022342                          IF PASFLG IS FALSE
      022342  005737  002264                                                                      TST PASFLG
      022346  001032                                                                            BNE L202
 7593 022350                            SET PASFLG
      022350  012737  177777  002264                                                              MOV  #-1,PASFLG
 7594 022356  104502                    CLRCSR                          ;CLEAR CSRS
 7595 022360  004737  036402            CALL  RELOCATE
 7596 022364                            ON.ERROR
      022364  103010                                                                            BCC L203
 7597 022366  104472                      ECCINIT                 ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
 7598 022370                              CLEAR       NOFSMODE,NOSCOPE,FULLREL
      022370  005037  002426                                                                      CLR  NOFSMODE
      022374  005037  002440                                                                      CLR  NOSCOPE
      022400  005037  002542                                                                      CLR  FULLREL
 7599 022404  000207                      RETURN
 7600 022406                            END ;OF ON.ERROR
      022406                                                                          L203:;;;;;;
 7601 022406  013737  002310  002102      MOV   NEWBANK,BANK
```

```
 7602 022414  004737  040052                  CALL  EXBANK
 7603 022420  004737  022212                  CALL  MTA030
 7604 022424  104472                          ECCINIT                 ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
 7605 022426  004737  037214                  CALL  UNRELOCATE
 7606 022432  000207                          RETURN
 7607 022434                                 END ;OF IF PASFLG
      022434                                                                              L202:;;;;;;
 7608 022434  104472                        ECCINIT          ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
 7609 022436                                 CLEAR   NOFSMODE,NOSCOPE,FULLREL
      022436  005037  002426                                                              CLR  NOFSMODE
      022442  005037  002440                                                              CLR  NOSCOPE
      022446  005037  002542                                                              CLR  FULLREL
 7610 022452  000207                        RETURN
```

```
 7613 022454                            MT0031: SUBTST  <<MT0031        SETUP SOB-A-LONG TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MT0031  SETUP SOB-A-LONG TEST
                                        ;*****************************************************************************
 7614 022454  004737  024234                    CALL    KAMITEST                ;CHECK FOR KAMIKAZE MODE
 7615 022460                                    ON.ERROR THEN $RETURN           ;IF NOT IN KAMIKAZE MODE RETURN
      022460  103001                                                                       BCC L204
      022462  000207                                                                       RTS PC
      022464                                                                      L204:;;;;;;
 7616 022464                                    SET     NOSCOPE
      022464  012737 ' 177777  002440                                                       MOV  #-1,NOSCOPE
 7617 022472  012737  000031  002300            MOV     #31,REALPAT             ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7618 022500  005037  002076                    CLR     NOPAR                   ;SETUP PARITY ACTION
 7619 022504                                    MAP     BANK                    ;MAP FIRST SO BLOCK MOVE WORKS
      022504  010346                                                                       MOV R3,-(SP)
      022506  013703  002102                    MOV     BANK,R3
      022512  004737  035716                    CALL    MAPPER
                                                .DSABL  CRF
      022516  012603                                                                       MOV (SP)+,R3
 7620 022520                                    TESTAREA                        ;ENTER TEST MODE
      022520  053737  002552  177776            BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                                .DSABL  CRF
 7621 022526                                    BMOV    MTP031,FIRST,SOBLENGTH/2
      022526  004537  041024                        JSR R5,BLOCK3
      022532  000027                                SOBLENGTH/2
      022534  060000                                FIRST
      022536  027476                                MTP031
                                                    .DSABL      CRF
 7622 022540  104417                            KERNEL                          ;ENTER KERNEL MODE
 7623 022542  013702  002572                    MOV     SOBK,R2
 7624 022546  010200                            MOV     R2,R0
 7625 022550  012701  100776                    MOV     #100776,R1              ;COMPLEMENT OF INSTRUCTION "SOB R0,DOT"
 7626 022554  012705  060056                    MOV     #FIRST+SOBLENGTH,R5
 7627 022560  012737  060002  002262            MOV     #FIRST+2,SUPDOADD
 7628 022566  012737  160000  002522            MOV     #LAST+2,LINK1
 7629 022574  005737  002456                    TST     NOSUPER
 7630 022600  001005                            BNE     1$
 7631 022602  023737  172252  172254            CMP     SIPAR5,SIPAR6
 7632 022610  001405                            BEQ     2$
 7633 022612  000407                            BR      3$
 7634 022614  023737  177652  177654  1$:       CMP     UIPAR5,UIPAR6
 7635 022622  001003                            BNE     3$
 7636 022624  012737  140000  002522  2$:       MOV     #140000,LINK1
 7637 022632  004737  024462          3$:       CALL    SUPD04
 7638 022636  005037  002440                    CLR     NOSCOPE
 7639 022642  000207                            RETURN
```

```
 7642 022644                            MT0032: SUBTST  <<MT0032        SETUP WRITE RECOVERY TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MT0032  SETUP WRITE RECOVERY TEST
                                        ;*****************************************************************************
 7643 022644  004737  024234                    CALL    KAMITEST                ;CHECK FOR KAMIKAZE MODE
 7644 022650                            ON.ERROR THEN $RETURN                   ;IF NOT IN KAMIKAZE MODE RETURN
      022650  103001                                                                   BCC L205
      022652  000207                                                                   RTS PC
      022654                                                                  L205:;;;;;;
 7645 022654                                    SET     NOSCOPE
      022654  012737  177777  002440                                                    MOV  #-1,NOSCOPE
 7646 022662  012737  000032  002300            MOV     #32,REALPAT             ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7647 022670  005037  002076                    CLR     NOPAR                   ;SETUP PARITY ACTION
 7648 022674                                    MAP     BANK                    ;MAP FIRST SO THAT THE BLOCK MOVE WORKS
      022674  010346                                                                   MOV R3,-(SP)
      022676  013703  002102                    MOV     BANK,R3
      022702  004737  035716                    CALL    MAPPER
                                                .DSABL  CRF
      022706  012603                                                                   MOV (SP)+,R3
 7649 022710  012700  010247                    MOV     #10247,R0               ;OP CODE OF INSTRUCTION "MOV    R2,-(PC)"
 7650 022714  012701  177667                    MOV     #177667,R1              ;OP CODE OF COMPLEMENT OF INSTRUCTION "JMP (R0)"
 7651 022720  012702  020000                    MOV     #SIZE/2,R2              ;USED FOR 1/2 BANK LOOP
 7652 022724  010237  002522                    MOV     R2,LINK1
 7653 022730  012703  060000                    MOV     #FIRST,R3
 7654 022734  012704  160000                    MOV     #LAST+2,R4
 7655 022740  005037  002524                    CLR     LINK2
 7656 022744  005737  002456                    TST     NOSUPER
 7657 022750  001005                            BNE     1$
 7658 022752  023737  172252  172254            CMP     SIPAR5,SIPAR6
 7659 022760  001405                            BEQ     2$
 7660 022762  000415                            BR      3$
 7661 022764  023737  177652  177654  1$:       CMP     UIPAR5,UIPAR6
 7662 022772  001011                            BNE     3$
 7663 022774  012704  140000          2$:       MOV     #140000,R4
 7664 023000  012702  014000                    MOV     #14000,R2
 7665 023004  010237  002522                    MOV     R2,LINK1
 7666 023010  012737  000001  002524            MOV     #1,LINK2
 7667
 7668 023016                            3$:     TESTAREA                        ;ENTER TEST MODE
      023016  053737  002552  177776            BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                                .DSABL  CRF
 7669                                           ;MOVE TEST TO MEMORY UNDER TEST
 7670 023024  010023                    4$:     MOV     R0,(R3)+
 7671 023026  010144                            MOV     R1,-(R4)
 7672 023030  077203                            SOB     R2,4$
 7673
 7674 023032  022737  000005  004010            CMP     #5,PROTYP
 7675 023040  001003                            BNE     5$
 7676                                           ;MOVE LAST PART OF TEST TO FASTCITY
 7677 023042                                    BMOV    MTP032
      023042  004537  040770                        JSR R5,BLOCK1
      023046  027554                            MTP032
                                                    .DSABL      CRF
 7678 023050  104417                    5$:     KERNEL                          ;ENTER KERNEL MODE
 7679
 7680 023052  012702  005141                    MOV     #5141,R2                ;OP CODE OF INSTRUCTION "COM     (R1)
 7681 023056  012700  023156                    MOV     #10$,R0                 ;ADDRESS TO RETURN TO IN R0
```

```
 7682 023062  012701  160000            MOV     @LAST+2,R1              ;TOP OF BANK
 7683 023066  012737  060000  002262    MOV     @FIRST,SUPDOADD
 7684 023074  005737  002524            TST     LINK2
 7685 023100  001402                    BEQ     6$
 7686 023102  012701  140000            MOV     @140000,R1
 7687 023106  004737  024462      6$:   CALL    SUPD04
 7688 023112  012703  020000            MOV     @SIZE/2,R3
 7689 023116  012705  000110            MOV     @110,R5
 7690 023122  012704  060000            MOV     @FIRST,R4
 7691 023126  005737  002524            TST     LINK2
 7692 023132  001402                    BEQ     7$
 7693 023134  012703  014000            MOV     @14000,R3
 7694 023140  012737  027554  002262  7$:   MOV     @MTP032,SUPDOADD
 7695 023146  004737  024462            CALL    SUPD04
 7696 023152  005037  002440      9$:   CLR     NOSCOPE
 7697 023156  000207                10$:  RETURN                          ;THIS RETURN ACTS AS A NORMAL RETURN FROM MT0032
 7698                                                                     ;ALSO A RETURN FROM THE "CALL   SUPD04" ABOVE
 7699
```

```
 7702 023160                          MT0033: SUBTST  <<MT0033        SETUP BRANCH GOBBLE TEST>>
                                      ;*********************************************************************
                                      ;*SUBTEST       MT0033  SETUP BRANCH GOBBLE TEST
                                      ;*********************************************************************
 7703 023160  004737  024234                  CALL    KAMITEST                ;CHECK FOR KAMIKAZE MODE
 7704 023164                                  ON.ERROR THEN $RETURN           ;IF NOT IN KAMIKAZE MODE RETURN
      023164  103001                                                                      BCC L206
      023166  000207                                                                      RTS PC
      023170                                                                    L206:;;;;;;;
 7705 023170                                  SET     NOSCOPE
      023170  012737  177777  002440                                                      MOV  #-1,NOSCOPE
 7706 023176  012737  000033  002300          MOV     #33,REALPAT             ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
 7707 023204  005037  002076                  CLR     NOPAR                   ;SETUP PARITY ACTION
 7708 023210                                  MAP     BANK                    ;MAP FIRST SO THAT BLOCK MOVE WORKS
      023210  010346                                                                      MOV R3,-(SP)
      023212  013703  002102                  MOV     BANK,R3
      023216  004737  035716                  CALL    MAPPER
                                               .DSABL  CRF
      023222  012603                                                                      MOV (SP)+,R3
 7709
 7710 023224                                  TESTAREA                        ;ENTER TEST MODE
      023224  053737  002552  177776          BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                               .DSABL  CRF
 7711 023232                                  BMOV    MTP033,FIRST,GBLENGTH/2
      023232  004537  041024                      JSR R5,BLOCK3
      023236  000037                              GBLENGTH/2
      023240  060000                              FIRST
      023242  027606                              MTP033
                                                   .DSABL      CRF
 7712 023244  104417                          KERNEL                          ;ENTER KERNEL MODE
 7713
 7714 023246  012705  060076                  MOV     #FIRST+GBLENGTH,R5
 7715 023252  012737  060004  002262          MOV     #FIRST+4,SUPDOADD
 7716 023260  012701  060002                  MOV     #FIRST+2,R1
 7717 023264  012702  060003                  MOV     #FIRST+3,R2
 7718 023270  012737  160000  002522          MOV     #LAST+2,LINK1
 7719 023276  005737  002456                  TST     NOSUPER
 7720 023302  001005                          BNE     1$
 7721 023304  023737  172252  172254          CMP     SIPAR5,SIPAR6
 7722 023312  001405                          BEQ     2$
 7723 023314  000407                          BR      3$
 7724 023316  023737  177652  177654  1$:     CMP     UIPAR5,UIPAR6
 7725 023324  001003                          BNE     3$
 7726 023326  012737  140000  002522  2$:     MOV     #140000,LINK1
 7727
 7728 023334  004737  024462          3$:     CALL    SUPD04
 7729 023340  005037  002440                  CLR     NOSCOPE
 7730 023344  000207                          RETURN
 7731
 7732 023346                          MT0034: SUBTST  <<MT0034        SOFT ERROR - BACKGROUND PATTERN TEST>>
                                      ;*********************************************************************
                                      ;*SUBTEST       MT0034  SOFT ERROR - BACKGROUND PATTERN TEST
                                      ;*********************************************************************
 7733 023346  012737  000034  002300          MOV     #34,REALPAT
 7734 023354  012700  060000                  MOV     #FIRST,R0
 7735 023360  012701  040000                  MOV     #SIZE,R1
 7736 023364  013702  002620                  MOV     SOFTPAT,R2
```

```
 7737 023370  010103                    MOV     R1,R3
 7738 023372  013705  002104            MOV     BANKINDEX,R5
 7739 023376  010004                    MOV     R0,R4
 7740 023400                            IF #BIT13 SET.IN CONFIG+2(R5)
      023400  032765  020000  002666                                  BIT #BIT13,CONFIG+2(R5)
      023406  001406                                                 BEQ L207
 7741                                     ;BACKGROUND PATTERN IS VALID
 7742 023410  012737  027712  002262      MOV   #MTP034+6,SUPDOADD
 7743 023416  004737  024446              CALL  SUPD03                ;READ IT
 7744 023422                            ELSE
      023422  000410                                                 BR L210
      023424                                                       L207:;;;;;;;
 7745                                     ;BACKGROUND PATTERN HAS BEEN INVALIDATED
 7746 023424  012737  027704  002262      MOV   #MTP034,SUPDOADD
 7747 023432  004737  024446              CALL  SUPD03
 7748 023436  052765  020000  002666      BIS   #BIT13,CONFIG+2(R5)   ;VALIDATE IT
 7749 023444                            END ;OF IF #BIT13
      023444                                                       L210:;;;;;;;
 7750 023444  000207                    RETURN
 7751
 7752 023446                    MT0035: SUBTST  <<MT0035        SETUP WORST CASE NOISE PARITY TEST>>
                                ;*****************************************************************************
                                ;*SUBTEST       MT0035  SETUP WORST CASE NOISE PARITY TEST
                                ;*****************************************************************************
 7753 023446  012737  000035  002300        MOV     #35,REALPAT         ;SET UP TEST NUMBER FOR DISPLAY
 7754 023454  013703  002104                MOV     BANKINDEX,R3
 7755 023460  016301  002664                MOV     CONFIG(R3),R1
 7756 023464  000301                        SWAB    R1
 7757 023466  042701  177760                BIC     #^C17,R1
 7758 023472  006301                        ASL     R1
 7759 023474  010137  002152                MOV     R1,CSRNO
 7760 023500  023737  002152  002532        CMP     CSRNO,PGMCSR
 7761 023506  001001                        BNE     1$
 7762 023510  000207                        RETURN
 7763 023512  012702  052524          1$:   MOV     #52524,R2
 7764 023516  004737  032630                CALL    BACKGND             ;WRITE BACKROUND OF ALMOST ALT. 1'S AND 0'S
 7765 023522  012737  027730  002262        MOV     #MTP035,SUPDOADD
 7766 023530  004737  024446                CALL    SUPD03
 7767 023534                                IF QVFLAG IS TRUE THEN $RETURN
      023534  005737  002346                                          TST QVFLAG
      023540  001401                                                  BEQ L211
      023542  000207                                                  RTS PC
      023544                                                       L211:;;;;;;;
 7768 023544  005102                        COM     R2
 7769 023546  004737  032630                CALL    BACKGND             ;WRITE COMPLEMENT PATTERN INTO MUT
 7770 023552  004737  024462                CALL    SUPD04
 7771 023556  000207                        RETURN
```

```
                                        MT0036: SUBTST  <<MT0036        SETUP CORRECTION CODE TEST>>
                                        ;*************************************************** **************************
                                        .*SUBTEST       MT0036  SETUP CORRECTION CODE TEST
                                        ;*************************************************************************************
 7774 023560  012737  000036  002300          MOV     #36,REALPAT             ;SET UP TEST NUMBER FOR TYPEOUT AND DISPLAY
 7775 023566  004737  032674                  CALL    GETCSR                  ;GET CSR INFO FROM CONFIG TABLE
 7776 023572  005037  002264                  CLR     PASFLG                  ;CLEAR LOOP COUNTER
 7777 023576  005000                          CLR     R0                      ;GET TEST DATA
 7778 023600  012701  100000                  MOV     #100000,R1              ;GET FIRST ADDRESS IN BANK
 7779 023604  004737  037740                  CALL    MAPKERNAL               ;MAP KIPAR5 AND 6 TO BANK
 7780 023610  004737  030072                  CALL    MTP036                  ;EXECUTE TEST
 7781 023614  004737  040026                  CALL    UNMAP                   ;REMAP KERNAL SPACE
 7782 023620  000207                          RETURN
```

```
 7784 023622                            MT0037: SUBTST  <<MT0037        SETUP ECC DISABLE TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST        MT0037  SETUP ECC DISABLE TEST
                                        ;*****************************************************************************
 7785 023622  012737  000037  002300            MOV     #37,REALPAT             ;SETUP PATTERN AND NUMBER FOR TYPEOUT AND DISPLAY
 7786 023630  012701  100000                    MOV     #100000,R1              ;SET UP TEST ADDRESS
 7787 023634  005000                            CLR     R0                      ;CLEAR DATA TO BE WRITTEN
 7788 023636  004737  037740                    CALL    MAPKERNAL               ;MAP THIS TEST TO KERNEL SPACE
 7789 023642  004737  032674                    CALL    GETCSR                  ;GET CSRINFO FROM CONFIG TABLE
 7790 023646  004737  030316                    CALL    MTP037                  ;CHECK ECC DISABLE
 7791 023652  004737  040026                    CALL    UNMAP                   ;REMAP KERNEL SPACE
 7792 023656  000207                            RETURN
```

```
 7794 023660                            MT0041: SUBTST  <<MT0041        SETUP ADDRESS TO CSR ON DOUBLE BIT ERROR TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MT0041  SETUP ADDRESS TO CSR ON DOUBLE BIT ERROR TEST
                                        ;*****************************************************************************
 7795 023660  012737  000041  002300          MOV     #41,REALPAT             ;SETUP PATTERN AND NUMBER FOR TYPEOUT AND DISPLAY
 7796 023666  004737  032674                  CALL    GETCSR                  ;GET CSR NUMBER AND ADDRESS FROM CONFIGURATION TABLE
 7797 023672                                  LET SUPDOADD := #MTP041         ;SET UP TEST ADDRESS
      023672  012737  030370  002262                                                  MOV #MTP041,SUPDOADD
 7798 023700                                  LET R1 := #FIRST                ;SET UP FIRST ADDRESS
      023700  012701  060000                                                  MOV #FIRST,R1
 7799 023704                                  IF BANK EQ #177                 ;ARE WE AT BANK 177?
      023704  023727  002102  000177                                                  CMP BANK,#177
      023712  001004                                                         BNE L212
 7800 023714                                     LET PASCNT := #12.
      023714  012737  000014  002570                                                  MOV #12.,PASCNT
 7801 023722                                  ELSE
      023722  000403                                                         BR L213
      023724                                                          L212:;;;;;;
 7802 023724                                     LET PASCNT :- #16.
      023724  012737  000020  002570                                                  MOV #16.,PASCNT
 7803 023732                                  END
      023732                                                          L213:;;;;;;
 7804 023732  004737  024446                  CALL SUPD03                     ;EXECUTE ADDDRESS TO CSR TEST IN SUPVISIOR MODE
 7805 023736  000207                          RETURN                          ;
```

```
 7807 023740                            MT0042: SUBTST  <<MT0042        SETUP EXTENDED Q BUS ADDRESS TO CSR TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MT0042  SETUP EXTENDED Q-BUS ADDRESS TO CSR TEST
                                        ;*****************************************************************************
 7808 023740  012737  000042  002300          MOV     #42,REALPAT             ;SETUP PATTERN AND NUMBER FOR TYPEOUT AND DISPLAY
 7809 023746  012701  100000                  MOV     #100000,R1              ;SET UP TEST ADDRESS
 7810 023752  004737  037740                  CALL    MAPKERNAL               ;MAP TO KERNEL SPACE
 7811 023756  004737  032674                  CALL    GETCSR                  ;SET UP CSRINFO FROM CONFIGURATION TABLE
 7812 023762  004737  030542                  CALL    MTP042                  ;CHECK EXTENDED Q-BUS ADDRESS TO CSR
 7813 023766  004737  040026                  CALL    UNMAP                   ;REMAP KERNEL SPACE
 7814 023772  000207                         RETURN
```

```
 7816 023774                          MT0043: SUBTST  <<MT0043        SETUP WRITE BYTE CLEARS SBE TEST>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       MT0043  SETUP WRITE BYTE CLEARS SBE TEST
                                      ;*****************************************************************************
 7817 023774  012737  000043  002300          MOV     #43,REALPAT             ;SET UP TEST NUMBER FOR TYPEOUT AND DISPLAY
 7818 024002  004737  037740                    CALL    MAPKERNAL               ;MAP TO KERNEL SPACE
 7819 024006                                    LET R1 := #100000               ;SET UP TEST ADDRESS
      024006  012701  100000                                                            MOV #100000,R1
 7820 024012  004737  031030                    CALL MTP043                     ;PERFORM WRITE BYTE TEST
 7821 024016  004737  040026                    CALL UNMAP                      ;REMAP KERNEL SPACE
 7822 024022  000207                            RETURN
 7823 024024                          MT0044: SUBTST  <<MT0044        SETUP SHIFTING 1/0'S THROUGH THE CHECK BITS TEST>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       MT0044  SETUP SHIFTING 1/0'S THROUGH THE CHECK BITS TEST
                                      ;*****************************************************************************
 7824 024024  012737  000044  002300          MOV     #44,REALPAT             ;SET UP TEST NUMBER FOR TYPEOUT AND DISPLAY
 7825 024032  004737  032674                    CALL    GETCSR                  ;GET CSR NUMBER AND ADDRESS FROM CONFIGURATION TABLE
 7826 024036                                    LET SUPDOADD := #MTP044         ;SET UP TEST ADDRESS                            ;;IL
      024036  012737  031224  002262                                                    MOV #MTP044,SUPDOADD
 7827 024044                                    LET R1 := #FIRST                ;SET UP FIRST ADDRESS                           ;;IL
      024044  012701  060000                                                            MOV #FIRST,R1
 7828 024050                                    IF BANK EQ #177                 ;ARE WE AT BANK 177?
      024050  023727  002102  000177                                                    CMP BANK,#177
      024056  001004                                                                    BNE L214
 7829 024060                                       LET ENDADD := #120000
      024060  012737  120000  002562                                                    MOV #120000,ENDADD
 7830 024066                                    ELSE
      024066  000403                                                                    BR L215
      024070                                                                  L214:;;;;;;
 7831 024070                                       LET ENDADD := #160000
      024070  012737  160000  002562                                                    MOV #160000,ENDADD
 7832 024076                                    END
      024076                                                                  L215:;;;;;;
 7833 024076  004737  024446                    CALL SUPD03                     ;EXECUTE ADDDRESS TO CSR TEST IN SUPVISIOR MODE

 7834 024102  000207                            RETURN
 7835 024104                          MT0045: SUBTST  <<MT0045        SETUP SYNDROMES TO CSR ON DOUBLE BIT ERROR>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       MT0045  SETUP SYNDROMES TO CSR ON DOUBLE BIT ERROR
                                      ;*****************************************************************************
 7836 024104  012737  000045  002300          MOV     #45,REALPAT             ;SET UP TEST NUMBER FOR TYPEOUT AND DISPLAY
 7837 024112  004737  037740                    CALL    MAPKERNAL               ;MAP TO KERNEL SPACE
 7838 024116                                    LET R1 := #100000               ;SET UP TEST ADDRESS
      024116  012701  100000                                                            MOV #100000,R1
 7839 024122  004737  031546                    CALL MTP045                     ;PERFORM SYNDROMES TO CSR ON DOUBLE BIT ERROR
 7840 024126  004737  040026                    CALL UNMAP                      ;REMAP KERNEL SPACE
 7841 024132  000207                            RETURN                          ;
 7842 024134                          MT0046: SUBTST  <<MT0046        SETUP CHECK SINGLE BIT ERRORS WITH ECC DISABLED TET>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       MT0046  SETUP CHECK SINGLE BIT ERRORS WITH ECC DISABLED TET
                                      ;*****************************************************************************
 7843 024134  012737  000046  002300          MOV     #46,REALPAT             ;SET UP TEST NUMBER FOR TYPEOUT AND DISPLAY
 7844 024142  004737  037740                    CALL    MAPKERNAL               ;MAP TO KERNEL SPACE
 7845 024146                                    LET R1 := #100000               ;SET UP TEST ADDRESS
      024146  012701  100000                                                            MOV #100000,R1
 7846 024152  004737  031734                    CALL MTP046                     ;PERFORM TRAPS DECTECTED ON SBE WITH ECC DISABLED TE
 7847 024156  004737  040026                    CALL UNMAP                      ;REMAP KERNEL SPACE
 7848 024162  000207                            RETURN
```

```
 7849 024164                            MT0047: SUBTST  <<MT0047        SETUP NO CSR UPDATE ON SBE WITH EXSISTING DBE TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MT0047  SETUP NO CSR UPDATE ON SBE WITH EXSISTING DBE TEST
                                        ;*****************************************************************************
 7850 024164  012737  000047  002300          MOV     #47,REALPAT             ;SET UP TEST NUMBER FOR TYPEOUT AND DISPLAY
 7851 024172  004737  037740                  CALL    MAPKERNAL               ;MAP TO KERNEL SPACE
 7852 024176                                  LET R1 := #100000               ;SET UP TEST ADDRESS
      024176  012701  100000                                                          MOV #100000,R1
 7853 024202                                  LET R2 := #120000               ; "  " SECOND  TEST ADDRESS
      024202  012702  120000                                                          MOV #120000,R2
 7854 024206  004737  032274                  CALL MTP047                     ;PERFORM NO UPDATE TO CSR ON SBE WITH DBE
 7855 024212  004737  040026                  CALL UNMAP                      ;REMAP KERNEL SPACE
 7856 024216  000207                          RETURN
```

```
 7859 024220                            MT0999: SUBTST  <<MT0999        SETUP NULL TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MT0999  SETUP NULL TEST
                                        ;*****************************************************************************
 7860 024220  005037  002300                    CLR     REALPAT
 7861 024224                                    SET     NULLFLAG
      024224  012737  177777  002344                                                    MOV  #-1,NULLFLAG
 7862 024232  000207                            RETURN
 7863
 7864 024234                            KAMITEST:SUBTST <<CHECK FOR KAMIKAZE MODE>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       CHECK FOR KAMIKAZE MODE
                                        ;*****************************************************************************
 7865 024234                                    IF KAMIKAZE IS TRUE OR ACTFLAG IS TRUE OR APTFLAG IS TRUE
      024234  005737  002006                                                        TST KAMIKAZE
      024240  001006                                                                BNE L216
      024242  005737  002350                                                        TST ACTFLAG
      024246  001003                                                                BNE L216
      024250  005737  002352                                                        TST APTFLAG
      024254  001403                                                                BEQ L217
      024256                                                                L216:;;;;;;
 7866 024256                                      $RETURN NOERROR           ;RUN THE TEST
      024256  000241                                                                CLC
      024260  000207                                                                RTS PC
 7867 024262                                    ELSE
      024262  000402                                                                BR L220
      024264                                                                L217:;;;;;;
 7868 024264                                      $RETURN ERROR             ;DON'T RUN THE TEST
      024264  000261                                                                SEC
      024266  000207                                                                RTS PC
 7869 024270                                    END ;OF IF KAMIKAZE
      024270                                                                L220:;;;;;;
```

```
 7872 024270                            SUPD01: SUBTST  <<SUBR  EXECUTE PATTERN IN SUPERVISOR>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       SUBR    EXECUTE PATTERN IN SUPERVISOR
                                        ;*****************************************************************************
 7873 024270                                    MAP     BANK                    ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
      024270  010346                                                                   MOV R3,-(SP)
      024272  013703  002102                    MOV     BANK,R3
      024276  004737  035716                    CALL    MAPPER
                                                .DSABL  CRF
      024302  012603                                                                   MOV (SP)+,R3
 7874 024304  004737  051430            SUPD02: CALL    GETDIS
 7875 024310                                    PUSH    $LPERR,$LPADR
      024310  013746  002624                                                       MOV $LPERR,-(SP)
      024314  013746  002622                                                       MOV $LPADR, (SP)
 7876 024320  010037  002160                    MOV     R0,SUPDR0
 7877 024324  012700  002162                    MOV     #SUPDR1,R0
 7878 024330  010120                            MOV     R1,(R0)+
 7879 024332  010220                            MOV     R2,(R0)+
 7880 024334  010320                            MOV     R3,(R0)+
 7881 024336  010420                            MOV     R4,(R0)+
 7882 024340  010520                            MOV     R5,(R0)+
 7883 024342  010620                            MOV     SP,(R0)+
 7884 024344  013700  002160                    MOV     SUPDR0,R0
 7885 024350  012737  024364  002622            MOV     #TAG4$,$LPADR
 7886 024356  013737  002622  002624            MOV     $LPADR,$LPERR
 7887 024364  012700  002176            TAG4$:  MOV     #SUPDR6+2,R0
 7888 024370  014006                            MOV     -(R0),SP
 7889 024372  014005                            MOV     -(R0),R5
 7890 024374  014004                            MOV     -(R0),R4
 7891 024376  014003                            MOV     -(R0),R3
 7892 024400  014002                            MOV     -(R0),R2
 7893 024402  014001                            MOV     -(R0),R1
 7894 024404  014000                            MOV     -(R0),R0
 7895 024406                                    SUPERVISOR              ;ENTER SUPERVISOR MODE
      024406  052737  040000  177776            BIS     #BIT14,PSW                      ;GO TO SUPERVISOR MODE
                                                .DSABL  CRF
 7896 024414  012706  000740                    MOV     #SUPSTK,SSP
 7897 024420  104424                            CACHOFF                 ;TURN CACHE OFF
 7898 024422  004737  177640                    CALL    FASTCITY                ;CALL TO THE USER INSTRUCTION PAR'S
 7899 024426  104423                            CACHON                  ;TURN CACHE ON
 7900 024430  104417                            KERNEL                  ;ENTER KERNEL MODE
 7901 024432  000004                            SCOPE
 7902 024434                                    POP     $LPADR,$LPERR
      024434  012637  002622                                                       MOV (SP)+,$LPADR
      024440  012637  002624                                                       MOV (SP)+,$LPERR
 7903 024444  000207                            RETURN
```

```
                                SUPD03: MAP     BANK                    ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
 024446 010346                                                                  MOV R3,-(SP)
 024450 013703 002102                   MOV     BANK,R3
 024454 004737 035716                   CALL    MAPPER
                                        .DSABL  CRF
 024460 012603                                                                  MOV (SP)+,R3
7907 024462 004737 051430       SUPD04: CALL    GETDIS
7908 024466                             PUSH    $LPERR,$LPADR
 024466 013746 002624                                                           MOV $LPERR, (SP)
 024472 013746 002622                                                           MOV $LPADR,-(SP)
7909 024476 010037 002160               MOV     R0,SUPDR0
7910 024502 012700 002162               MOV     #SUPDR1,R0
7911 024506 010120                      MOV     R1,(R0)+
7912 024510 010220                      MOV     R2,(R0)+
7913 024512 010320                      MOV     R3,(R0)+
7914 024514 010420                      MOV     R4,(R0)+
7915 024516 010520                      MOV     R5,(R0)+
7916 024520 010620                      MOV     SP,(R0)+
7917 024522 013700 002160               MOV     SUPDR0,R0
7918 024526 012737 024542 002622        MOV     #TBG4$,$LPADR
7919 024534 013737 002622 002624        MOV     $LPADR,$LPERR
7920 024542 012700 002176       TBG4$:  MOV     #SUPDR6+2,R0
7921 024546 014006                      MOV     -(R0),SP
7922 024550 014005                      MOV     -(R0),R5
7923 024552 014004                      MOV     -(R0),R4
7924 024554 014003                      MOV     -(R0),R3
7925 024556 014002                      MOV     -(R0),R2
7926 024560 014001                      MOV     -(R0),R1
7927 024562 014000                      MOV     -(R0),R0
7928 024564                             TESTAREA                        ;ENTER SUPERVISOR MODE
 024564 053737 002552 177776            BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                        .DSABL  CRF
7929 024572 005737 002456               TST     NOSUPER
7930 024576 001403                      BEQ     1$
7931 024600 012706 000700               MOV     #USESTK,USP
7932 024604 000402                      BR      2$
7933 024606 012706 000740       1$:     MOV     #SUPSTK,SSP
7934 024612 104424              2$:     CACHOFF                         ;TURN CACHE OFF
7935 024614 004777 155442               CALL    @SUPDOADD
7936 024620 104423                      CACHON                          ;TURN CACHE ON
7937 024622 104417                      KERNEL                          ;ENTER KERNEL MODE
7938 024624 000004                      SCOPE
7939 024626                             POP     $LPADR,$LPERR
 024626 012637 002622                                                           MOV (SP)+,$LPADR
 024632 012637 002624                                                           MOV (SP)+,$LPERR
7940 024636 000207                      RETURN
```

```
                                .SBTTL  MEMORY TEST PATTERN ROUTINES
                        ;*******************************************************************************
                        ; PATTERN REGISTER CONVENTIONS
                        ;       R0      FIRST ADDRESS OF PATTERN (FIRST,LAST+2,ETC)
                        ;       R1      NUMBER OF ADDRESSES IN PATTERN (SIZE)
                        ;       R2      DATA FOR PATTERN (ONES,52525,ETC)
                        ;       R3      COPY OF R1 (IF NECESSARY)
                        ;       R4      COPY OF R0 (IF NECESSARY)
                        ;       R5      COPY OF R2 (IF NECESSARY)
                        ;*******************************************************************************
024640                  MTP000: SUBTST  <<MTP000        BASIC DATA TEST>>
                        ;*******************************************************************************
                        ;*SUBTEST       MTP000  BASIC DATA TEST
                        ;*******************************************************************************
024640  010220          1$:     MOV     R2,(R0)+        ;V177640
024642  077102                  SOB     R1,MTP000       ;V177642
024644  000240                  NOP                     ;V177644
024646  012401          2$:     MOV     (R4)+,R1        ;V177646
024650  020102                  CMP     R1,R2           ;V177650
024652  001402                  BEQ     3$              ;V177652
024654  104430                  PERR02                  ;V177654
024656  000240                  NOP                     ;V177656
024660  077306          3$:     SOB     R3,2$           ;V177660
024662  000207                  RETURN                  ;V177662
024664                  MTP001: SUBTST  <<MTP001        ADDRESS TEST>>
                        ;*******************************************************************************
                        ;*SUBTEST       MTP001  ADDRESS TEST
                        ;*******************************************************************************
024664  010220          3$:     MOV     R2,(R0)+        ;V177640
024666  062702  000002          ADD     #2,R2           ;V177642
024672  077104                  SOB     R1,3$           ;V177646
024674  000240                  NOP                     ;V177650
024676  012400          1$:     MOV     (R4)+,R0        ;V177652
024700  020005                  CMP     R0,R5           ;V177654
024702  001401                  BEQ     2$              ;V177656
024704  104427                  PERR01                  ;V177660
024706  062705  000002  2$:     ADD     #2,R5           ;V177662
024712  077307                  SOB     R3,1$           ;V177666
024714  000207                  RETURN                  ;V177672
024716                  MTP002: SUBTST  <<MTP002        COMPLEMENT ADDRESS TEST (WRITE DOWN, READ UP)>>
                        ;*******************************************************************************
                        ;*SUBTEST       MTP002  COMPLEMENT ADDRESS TEST (WRITE DOWN, READ UP)
                        ;*******************************************************************************
024716  010540          3$:     MOV     R5,-(R0)        ;V177640
024720  062705  000002          ADD     #2,R5           ;V177642
024724  077104                  SOB     R1,3$           ;V177646
024726  000240                  NOP                     ;V177650
024730  162702  000002  1$:     SUB     #2,R2           ;V177652
024734  012401                  MOV     (R4)+,R1        ;V177656
024736  020102                  CMP     R1,R2           ;V177660
024740  001401                  BEQ     2$              ;V177662
024742  104430                  PERR02                  ;V177664
024744  077307          2$:     SOB     R3,1$           ;V177666
024746  000207                  RETURN                  ;V177670
```

```
 7990 024750                          MTPA03: SUBTST  <<MTPA03        3 XOR 9 WORST CASE NOISE TEST (WRITE)>>
                                      ;*****************************************************************************
                                      ;*SUBTEST        MTPA03  3 XOR 9 WORST CASE NOISE TEST (WRITE)
                                      ;*****************************************************************************
 7991                                         ;R1 = ADDRESS
 7992                                         ;R2 = SMALL LOOP CONSTANT
 7993                                         ;R3 = NUM OF ADD TO TEST (LARGE LOOP)
 7994                                         ;R4 = GOOD DATA
 7995                                         ;R5 = MEDIUM LOOP CONSTANT
 7996                                         .ENABL  LSB
 7997 024750  010421                 1$:     MOV     R4,(R1)+        ;V177640
 7998 024752  010421                         MOV     R4,(R1)+        ;V177642
 7999 024754  077203                         SOB     R2,1$           ;V177644
 8000 024756  005104                         COM     R4              ;V177646
 8001 024760  052704                         BIS     (PC)+,R4        ;V177650
 8002 024762  000401                 WARN2:  401                     ;V177652 WARNING LOCATION IS MODIFIED BEFORE LOADING
 8003 024764  012702  000004                 MOV     #4,R2           ;V177654
 8004 024770  077511                         SOB     R5,1$           ;V177660
 8005 024772  005104                         COM     R4              ;V177662
 8006 024774  052704                         BIS     (PC)+,R4        ;V177664
 8007 024776  000401                 WARN3:  401                     ;V177666 WARNING LOCATION IS MODIFIED BEFORE LOADING
 8008 025000  012705  000100                 MOV     #64.,R5         ;V177670
 8009 025004  077317                         SOB     R3,1$           ;V177674
 8010 025006  000207                         RETURN                  ;V177676
 8011                                        .DSABL  LSB
 8012
 8013 025010                          MTPB03: SUBTST  <<MTPB03        3 XOR 9 WORST CASE NOISE TEST (READ)>>
                                      ;*****************************************************************************
                                      ;*SUBTEST        MTPB03  3 XOR 9 WORST CASE NOISE TEST (READ)
                                      ;*****************************************************************************
 8014                                        .ENABL  LSB
 8015 025010  000137  025050         1$:     JMP     @#MTPC03        ;V177640        GO TO V172360
 8016 025014  077203                         SOB     R2,1$           ;V177644
 8017 025016  005104                         COM     R4              ;V177646
 8018 025020  052704                         BIS     (PC)+,R4        ;V177650
 8019 025022  000401                 WARN4:  401                     ;V177652 WARNING LOCATION IS MODIFIED BEFORE LOADING
 8020 025024  012702  000004                 MOV     #4,R2           ;V177654
 8021 025030  077511                         SOB     R5,1$           ;V177660
 8022 025032  005104                         COM     R4              ;V177662
 8023 025034  052704                         BIS     (PC)+,R4        ;V177664
 8024 025036  000401                 WARN5:  401                     ;V177666 WARNING LOCATION IS MODIFIED BEFORE LOADING
 8025 025040  012705  000100                 MOV     #64.,R5         ;V177670
 8026 025044  077317                         SOB     R3,1$           ;V177674
 8027 025046  000207                         RETURN                  ;V177676
 8028                                        .DSABL  LSB
```

```
 8031 025050                        MTPC03: SUBTST  <<MTPC03        TEST DATA SUBPROGRAM>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       MTPC03  TEST DATA SUBPROGRAM
                                    ;*****************************************************************************
 8032 025050  020421                        CMP     R4,(R1)+        ;V172360
 8033 025052  001401                        BEQ     1$              ;V172362
 8034 025054  104431                        PERR03                  ;V172364
 8035 025056  005141                1$:     COM     -(R1)           ;V172366
 8036 025060  005111                        COM     (R1)            ;V172370
 8037 025062  000137  025066                JMP     @#MTPD03        ;V172372        GO TO V172260
 8038
 8039 025066                        MTPD03: SUBTST  <<MTPD03        TEST DATA SUBSUBPROGRAM>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       MTPD03  TEST DATA SUBSUBPROGRAM
                                    ;*****************************************************************************
 8040 025066  020421                        CMP     R4,(R1)+        ;V172260
 8041 025070  001401                        BEQ     1$              ;V172262
 8042 025072  104431                        PERR03                  ;V172264
 8043 025074  005127                1$:     COM     (PC)+           ;V172266
 8044 025076  000000                        0                       ;V172270
 8045 025100  001363                        BNE     MTPC03          ;V172272        GO TO V172360
 8046 025102  000137  025014                JMP     @#MTPB03+4      ;V172274        GO TO V177644
```

```
 8049 025106                            MTPA04: SUBTST  <<MTPA04        ROTATING ZEROS TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MTPA04  ROTATING ZEROS TEST
                                        ;*****************************************************************************
 8050 025106  012705  000010            1$:     MOV     #8.,R5          ;V177640
 8051 025112  010504                            MOV     R5,R4           ;V177644
 8052 025114  000241                            CLC                     ;V177646
 8053 025116  000137  025142                    JMP     @#MTPB04        ;V177650
 8054 025122  016004  177776                    MOV     -2(R0),R4       ;V177654
 8055 025126  103402                            BCS     2$              ;V177660
 8056 025130  020204                            CMP     R2,R4           ;V177662
 8057 025132  001401                            BEQ     3$              ;V177664
 8058 025134  104432                    2$:     PERR04                  ;V177666
 8059 025136  077115                    3$:     SOB     R1,1$           ;V177670
 8060 025140  000207                            RETURN                  ;V177672
 8061
 8062 025142                            MTPB04: SUBTST  <<MTPB04        SUBR    ROTATING BIT>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MTPB04  SUBR    ROTATING BIT
                                        ;*****************************************************************************
 8063 025142  106110                    1$:     ROLB    (R0)            ;V172360
 8064 025144  077502                            SOB     R5,1$           ;V172362
 8065 025146  106120                            ROLB    (R0)+           ;V172364
 8066 025150  106110                    2$:     ROLB    (R0)            ;V172366
 8067 025152  077402                            SOB     R4,2$           ;V172370
 8068 025154  106120                            ROLB    (R0)+           ;V172372
 8069 025156  000137  025122                    JMP     @#MTPA04+14     ;V172374
 8070
 8071 025162                            MTP005: SUBTST  <<MTP005        ROTATION ONES TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MTP005  ROTATION ONES TEST
                                        ;*****************************************************************************
 8072 025162  012705  000010            1$:     MOV     #8.,R5          ;V177640
 8073 025166  010504                            MOV     R5,R4           ;V177644
 8074 025170  000261                            SEC                     ;V177646
 8075 025172  000137  025142                    JMP     @#MTPB04        ;V177650
 8076 025176  016004  177776                    MOV      2(R0),R4       ;V177654
 8077 025202  103002                            BCC     2$              ;V177660 IF THIS HAPPENS THE GOOD & BAD MATCH
 8078 025204  020204                            CMP     R2,R4           ;V177662
 8079 025206  001401                            BEQ     3$              ;V177664
 8080 025210  104432                    2$:     PERR04                  ;V177666
 8081 025212  077115                    3$:     SOB     R1,1$           ;V177670
 8082 025214  000207                            RETURN                  ;V177672
```

```
 8085 025216                            MTP006: SUBTST  <<MTP006        INITIAL DATA TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MTP006  INITIAL DATA TEST
                                        ;*****************************************************************************
 8086                                                   ;       THIS TEST CHECKS THE DI/DO LINES BY
 8087                                                   ;       SHIFTING A 1 THROUGH THE WORD.
 8088 025216  012737  000001  002242          MOV     #1,DATBUF       ;SET THE FIRST TEST BIT
 8089 025224  005037  002244                  CLR     DATBUF+2        ;CLEAR 2ND WORD
 8090 025230  013771  002242  000000  1$:     MOV     DATBUF,@(R1)    ;WRITE TEST WORD 1
 8091 025236  013771  002244  000002          MOV     DATBUF+2,@2(R1) ;AND TEST WORD 2
 8092 025244  017102  000000                  MOV     @(R1),R2
 8093 025250  023702  002242                  CMP     DATBUF,R2       ;NOW READ THEM
 8094 025254  001401                          BEQ     2$              ;BR IF FIRST 16 OK
 8095 025256  104433                          PERR07                  ;ERROR TRAP
 8096
 8097 025260  017102  000002          2$:     MOV     @2(R1),R2
 8098 025264  023702  002244                  CMP     DATBUF+2,R2     ;NOW READ SECOND WORD
 8099 025270  001401                          BEQ     3$              ;BR IF OK
 8100 025272  104434                          PERR10                  ;ERROR TRAP
 8101
 8102 025274  005737  002244          3$:     TST     DATBUF+2        ;HAS LAST BIT BEEN TESTED ?
 8103 025300  100405                          BMI     4$              ;MINUS MEANS BIT 31
 8104 025302                                  DLEFT   DATBUF          ;NO, SHIFT TEST BIT LEFT
      025302  006137  002242                  ROL     DATBUF
      025306  006137  002244                  ROL     DATBUF+2
                                               .DSABL  CRF
 8105 025312  000746                          BR      1$              ;GO WRITE NEW TEST DATA
 8106                                                                 ;NOW GOING TO SHIFT A 0 IN DATA DIRECTION
 8107 025314  012737  177776  002242  4$:     MOV     #177776,DATBUF  ;PUT A 0 IN BIT 0
 8108 025322  012737  177777  002244          MOV     #-1, DATBUF+2   ;AND 1'S IN ALL OTHERS
 8109 025330  013771  002242  000000  5$:     MOV     DATBUF,@(R1)    ;WRITE THE DATA
 8110 025336  013771  002244  000002          MOV     DATBUF+2,@2(R1) ;2 WORDS WORTH
 8111 025344  017102  000000                  MOV     @(R1),R2
 8112 025350  023702  002242                  CMP     DATBUF,R2       ;NOW READ FIRST WORD
 8113 025354  001401                          BEQ     6$              ;BR IF OK
 8114 025356  104433                          PERR07
 8115
 8116 025360  017102  000002          6$:     MOV     @2(R1),R2
 8117 025364  023702  002244                  CMP     DATBUF+2,R2     ;NOW, READ SECOND WORD
 8118 025370  001401                          BEQ     7$              ;BR IF OK
 8119 025372  104434                          PERR10
 8120
 8121 025374  005737  002244          7$:     TST     DATBUF+2        ;TESTED BIT 31 YET?
 8122 025400  100005                          BPL     8$              ;BR IF YES, WE'RE DONE
 8123 025402                                  DLEFT   DATBUF
      025402  006137  002242                  ROL     DATBUF
      025406  006137  002244                  ROL     DATBUF+2
                                               .DSABL  CRF
 8124 025412  000746                          BR      5$              ;KEEP GOING
 8125 025414  000207                  8$:     RETURN
```

```
 8128 025416                        MTP007: SUBTST  <<MTP007        ADDRESS BIT TEST>>
                                    ;*****************************************************************************
                                    ;*SUBTEST        MTP007  ADDRESS BIT TEST
                                    ;*****************************************************************************
 8129                                       ;       THIS TEST CHECKS TO SEE THAT EACH ADDRESS
 8130                                       ;       BIT IN EACH 16K BANK CAN BE ASSERTED UNIQUELY.
 8131                                       ;       IT CHECKS FOR ADDRESS BITS THAT MAY BE STUCK
 8132                                       ;       HIGH, STUCK LOW OR STUCK TOGETHER.
 8133 025416  111100                        MOVB    (R1),R0
 8134 025420  105700                        TSTB    R0              ;READ AND COMPARE FOR ZEROS
 8135 025422  001401                        BEQ     1$              ;BR IF OK
 8136 025424  104435                        PERR11
 8137
 8138 025426  105111                1$:     COMB    (R1)            ;COMPLEMENT THE BYTE
 8139 025430  111100                        MOVB    (R1),R0
 8140 025432  105700                        TSTB    R0              ;READ FOR NON ZEROS
 8141 025434  001001                        BNE     2$              ;BR IF OK
 8142 025436  104436                        PERR12
 8143
 8144 025440  040201                2$:     BIC     R2,R1           ;MASK OFF THE ASSERTED BIT
 8145 025442  006302                        ASL     R2              ;SHIFT R2 FOR NEXT BIT
 8146 025444  050201                        BIS     R2,R1           ;SET THE NEW BIT INTO R1
 8147 025446  011100                        MOV     (R1),R0
 8148 025450  005700                        TST     R0              ;READ THE NEW ADDRESS
 8149 025452  001401                        BEQ     3$              ;READ FOR ZEROS
 8150 025454  104437                        PERR13
 8151
 8152 025456  005111                3$:     COM     (R1)            ;COMPL THE WORD
 8153 025460  011100                        MOV     (R1),R0
 8154 025462  005700                        TST     R0              ;READ IT AGAIN
 8155 025464  001001                        BNE     4$
 8156 025466  104440                        PERR14
 8157
 8158 025470  022702  100000        4$:     CMP     #100000,R2
 8159 025474  001407                        BEQ     5$
 8160 025476  022702  010000                CMP     #10000,R2       ;CHECK FOR MSB IN 4K BANK
 8161 025502  001356                        BNE     2$              ;NOT LAST BIT, BRANCH
 8162 025504  006302                        ASL     R2
 8163 025506  012701  160000                MOV     #160000,R1
 8164 025512  000752                        BR      2$
 8165 025514  000207                5$:     RETURN
```

```
 8168 025516                            MTP010: SUBTST  <<MTP010        BYTE ADDRESSING TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MTP010  BYTE ADDRESSING TEST
                                        ;*****************************************************************************
 8169                                                   ;TEST 3 THIS TEST CHECKS FOR PROPER
 8170                                                   ;       BYTE ADDRESSING WITH ECC DISABLED
 8171 025516  010402                            MOV     R4,R2           ;R4 HAS LOWEST ADDRESS
 8172 025520  010403                            MOV     R4,R3           ;PUT IT IN R3 ALSO
 8173 025522  062702  000004                    ADD     #4,R2           ;POINT R2 TO LAST BYTE +1
 8174 025526  012713  177777                    MOV     # 1,(R3)        ;WRITE ALL ONES IN
 8175 025532  012763  177777  000002            MOV     #-1,2(R3)       ;THE 4 TEST BYTES
 8176 025540  105013                    1$:     CLRB    (R3)            ;CLEAR A BYTE
 8177 025542  010401                            MOV     R4,R1           ;INITIALIZE R1 FOR EACH PASS
 8178 025544  020201                    2$:     CMP     R2,R1           ;IF EQUAL, JUST READ LAST BYTE
 8179 025546  001420                            BEQ     6$              ;BR IF EQUAL
 8180 025550  020301                            CMP     R3,R1           ;IS THIS THE BYTE OF ZEROS
 8181 025552  001007                            BNE     4$              ;BR IF NOT
 8182 025554  111100                            MOVB    (R1),R0
 8183                                           ;WARNING IF YOU OPTOMIZE CHANGE THE PCBUMP FOR THIS ERROR INCASE OF TRAPS
 8184 025556  022700  000000                    CMP     #0,R0           ;IT IS, COMPARE FOR ZEROS
 8185 025562  001401                            BEQ     3$
 8186 025564  104435                            PERR11
 8187
 8188 025566  005201                    3$:     INC     R1              ;NEXT BYTE
 8189 025570  000765                            BR      2$              ;RETURN
 8190 025572  111100                    4$:     MOVB    (R1),R0
 8191 025574  122700  177777                    CMPB    #-1,R0          ;ITS NOT THE BYTE OF 0'S, READ 1'S
 8192 025600  001401                            BEQ     5$
 8193 025602  104436                            PERR12
 8194
 8195 025604  005201                    5$:     INC     R1              ;MOVE TO NEXT BYTE
 8196 025606  000756                            BR      2$
 8197 025610  112713  177777            6$:     MOVB    #-1,(R3)        ;RESTORE 1'S TO BYTE JUST TESTED
 8198 025614  005203                            INC     R3              ;INC TO NEXT BYTE
 8199 025616  020302                            CMP     R3,R2           ;WAS THAT JUST THE LAST ONE?
 8200 025620  001347                            BNE     1$              ;BR IF NO
 8201 025622  000207                            RETURN
 8202
```

```
 8205 025624                        MTP014: SUBTST  <<MTP014        BASIC DOUBLE BIT ERROR TEST>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       MTP014  BASIC DOUBLE BIT ERROR TEST
                                    ;*****************************************************************************
 8206                               ;
 8207                               ; THIS TEST CHECKS THAT A DOUBLE ERROR WILL BE DETECTED
 8208                               ; A BYTE WRITE WITH A DOUBLE ERROR ON A MSV11-P
 8209                               ; WILL BE ABOTRED.
 8210                               ;
 8211 025624  104424                       CACHOFF                 ;TURN OFF CACHE
 8212 025626                               LET PARCNT := #0        ;CLEAR PARCNT
      025626  005037  002072                                                        CLR PARCNT
 8213 025632                               LET NOPAR := #1         ;SET PARITY ACTION
      025632  012737  000001  002076                                                MOV #1,NOPAR
 8214 025640                               LET ADDRESS := #FIRST   ;SET ADDRESS FOR ERROR REPORT
      025640  012737  060000  002034                                                MOV #FIRST,ADDRESS
 8215 025646  104513                       CBREG                   ;ENABLE CHECK/SYNDROME BIT REGISTER
 8216 025650                               LET CSR := #3145        ;DBE CHECK BITS FOR CSR
      025650  012737  003145  002150                                                MOV #3145,CSR
 8217 025656  104425                       LOADCSR                 ;WRITE DBE CHECK BITS TO CSR
 8218 025660                               LET GOOD := #103145     ·GOOD DATA
      025660  012737  103145  002044                                                MOV #103145,GOOD
 8219 025666                               LET (R1) := #0          ;WRITE ZEROS AND DBL ERROR CHK BITS A=0
      025666  005011                                                                CLR (R1)
 8220 025670  005711                       TST (R1)                ;READ A=0 TO GET DOUBLE BIT ERROR
 8221 025672                               IF PARCNT NE #1         ;WAS BUSPBL ASSERTED????
      025672  023727  002072  000001                                                CMP PARCNT,#1
      025700  001401                                                               BEQ L221
 8222 025702  104055                          ERROR +55            ;ERROR CALL ;;MISSED EXPECTED TRAP
 8223 025704                               END                     ;
      025704                                                                 L221:;;;;;;
 8224 025704  104426                       READCSR                 ;READ CSR FOR CORRECT CHECK BITS AND DBE INDICATOR
 8225 025706  042737  020000  002150       BIC #BIT13,CSR          ;CLEAR INHIBIT MODE POINTER FROM DATA IF IT EXSISTS1
 8226 025714                               IF CSR NE GOOD THEN     ;CHECK IF DOUBLE ERROR BIT IS SET
      025714  023737  002150  002044                                                CMP CSR,GOOD
      025722  001407                                                               BEQ L222
 8227 025724                                  SET HEADER           ;
      025724  012737  177777  002612                                                MOV  #-1,HEADER
 8228 025732                                  LET BAD := CSR       ;BAD DATA
      025732  013737  002150  002052                                                MOV CSR,BAD
 8229 025740  104065                          ERROR +65            ;
 8230 025742                               END                     ;
      025742                                                                 L222:;;;;;;
 8231 025742  104473                       ECC1INIT                ;ENABLE BUSPBL
 8232 025744  005037  002266               CLR PASSNO              ;CLEAR LOOP COUNTER
 8233 025750                               REPEAT                  ;
      025750                                                                 B31:;;;;;;
 8234 025750  104473                         ECC1INIT              ;ENABLE BUSPBL
 8235 025752  005237  002266                 INC PASSNO            ;INCREMENT LOOP COUNTER
 8236 025756  005037  002072                 CLR PARCNT            ;CLEAR PARITY ACTION COUNTER
 8237 025762                                 LET (R1) :B= #377     ;WRITE BYTE SHOULD BE ABORTED
      025762  112711  000377                                                        MOVB #377,(R1)
 8238 025766  105711                         TSTB (R1)             ;READ R1 TO SEE IF IT IS STILL 0
 8239 025770                                 IF PARCNT NE #1       ;WAS WRITE ABORTED???
      025770  023727  002072  000001                                                CMP PARCNT,#1
      025776  001411                                                               BEQ L223
 8240 026000                                    SET HEADER         ;
```

```
      026000  012737  177777  002612                                                  MOV  #-1,HEADER
 8241 026006                          LET GOOD := #0      ;GOOD DATA
      026006  005037  002044                                                          CLR GOOD
 8242 026012                          LET BAD := #377     ;BAD DATA
      026012  012737  000377  002052                                                  MOV #377,BAD
 8243 026020  104056                  ERROR +56           ;
 8244 026022                        END                   ;
      026022                                                              L223:;;;;;;
 8245 026022  005201                  INC   R1            ;AND REPEAT ON HIGH BYTE
 8246 026024                        UNTIL PASSNO EQ #2    ;
      026024  023727  002266  000002                                                  CMP PASSNO,#2
      026032  001346                                                                 BNE B31
      026034                                                            E31:;;;;;;
 8247 026034  005041                CLR     -(R1)         ;CLEAR LUT
 8248 026036  104503                CLR1CSR               ;CLEAR CSR
 8249 026040  005037  002072        CLR     PARCNT        ;CLEAR PARITY TRAP COUNTER
 8250 026044  104423                CACHON                ;TURN ON CACHE
 8251 026046  000207                RETURN                ;
 8252
```

```
 8255 026050                        MTP017: SUBTST  <<MTP017        HOLDING 1'S & 0'S TEST>>
                                    ;*****************************************************************************
                                    ;*SUBTEST        MTP017  HOLDING 1'S & 0'S TEST
                                    ;*****************************************************************************
 8256                                       ;*(1)   THIS TEST CHECKS THE MEMORY FOR THE CAPABILITY
 8257                                       ;*      OF HOLDING 1'S AND 0'S BY WRITING A BACKGROUND
 8258                                       ;*      OF 000377 AND READING IT
 8259                                       ;*(2)   MEMORY IS WRITTEN USING A BYTE AT A TIME
 8260                                       ;*(3)   STEPS 1 & 2 ARE REPEATED WITH A SWAPPED BACKGROUND PATTERN
 8261                                       ;NOTE:  THIS TEST WRITES BYTES & READS WORDS
 8262 026050  012701  060000               MOV     #FIRST,R1
 8263 026054  010104                       MOV     R1,R4
 8264 026056  012705  160000               MOV     #LAST+2,R5
 8265 026062  012700  000377               MOV     #377,R0         ;GET THE PATTERN INTO R0
 8266 026066  010003                       MOV     R0,R3
 8267 026070  000303                       SWAB    R3
 8268 026072  110021                1$:    MOVB    R0,(R1)+        ;WRITE A BYTE
 8269 026074  110321                       MOVB    R3,(R1)+        ;WRITE THE MEMORY WITH THE BYTE STORED IN BAKPAT+1
 8270 026076  020105                       CMP     R1,R5           ;COMPARE TEST LOC TO TOP + 2
 8271 026100  103774                       BLO     1$              ;BRANCH IF LOWER
 8272
 8273 026102  014102                2$:    MOV     -(R1),R2
 8274 026104  020002                       CMP     R0,R2           ;TEST THE MEMORY TO SEE IF IT CONTAINS
 8275                                                               ;THE WORD STORED IN BAKPAT
 8276 026106  001401                       BEQ     3$
 8277 026110  104446                       PERR22
 8278
 8279 026112  020104                3$:    CMP     R1,R4           ;KEEP ON TESTIN , THE MEMORY UNTIL
 8280 026114  101372                       BHI     2$              ;R1 EQUALS THE LOWEST ADDRESS
 8281 026116  000303                       SWAB    R3              ;CHANGE THE DATA PATTERN
 8282 026120  000300                       SWAB    R0
 8283 026122  001763                       BEQ     1$              ;IF THE DATA PATTERN DOES NOT HAVE LOW
 8284                                                               ; BYTE =0 THEN FALL THRU
 8285 026124  000207                       RETURN
 8287
```

```
 8289 026126                        MTP020: SUBTST  <<MTP020        SYNDROMES TO CSR ON SINGLE BIT ERROR TEST>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       MTP020  SYNDROMES TO CSR ON SINGLE BIT ERROR TEST
                                    ;*****************************************************************************
 8290                                       ;
 8291                                       ;  THIS TEST CHECKS TO SEE IF THE SINGLE BIT ERRORS CAUSE THE SBE
 8292                                       ;  BIT IN THE CSR TO BE SET AND CORRECT SYNDROME BITS ARE GENERATED FOR
 8293                                       ;  ALL 16 DATA BITS.
 8294                                       ;
 8295 026126  104424                       CACHOFF                          ;TURN OFF CACHE
 8296 026130  005000                       CLR  R0                          ;CLEAR DATA
 8297 026132  105037  002264                CLRB PASFLG                      ;CLEAR PASFLG
 8298 026136  104513                       CBREG                            ;ENABLE CHECK/SYNDROME BIT REGISTER
 8299 026140                               REPEAT                           ;
      026140                                                                                  B32:;;;;;;
 8300 026140                                 LET PASFLG :B- PASFLG + #1     ;INCREMENT LOOP COUNTER
      026140  105237  002264                                                                 INCB PASFLG
 8301 026144                                 LET R4  := #-1                 ;INDEX TO SINGLE BIT ERROR TABLE
      026144  012704  177777                                                                 MOV #-1,R4
 8302 026150                                 LET BITNO := #0                ;CLEAR INNER LOOP COUNTER
      026150  005037  002324                                                                 CLR BITNO
 8303 026154                                 IFB PASFLG EQ #1               ;SELECT DATA TO BE CORRECTED BY PASSNO
      026154  123727  002264  000001                                                         CMPB PASFLG,#1
      026162  001003                                                                         BNE L225
 8304 026164                                   LET R5 := #1                 ;DATA-.;BIT TO BE CORRECTED IS A ONE
      026164  012705  000001                                                                 MOV #1,R5
 8305 026170                                 ELSE                           ;
      026170  000402                                                                         BR L226
      026172                                                                        L225:;;;;;;
 8306 026172                                   LET R5 := #177776            ;DATA=177776;BIT TO BE CORRECTED IS A ZERO
      026172  012705  177776                                                                 MOV #177776,R5
 8307 026176                                 END                            ;
      026176                                                                           L226:;;;;;;
 8308 026176                                 REPEAT                         ;
      026176                                                                           B33:;;;;;;
 8309 026176  005237  002324                   INC BITNO                    ;INCREMENT BIT POINTER
 8310 026202                                   LET R4 := R4 + #1            ;POINT TO NEXT SET OF CHECK BITS
      026202  005204                                                                         INC R4
 8311 026204                                   LET R2 :B= PTABLE(R4)        ;GET NEXT SET OF CHECK BITS
      026204  116402  030276                                                                 MOVB PTABLE(R4),R2
 8312 026210  072227  000005                   ASH #5,R2                    ;SHIFT TO LINE UP IN CSR
 8313 026214  052702  000004                   BIS #BIT2,R2                 ;ENABLE DIAG MODE
 8314 026220                                   LET CSR := R2                ;GET CHECK BITS TO BE WRITTEN
      026220  010237  002150                                                                 MOV R2,CSR
 8315 026224  104425                           LOADCSR                      ;LOAD CSR WITH DATA
 8316 026226                                   LET (R1) := R0               ;WRITE DATA TO TEST ADDRESS
      026226  010011                                                                         MOV R0,(R1)
 8317 026230  104503                           CLR1CSR                      ;CLEAR CSR
 8318 026232  005711                           TST (R1)                     ;CORRECT SBE
 8319 026234  104426                           READCSR                      ;READ CSR FOR CORRECT SBE BIT AND SYNDROMES
 8320 026236  042737  177757  002150           BIC #^C20,CSR                ;CLEAR ALL BUT SBE INDICATOR
 8321 026244                                   IF CSR NE #20                ;WAS DATA CORRECTED???
      026244  023727  002150  000020                                                         CMP CSR,#20
      026252  001407                                                                         BEQ L227
 8322 026254                                     LET GOOD := #20            ;
      026254  012737  000020  002044                                                         MOV #20,GOOD
 8323 026262                                     LET BAD := CSR             ;
```

```
      026262  013737  002150  002052                                                  MOV CSR,BAD
 8324 026270  104060                          ERROR +60                ;NO ERROR
 8325 026272                                  END                      ;
      026272                                                                  L227:;;;;;;
 8326 026272  104514                          SYNREG                   ;ENABLE SYNDROME BIT REGISTER
 8327 026274  104426                          READCSR                  ;GET SYNDROMES FROM CSR
 8328 026276  042737  174033  002150          BIC #^C3744,CSR          ;MASK SYNDROME BITS
 8329 026304                                  LET R3 :B= SBESYN(R4)    ;GET GOOD SYNDROMES
      026304  116403  026422                                                  MOVB SBESYN(R4),R3
 8330 026310  072327  000005                  ASH #5,R3                ;SHIFT INTO POSITION
 8331 026314  052703  000004                  BIS #BIT2,R3             ;SET DIAG MODE IN DATA
 8332 026320                                  IF R3 NE CSR             ;DO SYNDROME BITS AGREE
      026320  020337  002150                                                  CMP R3,CSR
      026324  001411                                                          BEQ L230
 8333 026326                                     SET HEADER            ;
      026326  012737  177777  002612                                          MOV  #-1,HEADER
 8334 026334                                     LET GOOD :- R3        ;
      026334  010337  002044                                                  MOV R3,GOOD
 8335 026340                                     LET BAD := CSR        ;
      026340  013737  002150  002052                                          MOV CSR,BAD
 8336 026346  104042                             ERROR +42             ;
 8337 026350                                  END                      ;
      026350                                                                  L230:;;;;;;
 8338 026350  005011                          CLR (R1)                 ;CLEAR LUT
 8339 026352                                  IFB PASFLG EQ #1         ;SHIFT NEW DATA DEPENDING ON PASFLG
      026352  123727  002264  000001                                          CMPB PASFLG,#1
      026360  001002                                                          BNE L231
 8340 026362  006305                             ASL  R5               ;SHIFT BITNO TO THE LEFT
 8341 026364                                  ELSE                     ;
      026364  000402                                                          BR L232
      026366                                                                  L231:;;;;;;
 8342 026366  000261                             SEC                   ;SET CARRY BIT AND......
 8343 026370  006105                             ROL   R5              ;ROTATE LEFT
 8344 026372                                  END                      ;
      026372                                                                  L232:;;;;;;
 8345 026372                                UNTIL BITNO EQ #16.        ;UNTIL ALL BITS ARE DONE
      026372  023727  002324  000020                                          CMP BITNO,#16.
      026400  001276                                                         BNE B33
      026402                                                                  E33:;;;;;;
 8346 026402  005100                           COM R0                   ;COMPLEMENT DATA AND REPEAT
 8347 026404                                 UNTILB PASFLG EQ #2        ;UNTIL 2 PASSES ARE COMPLETE!
      026404  123727  002264  000002                                          CMPB PASFLG,#2
      026412  001252                                                         BNE B32
      026414                                                                  E32:;;;;;;
 8348 026414  104503                          CLR1CSR                  ;CLEAR CSR
 8349 026416  104423                          CACHON                   ;TURN CACHE
 8350 026420  000207                          RETURN
 8351                                 ;
 8352                                 ;       MSV11-P SINGLE BIT ERROR SYNDROME BIT TABLE
 8353                                 ;
 8354 026422     016     013     023 SBESYN: .BYTE   16,13,23,25,26,31,32,34,43,45,46,51,52,54,61,64
      026425     025     026     031
      026430     032     034     043
      026433     045     046     051
      026436     052     054     061
      026441     064
 8355
```

```
 8357 026442                    MTPA21: SUBTST  <<MTPA21        MARCHING 1'S & 0'S PATTERN TEST>>
                                ;*****************************************************************************
                                ;*SUBTEST        MTPA21  MARCHING 1'S & 0'S PATTERN TEST
                                ;*****************************************************************************
 8358                                   ;READ,BYTESWAP-MODIFY,READ,DOWN
 8359 026442  014100            1$:     MOV     -(R1),R0;V177640
 8360 026444  020200                    CMP     R2,R0   ;V177642
 8361 026446  001401                    BEQ     2$      ;V177644
 8362 026450  104443                    PERR17          ;V177646
 8363
 8364 026452  000311            2$:     SWAB    (R1)    ;V177650
 8365 026454  011100                    MOV     (R1),R0 ;V177652
 8366 026456  020300                    CMP     R3,R0   ;V177654
 8367 026460  001401                    BEQ     3$      ;V177656
 8368 026462  104444                    PERR20          ;V177660
 8369
 8370 026464  020401            3$:     CMP     R4,R1   ;V177662        ;DONE?
 8371 026466  001365                    BNE     1$      ;V177664        ;NO - LOOP
 8372 026470  000207                    RETURN          ;V177666        ;YES - RETURN
 8373
 8374 026472                    MTPB21: ;READ,BYTESWAP-MODIFY,READ,UP
 8375 026472  011100            1$:     MOV     (R1),R0 ;V177640
 8376 026474  020300                    CMP     R3,R0   ;V177642
 8377 026476  001401                    BEQ     2$      ;V177644
 8378 026500  104444                    PERR20          ;V177646
 8379
 8380 026502  000311            2$:     SWAB    (R1)    ;V177650
 8381 026504  011100                    MOV     (R1),R0 ;V177652
 8382 026506  020200                    CMP     R2,R0   ;V177654
 8383 026510  001401                    BEQ     3$      ;V177656
 8384 026512  104443                    PERR17          ;V177660
 8385
 8386 026514  062701  000002    3$:     ADD     #2,R1   ;V177662
 8387 026520  020501                    CMP     R5,R1   ;V177666        ;DONE?
 8388 026522  001363                    BNE     1$      ;V177670        ;NO - LOOP
 8389 026524  000207                    RETURN          ;V177672        ;YES - RETURN
 8390
 8391 026526                    MTPC21: ;READ,BYTESWAP-MODIFY,READ,UP
 8392 026526  011100            1$:     MOV     (R1),R0 ;V177640
 8393 026530  020200                    CMP     R2,R0   ;V177642
 8394 026532  001401                    BEQ     2$      ;V177644
 8395 026534  104443                    PERR17          ;V177646
 8396
 8397 026536  000311            2$:     SWAB    (R1)    ;V177650
 8398 026540  011100                    MOV     (R1),R0 ;V177652
 8399 026542  020300                    CMP     R3,R0   ;V177654
 8400 026544  001401                    BEQ     3$      ;V177656
 8401 026546  104444                    PERR20          ;V177660
 8402
 8403 026550  062701  000002    3$:     ADD     #2,R1   ;V177662
 8404 026554  020501                    CMP     R5,R1   ;V177666        ;DONE?
 8405 026556  001363                    BNE     1$      ;V177670        ;NO - LOOP
 8406 026560  000207                    RETURN          ;V177672        ;YES - RETURN
```

```
 8409 026562                    MTPD21: ;READ,BYTESWAP-MODIFY,READ,DOWN
 8410 026562  014100            1$:     MOV     -(R1),R0;V177640
 8411 026564  020300                    CMP     R3,R0   ;V177642
 8412 026566  001401                    BEQ     2$      ;V177644
 8413 026570  104444                    PERR20          ;V177646
 8414
 8415 026572  000311            2$:     SWAB    (R1)    ;V177650
 8416 026574  011100                    MOV     (R1),R0 ;V177652
 8417 026576  020200                    CMP     R2,R0   ;V177654
 8418 026600  001401                    BEQ     3$      ;V177656
 8419 026602  104443                    PERR17          ;V177660
 8420
 8421 026604  020401            3$:     CMP     R4,R1   ;V177662        ;DONE?
 8422 026606  001365                    BNE     1$      ;V177664        ;NO - LOOP
 8423 026610  000207                    RETURN          ;V177666        ;YES - RETURN
 8424
```

```
 8427 026612                            MTP022: SUBTST  <<MTP022        REFRESH & SHIFTING DIAGONAL TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MTP022  REFRESH & SHIFTING DIAGONAL TEST
                                        ;*****************************************************************************
 8428                                           ;(1)    WE WRITE A DIAGONAL PATTERN IN MEMORY (WITH CACHE ON).
 8429                                           ;(2)    IF A REFRESH TEST WE DISTURB ALL ROWS FOR > 2 MS (WITH CACHE ON).
 8430                                           ;(3)    WE READ & CHECK FOR CORRECTNESS THE DIAGONAL PATTERN
 8431                                           ;       (WITH CACHE OFF).
 8432           000010                  KDIAG=8.                ;HOW OFTEN A DIAGONAL STRIPE OCCURS (MUST BE A POWER OF 2)
 8433 026612                                    FOR EVEN := #1 TO #2                    ;FOR DATA & COMPLEMENT DATA
      026612  012737  000001  002364                                                            MOV #1,EVEN
      026620                                                                          B34:;;;;;;;
 8434 026620                                      IF EVEN EQ #1
      026620  023727  002364  000001                                                            CMP EVEN,#1
      026626  001005                                                                            BNE L235
 8435 026630                                        LET R2 := ZEROS
      026630  013702  002336                                                                    MOV ZEROS,R2
 8436 026634                                        LET R3 := ONES
      026634  013703  002614                                                                    MOV ONES,R3
 8437 026640                                      ELSE
      026640  000404                                                                           BR L236
      026642                                                                          L235:;;;;;;;
 8438 026642                                        LET R2 := ONES
      026642  013702  002614                                                                    MOV ONES,R2
 8439 026646                                        LET R3 := ZEROS
      026646  013703  002336                                                                    MOV ZEROS,R3
 8440 026652                                      END ;OF IF EVEN
      026652                                                                          L236:;;;;;;;
 8441 026652                                      FOR STRIPES := #0 TO #KDIAG 1         ;FOR THE NUMBER OF STRIPES
      026652  005037  002366                                                                    CLR STRIPES
      026656                                                                          B35:;;;;;;;
 8442
 8443                                               -
 8444 026656  104423                                ;WRITE LOOP
 8445 026660                                        CACHON                          ;TURN CACHE ON
                                                    LET COUNT := STRIPES
      026660  013737  002366  002370                                                            MOV STRIPES,COUNT
 8446 026666                                        LET R1 := #FIRST
      026666  012701  060000                                                                    MOV #FIRST,R1
 8447 026672                                        WHILE R1 LOS #LAST
      026672                                                                          B36:;;;;;;;
      026672  020127  157776                                                                    CMP R1,#LAST
      026676  101032                                                                            BHI L237
 8448 026700                                          IF COUNT LT #0 THEN LET COUNT := #KDIAG-1
      026700  005737  002370                                                                    TST COUNT
      026704  002003                                                                            BGE L240
      026706  012737  000007  002370                                                            MOV #KDIAG-1,COUNT
      026714                                                                          L240:;;;;;;;
 8449 026714                                          IF #374 OFF.IN R1 THEN LET COUNT := COUNT - #1
      026714  032701  000374                                                                    BIT #374,R1
      026720  001002                                                                            BNE L241
      026722  005337  002370                                                                    DEC COUNT
      026726                                                                          L241:;;;;;;;
 8450 026726                                          IF COUNT NE #0
      026726  005737  002370                                                                    TST COUNT
      026732  001404                                                                            BEQ L242
 8451 026734                                            LET (R1) :- R2
      026734  010211                                                                           MOV R2,(R1)
```

```
 8452 026736
      026736  010261  000002          LET 2(R1) := R2                         MOV R2,2(R1)
 8453 026742
      026742  000403                  ELSE                                    BR L243
      026744                                                                  L242:;;;;;;
 8454 026744
      026744  010311                  LET (R1) := R3                          MOV R3,(R1)
 8455 026746
      026746  010361  000002          LET 2(R1) := R3                         MOV R3,2(R1)
 8456 026752                          END ;OF IF COUNT
      026752                                                                  L243:;;;;;;
 8457 026752
      026752  005337  002370          LET COUNT := COUNT - #1                 DEC COUNT
 8458 026756
      026756  062701  000004          LET R1 := R1 + #4                       ADD #4,R1
 8459 026762                          END ;OF WHILE
      026762  000743                                                          BR B36
      026764                                                                  L237:;;;;;;
      026764                                                                  E36:;;;;;;
 8460                                 ;END OF WRITE LOOP
 8461
 8462 026764                          IF DIAGFLAG IS FALSE THEN $CALL REFRESH
      026764  005737  002004                                                  TST DIAGFLAG
      026770  001002                                                          BNE L244
      026772  004737  027166                                                  JSR PC,REFRESH
      026776                                                                  L244:;;;;;;
 8463                                 ;READ LOOP
 8464 026776                          LET COUNT := STRIPES
      026776  013737  002366  002370                                          MOV STRIPES,COUNT
 8465 027004                          LET R1 := #FIRST
      027004  012701  060000                                                  MOV #FIRST,R1
 8466 027010  104424                  CACHOFF                 ;TURN CACHE OFF
```

```
 8468 027012                            WHILE R1 LOS #LAST
      027012                                                          837:;;;;;;
      027012  020127  157776                                                CMP R1,#LAST
      027016  101046                                                      BHI L245
 8469 027020                              IF COUNT LT #0 THEN LET COUNT := #KDIAG-1
      027020  005737  002370                                             TST COUNT
      027024  002003                                                     BGE L246
      027026  012737  000007  002370                                     MOV #KDIAG-1,COUNT
      027034                                                          L246:;;;;;;
 8470 027034                              IF #374 OFF.IN R1 THEN LET COUNT := COUNT - #1
      027034  032701  000374                                             BIT #374,R1
      027040  001002                                                     BNE L247
      027042  005337  002370                                             DEC COUNT
      027046                                                          L247:;;;;;;
 8471 027046                              IF COUNT NE #0
      027046  005737  002370                                             TST COUNT
      027052  001412                                                     BEQ L250
 8472 027054                                LET R0 := (R1)
      027054  011100                                                     MOV (R1),R0
 8473 027056                                IF R2 NE R0
      027056  020200                                                     CMP R2,R0
      027060  001401                                                     BEQ L251
 8474 027062  104443                          PERR17
 8475 027064                              END ;OF IF R2
      027064                                                          L251:;;;;;;
 8476 027064                                LET R0 := 2(R1)
      027064  016100  000002                                             MOV 2(R1),R0
 8477 027070                                IF R2 NE R0
      027070  020200                                                     CMP R2,R0
      027072  001401                                                     BEQ L252
 8478 027074  104443                          PERR17
 8479 027076                              END ;OF IF R2
      027076                                                          L252:;;;;;;
 8480 027076                            ELSE
      027076  000411                                                     BR L253
      027100                                                          L250:;;;;;;
 8481 027100                                LET R0 := (R1)
      027100  011100                                                     MOV (R1),R0
 8482 027102                                IF R3 NE R0
      027102  020300                                                     CMP R3,R0
      027104  001401                                                     BEQ L254
 8483 027106  104444                          PERR20
 8484 027110                              END ;OF IF R3
      027110                                                          L254:;;;;;;
 8485 027110                                LET R0 := 2(R1)
      027110  016100  000002                                             MOV 2(R1),R0
 8486 027114                                IF R3 NE R0
      027114  020300                                                     CMP R3,R0
      027116  001401                                                     BEQ L255
 8487 027120  104444                          PERR20
 8488 027122                              END ;OF IF R3
      027122                                                          L255:;;;;;;
 8489 027122                            END ;OF IF COUNT
      027122                                                          L253:;;;;;;
 8490 027122                            LET COUNT := COUNT - #1
      027122  005337  002370                                             DEC COUNT
 8491 027126                            LET R1 := R1 + #4
```

```
      027126  062701  000004                                                  ADD #4,R1
 8492 027132                          END ;OF WHILE
      027132  000727                                                          BR B37
      027134                                                          L245:;;;;;;;
      027134                                                          E37:;;;;;;;
 8493                                 ;END OF READ LOOP
 8494
 8495 027134                        END ;OF FOR STRIPES
      027134  005237  002366                                                  INC STRIPES
      027140  023727  002366  000007                                          CMP STRIPES,#KDIAG-1
      027146  003643                                                          BLE B35
      027150                                                          E35:;;;;;;;;
 8496 027150                  END ;OF FOR EVEN
      027150  005237  002364                                                  INC EVEN
      027154  023727  002364  000002                                          CMP EVEN,#2
      027162  003616                                                          BLE B34
      027164                                                          E34:;;;;;;;;
 8497 027164  000207                  RETURN
 8498
 8499 027166                REFRESH:SUBTST  <<SUBR  REFRESH DELAY>>
                            ;*****************************************************************************
                            ;*SUBTEST       SUBR    REFRESH DELAY
                            ;*****************************************************************************
 8500                               ;DISTURB EACH ROW FOR > 3.2 MS
 8501 027166                       FOR R0 := #FIRST TO #FIRST+374 BY #4
      027166  012700  060000                                                  MOV #FIRST,R0
      027172                                                          B40:;;;;;;;
 8502 027172  004737  027236         CALL REFSUB
 8503 027176                       END ;OF FOR R0
      027176  062700  000004                                                  ADD #4,R0
      027202  020027  060374                                                  CMP R0,#FIRST+374
      027206  003771                                                          BLE B40
      027210                                                          E40:;;;;;;;;
 8504 027210                       LET R0 := #FIRST+BIT14
      027210  012700  120000                                                  MOV #FIRST+BIT14,R0
 8505 027214                       WHILE R0 LOS #LAST+BIT14+374
      027214                                                          B41:;;;;;;;
      027214  020027  020372                                                  CMP R0,#LAST+BIT14+374
      027220  101005                                                          BHI L256
 8506 027222  004737  027236         CALL REFSUB
 8507 027226                       LET R0 := R0 + #4
      027226  062700  000004                                                  ADD #4,R0
 8508 027232                       END ;OF WHILE
      027232  000770                                                          BR B41
      027234                                                          L256:;;;;;;;
      027234                                                          E41:;;;;;;;
 8509 027234  000207                  RETURN
 8510 027236  012704  000640  REFSUB: MOV     #640,R4          ;TIME FOR A > 3.2 MS LOOP
 8511 027242  062700  000002         ADD     #2,R0
 8512 027246  005140          1$:    COM     -(R0)
 8513 027250  005120                 COM     (R0)+
 8514 027252  005110                 COM     (R0)
 8515 027254  005110                 COM     (R0)
 8516 027256  077405                 SOB     R4,1$
 8517 027260  162700  000002         SUB     #2,R0
 8518 027264  000207                 RETURN
```

```
 8521 027266                    MTPA24: SUBTST  <<MTPA24        FAST GALLOPING PATTERN TEST>>
                                ;*****************************************************************************
                                ;*SUBTEST       MTPA24  FAST GALLOPING PATTERN TEST
                                ;*****************************************************************************
 8522                                   ;THE TOTAL TEST (INCLUDING SETUP) IS AS FOLLOWS
 8523                                   ;*(1)   THIS TEST WRITES THE MEMORY WITH A BACK GROUND PATTERN
 8524                                   ;*      STORED AT LOCATION BAKPAT
 8525                                   ;*(2)   TEST BEGINS AT LOWEST LOCATION BEING TESTED
 8526                                   ;*      (LETS NAME IT 'A')
 8527                                   ;*(3)   LETS NAME THE 1ST LOCATION IN THE ROW/COLUMN UNDER TEST AS 'B'.
 8528                                   ;*(4)   SWAPS BYTES FOR LOCATION 'A'.
 8529                                   ;*(5)   READS 'A', READS 'B'
 8530                                   ;*(6)   'B' = 'B'+400   (ADDS 64 DOUBLE WORDS TO 'B')
 8531                                   ;*(7)   REPEATS STEPS 5 AND 6 UNTIL 'B' IS GREATER THAN THE
 8532                                   ;*(8)   END OF THE BANK  A+2
 8533                                   ;*(9)   REPEATS  STEPS 3-8 UNTILL 'A' REACHES THE END OF THE BANK
 8534                                   ;*(10)  AFTER EXECUTING THE TEST  DATA IS COMPLEMENTED
 8535                                   ;*      AND STEPS 1-9 ARE REPEATED
 8536                                   ;REGISTERS ARE USED AS FOLLOWS
 8537                                   ;R0     TEST DATA
 8538                                   ;R1     'A'
 8539                                   ;R2     'B'
 8540                                   ;R3     BAKPAT
 8541                                   ;R4     SWAPAT
 8542                                   ;R5     LAST
 8543
 8544                                   ;NOTE THE PATTERN STARTS AT MTPB24!!!!!!!!!!!!!!!
 8545
 8546                                   ;UIPAR'S
 8547 027266  011100            1$:     MOV     (R1),R0         ;V177640        ;READ 'A'
 8548 027270  020004                    CMP     R0,R4           ;V177642        ;CHECK 'A'
 8549 027272  001401                    BEQ     2$              ;V177644        ;BR IF OK
 8550 027274  104447                    PERR23                  ;V177646        ;REPORT ERROR
 8551
 8552 027276  011200            2$:     MOV     (R2),R0         ;V177650        ;READ 'B'
 8553 027300  020003                    CMP     R0,R3           ;V177652        ;CHECK 'B'
 8554 027302  001401                    BEQ     3$              ;V177654        ;BR IF OK
 8555 027304  104450                    PERR24                  ;V177656        ;REPORT ERROR
 8556
 8557 027306  062702  000400    3$:     ADD     #400,R2         ;V177660        ;BUMP 'B'
 8558 027312  020205                    CMP     R2,R5           ;V177664        ;AT END YET?
 8559 027314  101764                    BLOS    1$              ;V177666        ;BR IF NO
 8560
 8561 027316  062701  000002            ADD     #2,R1           ;V177670        ;BUMP 'A'
 8562 027322  000137  027326            JMP     @#MTPB24        ;V177674        ;GOTO V177260
```

```
 8565 027326                            MTPB24: SUBTST  <<MTPB24        FAST GALLOP PART B>>
                                        ;*****************************************************************************
                                        ;*SUBTEST        MTPB24  FAST GALLOP PART B
                                        ;*****************************************************************************
 8566                                           ;SDPAR'S
 8567 027326  010411                            MOV     R4,(R1)         ;V172260        ;WRITE 'A'
 8568 027330  020105                            CMP     R1,R5           ;V172262        ;DONE?
 8569 027332  001001                            BNE     1$              ;V172264        ;BR IF NO
 8570 027334  000207                            RETURN                  ;V172266        ;YES   RETURN
 8571 027336  000137  027342       1$:         JMP     @#MTPC24        ;V172270        ;GOTO V172360
 8572
 8573 027342                            MTPC24: SUBTST  <<MTPC24        FAST GALLOP PART C>>
                                        ;*****************************************************************************
                                        ;*SUBTEST        MTPC24  FAST GALLOP PART C
                                        ;*****************************************************************************
 8574                                           ;KDPAR'S
 8575 027342  010102                            MOV     R1,R2           ;V172360        ;RESET 'B' <-   'A'
 8576 027344  011100                            MOV     (R1),R0         ;V172362        ;READ 'A'
 8577 027346  020004                            CMP     R0,R4           ;V172364        ;CHECK 'A'
 8578 027350  001401                            BEQ     1$              ;V172366        ;BR IF OK
 8579 027352  104447                            PERR23                  ;V172370        ;REPORT ERROR
 8580 027354  000137  027306       1$:         JMP     @#MTPA24+20     ;V172372        ;GOTO V177660
 8581
```

```
 8584 027360                    MTPA26: SUBTST  <<MTPA26        RANDOM DATA (WRITE)>>
                                ;*****************************************************************************
                                ;*SUBTEST        MTPA26  RANDOM DATA (WRITE)
                                ;*****************************************************************************
 8585 027360  000137  027430    1$:     JMP     @#MTPC26        ;V177640        GOTO V172360
 8586 027364  010221            MOV     R2,(R1)+        ;V177644
 8587 027366  010321            MOV     R3,(R1)+        ;V177646
 8588 027370  077005            SOB     R0,1$           ;V177650
 8589 027372  000207            RETURN                  ;V177652
 8590
 8591 027374                    MTPB26: SUBTST  <<MTPB26        RANDOM DATA (READ)>>
                                ;*****************************************************************************
                                ;*SUBTEST        MTPB26  RANDOM DATA (READ)
                                ;*****************************************************************************
 8592                           .DSABL  AMA
 8593                           .ENABL  LSB
 8594 027374  000137  027430    1$:     JMP     @#MTPC26        ;V177640        GOTO V172360
 8595 027400  020221            CMP     R2,(R1)+        ;V177644
 8596 027402  001401            BEQ     2$              ;V177646
 8597 027404  104451            PERR25                  ;V177650
 8598 027406  005127            2$:     COM     (PC)+           ;V177652
 8599 027410  000000            RANODD: 0                       ;V177654        FOR ERROR REPORTING
 8600 027412  020321            CMP     R3,(R1)+        ;V177656
 8601 027414  001401            BEQ     3$              ;V177660
 8602 027416  104451            PERR25                  ;V177662
 8603 027420  005167  177764    3$:     COM     RANODD          ;V177664
 8604 027424  077015            SOB     R0,1$           ;V177670
 8605 027426  000207            RETURN                  ;V177672
 8606                           .DSABL  LSB
 8607                           .ENABL  AMA
 8608
 8609 027430                    MTPC26: SUBTST  <<RANDOM NUMBER SUBPROGRAM>>
                                ;*****************************************************************************
                                ;*SUBTEST        RANDOM NUMBER SUBPROGRAM
                                ;*****************************************************************************
 8610                           ;CALLER MUST SETUP
 8611                           ;       MOV     SEEDLO,R3
 8612                           ;       MOV     SEEDHI,R2
 8613                           ;       MOV     R3,R5
 8614                           ;       MOV     R2,R4
 8615 027430  073427  000007            ASHC    #7,R4           ;V172360
 8616 027434  060305            ADD     R3,R5           ;V172364
 8617 027436  005504            ADC     R4              ;V172366
 8618 027440  060204            ADD     R2,R4           ;V172370
 8619 027442  062705  001057            ADD     #1057,R5        ;V172372
 8620 027446  000240            NOP                     ;V172376        GOTO V172260
 8621
 8622 027450                    MTPD26: SUBTST  <<RANDOM NUMBER SUBSUBPROGRAM>>
                                ;*****************************************************************************
                                ;*SUBTEST        RANDOM NUMBER SUBSUBPROGRAM
                                ;*****************************************************************************
 8623 027450  005504            ADC     R4              ;V172260
 8624 027452  062704  047401            ADD     #47401,R4       ;V172262
 8625 027456  010503            MOV     R5,R3           ;V172266
 8626 027460  010402            MOV     R4,R2           ;V172270
 8627 027462  000137  027364            JMP     @#MTPA26+4      ;V172272        GOTO V177644
```

```
 8630 027466                            MTP030: SUBTST  <<MT0030        FLUSH OUT DBE'S>>
                                        ;*****************************************************************************
                                        ;*SUBTEST        MT0030  FLUSH OUT DBE'S
                                        ;*****************************************************************************
 8631 027466  011002                    1$:     MOV     (R0),R2         ;V177640
 8632 027470  010220                            MOV     R2,(R0)+        ;V177642
 8633 027472  077103                            SOB     R1,1$           ;V177644
 8634 027474  000207                            RETURN                  ;V177646
 8635
 8636 027476                            MTP031: SUBTST  <<MTP031        SOB-A-LONG TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST        MTP031  SOB-A-LONG TEST
                                        ;*****************************************************************************
 8637                                           .DSABL  AMA
 8638 027476  000000                            0                       ;MOVE TERMINATOR
 8639 027500  077001                    1$:     SOB     R0,1$           ;SOB TILL R0 UNDERFLOWS
 8640 027502  005167  177772                    COM     1$              ;WRITE COMPLEMENT OF SOB
 8641 027506  020167  177766                    CMP     R1,1$           ;READ & CHECK FOR NOT "SOB R0,DOT"
 8642 027512  001403                            BEQ     2$              ;OK - SKIP
 8643 027514  104454                            PERR30
 8644 027516  010167  177756                    MOV     R1,1$
 8645 027522  005167  177752            2$:     COM     1$              ;CORRECT SOB INSTRUCTION
 8646 027526  010200                            MOV     R2,R0           ;REINITIALIZE SOB CONSTANT
 8647                                           ;UPDATE MOVE REGISTERS
 8648 027530  010503                            MOV     R5,R3
 8649 027532  005725                            TST     (R5)+           ;BUMP (SAFELY) BY 2
 8650 027534  010504                            MOV     R5,R4
 8651 027536  020537  002522                    CMP     R5,@#LINK1      ;DONE?
 8652 027542  001001                            BNE     3$              ;NO - SKIP
 8653 027544  000207                            RETURN                  ;YES
 8654
 8655 027546  014344                    3$:     MOV     -(R3),-(R4)
 8656 027550  001376                            BNE     3$
 8657 027552  000752                            BR      1$
 8658         000056                    SOBLENGTH=.-MTP031
 8659                                           .ENABL  AMA
```

```
 8687 027554                        MTP032: SUBTST  <<MTP032        WRITE RECOVERY TEST>>
                                    ;*********************************************************************************
                                    ;*SUBTEST       MTP032  WRITE RECOVERY TEST
                                    ;*********************************************************************************
 8688                                       ;THE TEST ACTUALLY EXECUTED ALREADY IN THE MEMORY UNDER TEST.
 8689                                       ;THIS CODE INSURES THAT IT CHANGED MEMORY TO HAVE
 8690                                       ;1/2 BANK OF #5141      WHICH IS A "COM -(R1)" INSTRUCTION AND
 8691                                       ;1/2 BANK OF #110       WHICH IS A "JMP (R0)"   INSTRUCTION.
 8692
 8693 027554  012401                1$:      MOV     (R4)+,R1        ;V177640        ;GET DATA FROM LOWER 1/2 BANK
 8694 027556  020102                         CMP     R1,R2           ;V177642        ;IS IT #5141?
 8695 027560  001401                         BEQ     2$              ;V177644        ;YES - SKIP
 8696 027562  104430                         PERR02                  ;V177646        ;NO - TAKE ERROR TRAP
 8697 027564  077305                2$:      SOB     R3,1$           ;V177650        ;LOOP FOR 1/2 BANK
 8698 027566  013703  002522                 MOV     @#LINK1,R3      ;V177652        ;RESTORE LOOP SIZE
 8699 027572  012400                3$:      MOV     (R4)+,R0        ;V177656        ;GET DATA FROM UPPER 1/2 BANK
 8700 027574  020005                         CMP     R0,R5           ;V177660        ;IS IT #110?
 8701 027576  001401                         BEQ     4$              ;V177662        ;YES - SKIP
 8702 027600  104427                         PERR01                  ;V177664        ;NO- TAKE ERROR TRAP
 8703 027602  077305                4$:      SOB     R3,3$           ;V177666        ;LOOP FOR 1/2 BANK
 8704 027604  000207                         RETURN
```

```
 8707 027606                            MTP033: SUBTST  <<MTP033        BRANCH GOBBLE TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST        MTP033  BRANCH GOBBLE TEST
                                        ;*****************************************************************************
 8708                                           .DSABL  AMA
 8709 027606  000000                    BGTEST. 0                       ;TEST WORD (TWO BYTES)
 8710 027610  000000                    BRGOBB: SEC                     ;SET CARRY (TO BE ADDED TO "BGTEST")
 8711 027612  000261                            ADCB    (R1)            ;INCREMENT LOW BYTE OF "BGTEST"
 8712 027614  105511                            BMI     1$              ;BRANCH WHEN BIT7 IS SET
 8713 027616  100402                            INCB    (R2)            ;INCREMENT HIGH BYTE OF "BGTEST"
 8714 027620  105212                            BR      BRGOBB          ;LOOP 128 TIMES
 8715 027622  000773
 8716
 8717                                           ;NOW CHECK FOR CORRECT CONDITION CODES
 8718 027624  102401                    1$:     BVS     2$              ;BR IF V-BIT SET (SHOULD BE)
 8719 027626  104461                            PERR35                  ;NO - REPORT ERROR AND ABORT TEST
 8720                                                                   ;COND CODES NOT EQUAL TO 1010
 8721 027630  000242                    2$:     CLV                     ;CLEAR V-BIT
 8722 027632  105212                            INCB    (R2)            ;INCREMENT HIGH BYTE OF "BGTEST" ONCE MORE
 8723 027634  103402                            BCS     3$              ;BR IF C-BIT SET (SHOULD NOT BE)
 8724 027636  102001                            BVC     3$              ;BR IF V-BIT CLEAR (SHOULD NOT BE)
 8725 027640  100401                            BMI     4$              ;BR IF N-BIT SET (SHOULD BE)
 8726 027642  104461                    3$:     PERR35                  ;NO - REPORT ERROR AND ABORT TEST
 8727                                                                   ;COND CODES NOT EQUAL TO 1010
 8728
 8729                                           ;UPDATE TEST POINTERS
 8730 027644  010701                    4$:     MOV     PC,R1
 8731 027646  162701  000036            5$:     SUB     #5$-BGTEST,R1
 8732 027652  010102                            MOV     R1,R2
 8733 027654  005202                            INC     R2
 8734
 8735                                           ;UPDATE MOVE REGISTERS
 8736 027656  010503                            MOV     R5,R3
 8737 027660  005725                            TST     (R5)+           ;BUMP (SAFELY) BY 2
 8738 027662  010504                            MOV     R5,R4
 8739
 8740                                           ;DONE?
 8741 027664  020537  002522                    CMP     R5,@#LINK1      ;DONE?
 8742 027670  001001                            BNE     6$              ;NO - SKIP
 8743 027672  000207                            RETURN                  ;YES - RETURN
 8744
 8745                                           ;MOVE CODE 1 LOCATION
 8746 027674  014344                    6$:     MOV     -(R3),-(R4)
 8747 027676  001376                            BNE     6$
 8748 027700  005011                            CLR     (R1)            ;CLEAR TEST WORD "BGTEST"
 8749 027702  000743                            BR      BRGOBB          ;RUN MOVED CODE AGAIN
 8750         000076                    GBLENGTH=.-MTP033
 8751                                           .ENABL  AMA
```

```
 8753 027704                    MTP034: SUBTST  <<MTP034        SOFT ERROR - BACKROUND PATTERN TEST>>
                                ;*********************************************************************
                                ;*SUBTEST        MTP034  SOFT ERROR - BACKROUND PATTERN TEST
                                ;*********************************************************************
 8754 027704  010220            1$:     MOV     R2,(R0)+        ;V177640
 8755 027706  077102                    SOB     R1,MTP034       ;V177642
 8756 027710  000207                    RETURN                  ;V177644
 8757 027712  012401            2$:     MOV     (R4)+,R1        ;V177646
 8758 027714  020102                    CMP     R1,R2           ;V177650
 8759 027716  001402                    BEQ     3$              ;V177652
 8760 027720  104430                    PERR02                  ;V177654
 8761 027722  000240                    NOP                     ;V177656
 8762 027724  077306            3$:     SOB     R3,2$           ;V177660
 8763 027726  000207                    RETURN                  ;V177662
```

```
 8765 027730                            MTP035:SUBTST   <<MTP035        WORST CASE NOISE PARITY TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MTP035  WORST CASE NOISE PARITY TEST
                                        ;*****************************************************************************
 8766 027730  012737  000003  002076          MOV     #3,NOPAR        ;SET PARITY TRAPS TO RETURN TO "PARTHERE'
 8767
 8768 027736                                  FOR R0 := #FIRST TO #LAST BY #4000
      027736  012700  060000                                                          MOV #FIRST,R0
      027742                                                                  B42:;;;;;;;;
 8769 027742  012737  000005  002150            MOV   #BIT2!BIT0,CSR  ;SET WRITE WRONG PARITY & PAR. TRAPS INTO CSR
 8770 027750  104425                            LOADCSR
 8771 027752  012737  030006  002304            MOV   #1$,PARTHERE
 8772 027760  011010                            MOV   (R0),(R0)       ;WWP TEST LOCATION
 8773 027762  005710                            TST   (R0)
 8774 027764  010037  002034                    MOV   R0,ADDRESS
 8775 027770  104050                            ERROR +50
 8776 027772  004737  050446                    CALL  PERBNK
 8777 027776  032763  002000  002666            BIT   #BIT10,CONFIG+2(R3)
 8778 030004  001002                            BNE   2$
 8779 030006  104426                      1$:   READCSR
 8780 030010  104512                            ERRGEN
 8781
 8782 030012  104503                      2$:   CLR1CSR
 8783 030014  011010                            MOV   (R0),(R0)       ;CLEAR WRONG PARITY IN MEMORY
 8784 030016  012737  000001  002150            MOV   #BIT0,CSR
 8785 030024  104425                            LOADCSR
 8786 030026  012737  030040  002304            MOV   #3$,PARTHERE
 8787 030034  005710                            TST   (R0)
 8788 030036  000405                            BR    4$
 8789 030040  010037  002034              3$:   MOV   R0,ADDRESS
 8790 030044  104050                            ERROR +50
 8791 030046  004737  050446                    CALL  PERBNK
 8792 030052                              4$:   END; OF FOR
      030052  062700  004000                                                          ADD #4000,R0
      030056  020027  157776                                                          CMP R0,#LAST
      030062  003727                                                                 BLE B42
      030064                                                                  E42:;;;;;;;;
 8793
 8794 030064  005037  002076                  CLR     NOPAR           ;RESET PARITY TRAP ACTION
 8795 030070  000207                          RETURN
```

```
 8797 030072                            MTP036: SUBTST          <<MTP036        CORRECTION CODE TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MTP036  CORRECTION CODE TEST
                                        ;*****************************************************************************
 8798                                           ;
 8799                                           ; THIS TEST CHECKS TO SEE THAT EACH BIT OF A DATA WORD
 8800                                           ; CAN BE CORRECTED INDIVIDUALLY FROM A ZERO TO A ONE AND
 8801                                           ; VISA VERSA.
 8802 030072  104424                           CACHOFF                         ;TURN OFF CACHE
 8803 030074  105037  002264                   CLRB PASFLG                     ;CLEAR PASFLG
 8804 030100  104513                           CBREG                           ;ENABLE CHECK/SYNDROME BIT REGISTER
 8805 030102                                   REPEAT                          ;
      030102                                                                                B43:;;;;;;
 8806 030102                                     LET PASFLG :B= PASFLG + #1     ;INCREMENT LOOP COUNTER
      030102  105237  002264                                                                INCB PASFLG
 8807 030106                                     LET R4  := #-1                 ;INDEX TO SINGLE BIT ERROR TABLE
      030106  012704  177777                                                                MOV #-1,R4
 8808 030112                                     LET BITNO := #0                ;CLEAR INNER LOOP COUNTER
      030112  005037  002324                                                                CLR BITNO
 8809 030116                                     IFB PASFLG EQ #1               ;SELECT DATA TO BE CORRECTED BY PASSNO
      030116  123727  002264  000001                                                        CMPB PASFLG,#1
      030124  001003                                                                       BNE L257
 8810 030126                                        LET R5 := #1                ;DATA=0;BIT TO BE CORRECTED IS A ONE
      030126  012705  000001                                                                MOV #1,R5
 8811 030132                                     ELSE                           ;
      030132  000402                                                                        BR L260
      030134                                                                        L257:;;;;;;
 8812 030134                                        LET R5 := #177776           ;DATA=177776;BIT TO BE CORRECTED IS A ZERO
      030134  012705  177776                                                                MOV #177776,R5
 8813 030140                                     ENC                            ;
      030140                                                                        L260:;;;;;;
 8814 030140                                     REPEAT                         ;
      030140                                                                                B44:;;;;;;
 8815
 8816 030140  005237  002324                     INC BITNO                      ;INCREMENT BIT POINTER
 8817 030144                                     LET R4 := R4 + #1              ;POINT TO NEXT SET OF CHECK BITS
      030144  005204                                                                        INC R4
 8818 030146                                     LET R2 :B= PTABLE(R4)          ;GET NEXT SET OF CHECK BITS
      030146  116402  030276                                                                MOVB PTABLE(R4),R2
 8819 030152  072227  000005                     ASH #5,R2                      ;SHIFT TO LINE UP IN CSR
 8820 030156  052702  000004                     BIS #BIT2,R2                   ;ENABLE DIAG MODE
 8821 030162                                     LET CSR := R2                  ;GET CHECK BITS TO BE WRITTEN
      030162  010237  002150                                                                MOV R2,CSR
 8822 030166  104425                             LOADCSR                        ;LOAD CSR WITH DATA
 8823 030170                                     LET (R1) := R0                 ;WRITE DATA TO TEST ADDRESS
      030170  010011                                                                        MOV R0,(R1)
 8824 030172  005711                             TST (R1)                       ;CORRECT BBE
 8825 030174                                     IF (R1) NE R5                  ;WAS DATA CORRECTED???
      030174  021105                                                                        CMP (R1),R5
      030176  001412                                                                        BEQ L261
 8826 030200                                        LET ADDRESS := #60000       ;MOV ERROR INFORMATION IN
      030200  012737  060000  002034                                                        MOV #60000,ADDRESS
 8827 030206                                        LET CHECK := R2             ;
      030206  010237  002314                                                                MOV R2,CHECK
 8828 030212                                        LET TSTDAT := R5            ;
      030212  010537  002246                                                                MOV R5,TSTDAT
 8829 030216                                        LET TSTDAT+2 := (R1)        ;
```

```
                030216  011137  002250                                                  MOV (R1),TSTDAT+2
 8830           030222  104052                  ERROR +52               ;NO ERROR
 8831           030224                        END                       ;
                030224                                                          L261:;;;;;;;
 8832           030224  005011                CLR (R1)                  ;CLEAR LUT
 8833           030226                        IFB PASFLG EQ #1          ;SHIFT NEW DATA DEPENDING ON PASFLG
                030226  123727  002264  000001                                          CMPB PASFLG,#1
                030234  001002                                                          BNE L262
 8834           030236  006305                  ASL  R5                 ;SHIFT BITNO TO THE LEFT
 8835           030240                        ELSE                      ;
                030240  000402                                                          BR L263
                030242                                                          L262:;;;;;;;
 8836           030242  000261                  SEC                     ;SET CARRY BIT AND.....
 8837           030244  006105                  ROL   R5                ;ROTATE LEFT
 8838           030246                        END                       ;
                030246                                                          L263:;;;;;;;
 8839           030246                      UNTIL BITNO EQ #16.         ;UNTIL ALL BITS ARE DONE
                030246  023727  002324  000020                                          CMP BITNO,#16.
                030254  001331                                                          BNE B44
                030256                                                          E44:;;;;;;;
 8840           030256  005100                COM R0                    ;COMPLEMENT DATA AND REPEAT
 8841           030260                      UNTILB PASFLG EQ #2         ;UNTIL 2 PASSES ARE COMPLETE!
                030260  123727  002264  000002                                          CMPB PASFLG,#2
                030266  001305                                                          BNE B43
                030270                                                          E43:;;;;;;;
 8842           030270  104503              CLR1CSR                     ;CLEAR CSR
 8843           030272  104423              CACHON                      ;TURN CACHE
 8844           030274  000207              RETURN                      ;
 8845                                    ;
 8846                                    ;               MSV11-P SINGLE BIT ERROR CHECK BIT TABLE
 8847                                    ;
 8848           030276    002     007     037  PTABLE: .BYTE   2,7,37,31,32,25,26,20,57,51,52,45,46,40,75,70
                030301    031     032     025
                030304    026     020     057
                030307    051     052     045
                030312    046     040     075
                030315    070
```

```
 8850 030316                        MTP037: SUBTST  <<MTP037        CHECK ECC DISABLE TEST>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       MTP037  CHECK ECC DISABLE TEST
                                    ;*****************************************************************************
 8851                                       ;
 8852                                       ; THIS TEST CHECKS THAT ECC CAN BE DISABLED AND THAT
 8853                                       ; NO CORRECTION TAKES PLACE WITH ECC DISABLED.
 8854                                       ;
 8855 030316  104424                       CACHOFF                 ;TURN OFF CACHE
 8856 030320                               LET GOOD := #0          ;GOOD DATA FOR ERROR PRINT OUT
      030320  005037  002044                                                        CLR GOOD
 8857 030324                               LET CHECK := #0         ;CLEAR CHECK BIT FIELD
      030324  005037  002314                                                        CLR CHECK
 8858 030330  104475                       CB1CSR                  ;ENABLE SYNDROME/CHECK BIT REGISTER
 8859 030332                               LET CHECK := #100       ;SBE CHECK BITS
      030332  012737  000100  002314                                                MOV #100,CHECK
 8860 030340  104475                       CB1CSR                  ;WRITE CHECK BITS TO CB REGISTER
 8861 030342                               LET (R1) := #0          ;WRITE CHECK BITS TO MEMORY
      030342  005011                                                                CLR (R1)
 8862 030344                               IF (R1) NE #0           ;WAS CORRECTION MADE????
      030344  005711                                                                TST (R1)
      030346  001406                                                                BEQ L266
 8863 030350                                  LET BAD := (R1)      ;YES IT WAS.....ERROR
      030350  011137  002052                                                        MOV (R1),BAD
 8864 030354                                  LET ADDRESS := #60000 ;
      030354  012737  060000  002034                                                MOV #60000,ADDRESS
 8865 030362  104037                          ERROR +37            ;
 8866 030364                               END                     ;
      030364                                                              L266:::::::
 8867 030364  104423                       CACHON                  ;TURN ON CACHE
 8868 030366  000207                       RETURN                  ;
```

```
 8871 030370                            MTP041: SUBTST  <<MTP041        ADDRESS TO CSR ON DOUBLE BIT ERROR TEST>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       MTP041  ADDRESS TO CSR ON DOUBLE BIT ERROR TEST
                                        ;*****************************************************************************
 8872                                   ;
 8873                                   ; THIS TEST CHECKS TO SEE IF THE CORRECT ADDRESS APPEARS
 8874                                   ; IN CSR BITS 5-11 ON A DOUBLE ERROR.
 8875                                   ;
 8876 030370                                   LET R4 := BANK          ;GET STARTING BANK NUMBER
      030370  013704  002102                                                                MOV BANK,R4
 8877 030374  072427  000011                   ASH #9.,R4              ;SHIFT INTO POSTION TO MATCH ADDRESS IN CSR
 8878 030400  042704  170037                   BIC #^C7740,R4          ;CLEAR OFF EXTRANEOUS BITS
 8879 030404                                   LET R0 := #-40          ;INIT CSR ADDRESS TO 0 - 1K (BIT 5 = 1K ADD.)
      030404  012700  177740                                                                MOV #-40,R0
 8880 030410                                   LET R1 := #FIRST   #4000 ;GET LOW ADDRESS IN BANK
      030410  012701  060000                                                                MOV #FIRST,R1
      030414  162701  004000                                                                SUB #4000,R1
 8881 030420                                   LET PASFLG :B= #0       ;INIT PASFLG
      030420  105037  002264                                                                CLRB PASFLG
 8882 030424  005037  002314                   CLR CHECK               ;CLEAR CHECK BIT FIELD TO BE LOADED
 8883 030430  104475                           CB1CSR                  ;ENABLE CHECK/SYNDROME BIT REGISTER
 8884 030432                                   REPEAT
      030432                                                                          B45:;;;;;;
 8885 030432  105237  002264                     INCB  PASFLG          ;INC LOOP COUNTER
 8886 030436                                     LET R0 := R0 + #40    ;INC CSR ADDRESS TO BE EXPECTED
      030436  062700  000040                                                                ADD #40,R0
 8887 030442                                     LET R1 := R1 + #4000                        ;
      030442  062701  004000                                                                ADD #4000,R1
 8888 030446                                     LET CHECK := #1340    ;DOUBLE ERROR CHECK BITS
      030446  012737  001340  002314                                                        MOV #1340,CHECK
 8889 030454  104475                             CB1CSR                ;WRITE DOUBLE ERROR CHECK BITS
 8890 030456                                     LET (R1) := #0        ;WRITE DATA AND D.E. CHK BITS AT A=0
      030456  005011                                                                        CLR (R1)
 8891 030460  104503                             CLR1CSR               ;CLEAR CSR
 8892 030462  005711                             TST (R1)              ;READ ADDRESS TO GET DOUBLE ERROR
 8893 030464  104426                             READCSR               ;READ CSR FOR CORRECT ADDRESS
 8894 030466                                     LET R5 := CSR         ;
      030466  013705  002150                                                                MOV CSR,R5
 8895 030472  042705  170037                     BIC #^C7740,R5        ;
 8896 030476                                     LET R2 := R0          ;GET CORRECT ADDRESS
      030476  010002                                                                        MOV R0,R2
 8897 030500  060402                             ADD R4,R2             ;ADD STARTING BANK TO DOUBLE BIT ADDRESS
 8898 030502  000240                             NOP                   ;DEBUG AIDE
 8899 030504                                     IF R2 NE R5           ;DO ADDRESSES AGREE?
      030504  020205                                                                        CMP R2,R5
      030506  001405                                                                        BEQ L267
 8900 030510                                        LET BAD := R2      ;
      030510  010237  002052                                                                MOV R2,BAD
 8901 030514                                        LET GOOD := R5     ;
      030514  010537  002044                                                                MOV R5,GOOD
 8902 030520  104455                                PERR31             ;NO ERROR
 8903 030522                                     END                   ;
      030522                                                                      L267:;;;;;;
 8904 030522                                     LET (R1) := #0        ;
      030522  005011                                                                        CLR (R1)
 8905 030524  104475                             CB1CSR                ;ENABLE CHECK/SYNDROME BIT REGISTER
 8906 030526                                   UNTILB PASFLG EQ PASCNT ;DO 16K AT A TIME
```

```
        030526  123737  002264  002570                          CMPB PASFLG,PASCNT
        030534  001336                                          BNE B45
        030536                                          E45:;;;;;;
   8907 030536  104503                  CLR1CSR         ;
   8908 030540  000207                  RETURN          ;
   8909
```

```
                                MTP042: SUBTST  <<MTP042        EXTENDED ADDRESS TO CSR ON ERROR TEST>>
                                ;*****************************************************************************
                                ;*SUBTEST       MTP042  EXTENDED ADDRESS TO CSR ON ERROR TEST
                                ;*****************************************************************************
                                ;
                                ; THIS TESTS THE EXTENDED Q BUS ADDRESS IN THE
                                ; CSR BY CAUSING A SINGLE ERROR, ENABLING BIT # 14, THEN CHECKING
                                ; FOR THE PROPER ADDRESS IN THE CSR.
                                ;
030542  104424                         CACHOFF                 ;TURN OFF CACHE MEMORY
030544                                  LET R4 := BANK          ;GET BANK NUMBER TO FIGURE OUT EXTENDED ADDRESS
030544  013704  002102                                                  MOV BANK,R4
030550                                  IF BANK EQ #177
030550  023727  002102  000177                                         CMP BANK,#177
030556  001004                                                          BNE L271
030560                                      LET PASCNT := #1    ;DO ONCE IN LAST BANK
030560  012737  000001  002570                                         MOV #1,PASCNT
030566                                  ELSE
030566  000403                                                          BR L272
030570                                                                L271:;;;;;;
030570                                      LET PASCNT := #2
030570  012737  000002  002570                                         MOV #2,PASCNT
030576                                  END
030576                                                                L272:;;;;;;
030576  042704  177607                  BIC #^C170,R4           ;CLEAR OFF LOWER BITS
030602  072427  000002                  ASH #2,R4               ;SHIFT TO LINE UP WITH CSR
030606  052704  040000                  BIS #BIT14,R4           ;SET EXTENDED ADDRESS BIT
030612  062737  000400  172352          ADD #400,KIPAR5         ;SET UP PAR TO POINT TO TOP OF A BANK
030620                                  LET PASFLG :B= #0       ;INIT LOOP COUNTER
030620  105037  002264                                                  CLRB PASFLG
030624                                  LET R5 := BANK          ;R5 GETS THE BANK NUMBER
030624  013705  002102                                                  MOV BANK,R5
030630  042705  177770                  BIC #^C7,R5             ;CLEAR ALL BUT THE LOWER BITS
030634  072527  000011                  ASH #9.,R5              ;ROTATE INTO POSTION
030640  052705  000020                  BIS #BIT4,R5            ;SET UP SBE INDICATOR ;;DATA TO BE EXPECTED
030644  104513                          CBREG                   ;ENABLE CHECK/SYNDROME BIT REGISTER
030646                                  REPEAT
030646                                                                B46:;;;;;;
030646  105237  002264                      INCB PASFLG         ;INCR LOOP COUNTER
030652                                      LET CSR := #104     ;WRITE CHECK BITS TO CSR WITH DIAG MODE
030652  012737  000104  002150                                         MOV #104,CSR
030660  104425                              LOADCSR             ;LOAD CSR WITH DATA
030662                                      LET (R1) := #0      ;WRT ZEROS AT A=0 AND SINGLE ERROR BITS
030662  005011                                                          CLR (R1)
030664  104503                              CLR1CSR             ;CLEAR CSR
030666  005711                              TST (R1)            ;READ A=0;DATA BIT 0 SHOULD BE CORRECTED TO A 1
030670  104426                              READCSR             ;READ CSR FOR DATA
030672  042737  020000  002150              BIC #BIT13,CSR      ;CLEAR POSSIBLE INHIBIT MODE IN DATA "CSR"
030700                                      IF CSR NE R5 THEN   ;HAS SINGLE ERROR BITS SET IN CSR?
030700  023705  002150                                                  CMP CSR,R5
030704  001406                                                          BEQ L273
030706                                         LET BAD := CSR   ;
030706  013737  002150  002052                                         MOV CSR,BAD
030714                                         LET GOOD := R5   ;
030714  010537  002044                                                  MOV R5,GOOD
030720  104023                                 ERROR +23        ;
030722                                      END                 ;
```

```
        030722                                                                  L273:;;;;;;
   8949 030722                                  LET CSR := #40000    ;WRITE EQB BIT TO CSR
        030722  012737  040000  002150                                                  MOV #40000,CSR
   8950 030730  104425                          LOADCSR              ;
   8951 030732  104426                          READCSR              ;READ FOR CORRECT EXTENDED Q-BUS ADDRESS
   8952 030734  042737  020000  002150          BIC #BIT13,CSR       ;CLEAR INHIBIT MODE POINTER IN DATA
   8953 030742                                  IF CSR NE R4 THEN    ;READ EQB ADDRESS
        030742  023704  002150                                                          CMP CSR,R4
        030746  001411                                                                  BEQ L274
   8954 030750                                     LET BAD :  CSR    ;
        030750  013737  002150  002052                                                  MOV CSR,BAD
   8955 030756                                     LET GOOD :- R4    ;
        030756  010437  002044                                                          MOV R4,GOOD
   8956 030762                                     SET HEADER        ;
        030762  012737  177777  002612                                                  MOV  #-1,HEADER
   8957 030770  104023                             ERROR +23         ;
   8958 030772                                  END                  ;
        030772                                                                  L274:;;;;;;
   8959 030772                                  LET (R1) := #0       ;CLEAR LUT
        030772  005011                                                                  CLR (R1)
   8960 030774                                  LET R1 := #137776    ;SET UP NEW ADDRESS
        030774  012701  137776                                                          MOV #137776,R1
   8961 031000  062705  000740                  ADD #740,R5          ;ADD TO GET NEW ADDRESS
   8962 031004  052704  001000                  BIS #BIT9,R4         ;SET BIT 9 SINCE WE ARE ASSERTING A1 ON PASS2
   8963 031010  104513                          CBREG                ;ENABLE CHECK/SYNDROME BIT REGISTER
   8964 031012                              UNTILB PASFLG EQ PASCNT  ;LOOP 2 TIMES
        031012  123737  002264  002570                                                  CMPB PASFLG,PASCNT
        031020  001312                                                                  BNE B46
        031022                                                                  E46:;;;;;;
   8965 031022  104503                      CLR1CSR                  ;CLEAR CSR
   8966 031024  104423                      CACHON                   ;TURN  ON CACHE
   8967 031026  000207                      RETURN
```

```
 8969 031030                        MTP043: SUBTST <<MTP043 WRITE BYTE CLEARS SINGLE BIT ERROR TEST>>
                                    ;*********************************************************************
                                    ;*SUBTEST       MTP043  WRITE BYTE CLEARS SINGLE BIT ERROR TEST
                                    ;*********************************************************************
 8970                                       ;
 8971                                       ; THIS TEST CHECKS TO SEE IF A SINGLE BIT ERROR WILL BE CORRECTED DURING
 8972                                       ; THE READ PORTION OF A WRITE BYTE AND THAT THE CORRECT CHECK BITS WILL
 8973                                       ; BE GENERATED ON A WRITE.
 8974                                       ;
 8975 031030  104424                       CACHOFF                 ;TURN OFF CACHE
 8976 031032  104513                       CBREG                   ;ENABLE CHECK/SYNDROME BIT REGISTER
 8977 031034  105037  002264               CLRB PASFLG             ;CLEAR LOOP COUNTER
 8978 031040                               LET R2 := R1 + #1       ;R2 POINTS TO HIGH BYTE
      031040  010102                                                                    MOV R1,R2
      031042  005202                                                                    INC R2
 8979 031044                               LET R4 := #1            ;INITIAL DATA = 1
      031044  012704  000001                                                            MOV #1,R4
 8980 031050                               REPEAT                  ;
      031050                                                                    B47:;;;;;;
 8981 031050  105237  002264                  INCB PASFLG          ;INCREMENT LOOP COUNTER
 8982 031054                                  LET CSR := #604      ;WRITE CHECK BITS CORRESPONDING TO DATA OF 0
      031054  012737  000604  002150                                                    MOV #604,CSR
 8983 031062  104425                          LOADCSR              ;WRITE CSR
 8984 031064                                  LET (R1) := R4       ;WRITE DATA OF 1 CREATING A SINGLE BIT ERROR
      031064  010411                                                                    MOV R4,(R1)
 8985 031066  104503                          CLR1CSR              ;WRITE CSR TO NORMAL MODE
 8986 031070                                  LET (R2) :B= #377    ;WRITE BYTE OF WORD
      031070  112712  000377                                                            MOVB #377,(R2)
 8987 031074  104426                          READCSR              ;READ CSR
 8988 031076  042737  177757  002150          BIC #^C20,CSR        ;SEE IF SBE INDICATOR IS SET
 8989 031104                                  IF CSR NE #20        ;IS SBE SET?????
      031104  023727  002150  000020                                                    CMP CSR,#20
      031112  001407                                                                    BEQ L276
 8990 031114                                     LET GOOD := #20   ;
      031114  012737  000020  002044                                                    MOV #20,GOOD
 8991 031122                                     LET BAD := CSR    ;
      031122  013737  002150  002052                                                    MOV CSR,BAD
 8992 031130  104060                             ERROR +60         ;
 8993 031132                                  END                  ;
      031132                                                                    L276:;;;;;;
 8994 031132  104513                          CBREG                ;WRITE CSR TO DIAG MODE
 8995 031134  005711                          TST (R1)             ;READ SAO FOR CORRECT CHECK BITS
 8996 031136  104426                          READCSR              ;READ CSR
 8997 031140  042737  174037  002150          BIC #^C3740,CSR      ;MASK OUT CHECK BIT FIELD
 8998 031146                                  IF CSR NE #300       ;WERE CORRECT CHECK BITS GENERATED?????
      031146  023727  002150  000300                                                    CMP CSR,#300
      031154  001412                                                                    BEQ L277
 8999 031156                                     SET HEADER        ;
      031156  012737  177777  002612                                                    MOV  #-1,HEADER
 9000 031164                                     LET GOOD := #300  ;
      031164  012737  000300  002044                                                    MOV #300,GOOD
 9001 031172                                     LET BAD := CSR    ;
      031172  013737  002150  002052                                                    MOV CSR,BAD
 9002 031200  104061                             ERROR +61         ;
 9003 031202                                  END                  ;
      031202                                                                    L277:;;;;;;
 9004 031202  005302                          DEC R2               ;POINT TO HIGH BYTE AND REPEAT
```

```
 9005 031204                                LET R4 := #400        ;BIT 0 OF HIGH BYTE
      031204  012704  000400                                                MOV #400,R4
 9006 031210                                UNTILB PASFLG EQ #2   ;DO HIGH AND LOW BYTE
      031210  123727  002264  000002                                        CMPB PASFLG,#2
      031216  001314                                                       BNE 847
      031220                                                     E47:;;;;;;;
 9007 031220  104423                        CACHON                ;TURN ON CACHE
 9008 031222  000207                        RETURN                ;
```

```
 9010 031224                        MTP044: SUBTST  <<MTP044        SHIFTING CHECK BITS THROUGH THE CSR TEST>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       MTP044  SHIFTING CHECK BITS THROUGH THE CSR TEST
                                    ;*****************************************************************************
 9011                               ;
 9012                               ; THIS TEST CHECKS THE ABILITY TO READ AND WRITE CHECKBITS INTO MEMORY
 9013                               ; BY SHIFTING A ONE BIT THROUGH A FIELD OF ZEROS. THE CSR IS READ FOR THE
 9014                               ; CORRECT PATTERNS. THE TEST IS THEN REPEATED ON A ZERO BIT THROUGH A
 9015                               ; FIELD OF ALL ONES.
 9016                               ;
 9017 031224                            REPEAT                          ;ILC;;REV B
      031224                                                                        B50:;;;;;;;
 9018 031224  104424                      CACHOFF                       ;TURN OFF CACHE
 9019 031226                              LET PASFLG :B= #0             ;INIT PASFLG
      031226  105037  002264                                                        CLRB PASFLG
 9020 031232                              LET R5 := #174037             ;CHECK BIT MASK FOR CSR
      031232  012705  174037                                                        MOV #174037,R5
 9021 031236  104475                      CB1CSR                        ;ENABLE CHECK/SYNDROME BIT REGISTER
 9022 031240                              LET R2 := #46                 ;SET UP INITIAL CSR DATA
      031240  012702  000046                                                        MOV #46,R2
 9023 031244                              REPEAT
      031244                                                                        B51:;;;;;;;
 9024 031244                                 LET PASFLG :B= PASFLG + #1  ;INC LOOP COUNTER
      031244  105237  002264                                                        INCB PASFLG
 9025                                                                   ;CHK BITS = 1
 9026                                                                   ;DISABLE ECC;DIAG CHK SET
 9027 031250                                 LET PASSNO := #0           ;INIT PASSNO(INNER LOOP COUNTER)
      031250  005037  002266                                                        CLR PASSNO
 9028 031254                                 REPEAT
      031254                                                                        B52:;;;;;;;
 9029 031254                                   LET PASSNO := PASSNO + #1 ;INC LOOP COUNTER
      031254  005237  002266                                                        INC PASSNO
 9030 031260                                   LET R4 := R2               ;COPY R2 TO R4
      031260  010204                                                                MOV R2,R4
 9031 031262                                   LET CSR := R2              ;GET CSR DATA TO BE WRITTEN
      031262  010237  002150                                                        MOV R2,CSR
 9032 031266  104425                           LOADCSR                    ;WRITE SBE CHECK BITS TO CSR
 9033 031270                                   LET (R1) := #0             ;WRITE DATA AND CHECK BITS AT A=0
      031270  005011                                                                CLR (R1)
 9034 031272  005105                           COM R5                     ;COMPLEMENT MASK
 9035 031274  010546                           MOV R5,-(SP)               ;SAVE R5 ON STACK
 9036 031276  040416                           BIC R4,(SP)                ;CREATE AN XOR FUNCTION
 9037 031300  040504                           BIC R5,R4                  ;
 9038 031302  052604                           BIS (SP)+,R4               ;
 9039 031304                                   LET CSR := R4              ;
      031304  010437  002150                                                        MOV R4,CSR
 9040 031310  104425                           LOADCSR                    ;LOAD CSR WITH COMPLEMENT CHECK BITS
 9041 031312  104426                           READCSR                    ;READ CSR FOR COMPLEMENT CHECK BITS
 9042 031314                                   LET R3 := CSR              ;COPY CSR DATA TO R3
      031314  013703  002150                                                        MOV CSR,R3
 9043 031320  042703  020000                   BIC #BIT13,R3              ;CLEAR ANY POSSIBLE INHIBIT MODE POINTER
 9044 031324                                   IF R3 NE R4 THEN           ;READ CSR FOR PROPER CHECK BITS
      031324  020304                                                                CMP R3,R4
      031326  001412                                                                BEQ L301
 9045 031330                                      LET ADDRESS := R1       ;
      031330  010137  002034                                                        MOV R1,ADDRESS
 9046 031334                                      LET GOOD := R4          ;
```

```
      031334  010437  002044                                                    MOV R4,GOOD
 9047 031340                          LET BAD := R3          ;
      031340  010337  002052                                                    MOV R3,BAD
 9048 031344                          SET HEADER             ;
      031344  012737  177777  002612                                            MOV  #-1,HEADER
 9049 031352  104463                  PERR37                 ;ERROR CALL                ;;ILC;;REVB
 9050 031354                        END
      031354                                                          L301:;;;;;;;
 9051 031354  005105                COM R5                 ;COMPLEMENT MASK
 9052 031356  005711                TST (R1)               ;READ CHECK BITS AT A=0 INTO CSR
 9053 031360  000240                NOP                    ;
 9054 031362  104426                READCSR                ;READ CSR FOR CORRECT CHECK BITS
 9055 031364  040537  002150        BIC R5,CSR             ;MASK OUT CHECK BIT FIELD
 9056 031370                        LET R4 := R2           ;GET CHECK BITS THAT WERE WRITTEN
      031370  010204                                                            MOV R2,R4
 9057 031372  040504                BIC R5,R4              ;MASK OUT CHECK BIT FIELD
 9058 031374                        IF R4 NE CSR           ;ARE CHECK BITS THE SAME?
      031374  020437  002150                                                    CMP R4,CSR
      031400  001413                                                           BEQ L302
 9059 031402                          LET GOOD := R4         ;
      031402  010437  002044                                                    MOV R4,GOOD
 9060 031406                          LET BAD := CSR         ;
      031406  013737  002150  002052                                            MOV CSR,BAD
 9061 031414                          LET ADDRESS := R1      ;
      031414  010137  002034                                                    MOV R1,ADDRESS
 9062 031420                          SET HEADER             ;
      031420  012737  177777  002612                                            MOV  #-1,HEADER
 9063 031426  104464                  PERR40                 ;ERROR CALL                ;;ILC;;REVB
 9064 031430                        END
      031430                                                          L302:;;;;;;;
 9065 031430  040502                BIC R5,R2              ;SHIFT CHECK BITS AND CREATE NEW DATA FOR CSR
 9066 031432                        IFB PASFLG EQ #1       ;SELECT FUNCTION
      031432  123727  002264  000001                                            CMPB PASFLG,#1
      031440  001002                                                           BNE L303
 9067                                                       ;DO A FIELD OF ZEROS--->ONES
 9068 031442  006302                  ASL R2                 ;SHIFT CHECK BITS
 9069 031444                        ELSE                   ;DO A FIELD OF ONES --->ZEROS
      031444  000413                                                           BR L304
      031446                                                          L303:;;;;;;;
 9070 031446  005105                  COM R5                 ;
 9071 031450  010546                  MOV R5,-(SP)           ;TAKE OUT CHECK BIT FIELD
 9072 031452  040216                  BIC R2,(SP)            ;
 9073 031454  040502                  BIC R5,R2              ;
 9074 031456  052602                  BIS (SP)+,R2           ;
 9075 031460  006302                  ASL R2                 ;SHIFT CHECK BITS
 9076 031462  010546                  MOV R5,-(SP)           ;PUT BACK CHECK BIT FIELD
 9077 031464  040216                  BIC R2,(SP)            ;
 9078 031466  040502                  BIC R5,R2              ;
 9079 031470  052602                  BIS (SP)+,R2           ;
 9080 031472  005105                  COM R5                 ;COMPLEMENENT DATA PATTERN
 9081 031474                        END
      031474                                                          L304:;;;;;;;
 9082 031474                          LET R2 := R2 + #6      ;ADD 6 SO THAT WRITE ON CSR WILL ENABLE DIAG MODE
      031474  062702  000006                                                    ADD #6,R2
 9083 031500                        UNTILB PASSNO EQ #6      ;DO ALL CHECK BITS
      031500  123727  002266  000006                                            CMPB PASSNO,#6
      031506  001262                                                           BNE B52
```

```
        031510                                                          E52:;;;;;;
 9084   031510                          LET R2 := #3706                ;REPEAT WITH FIELD OF ONES
        031510  012702  003706                                                  MOV #3706,R2
 9085   031514                        UNTILB PASFLG EQ #2
        031514  123727  002264  000002                                          CMPB PASFLG,#2
        031522  001250                                                         BNE B51
        031524                                                          E51:;;;;;;
 9086   031524  104503                CLR1CSR                        ;
 9087   031526  005011                CLR (R1)
 9088   031530  062701  000100        ADD #100,R1                    ;ALL 256 TO ADDRESS             ;ILC;;REVB
 9089   031534                      UNTIL R1 EQ ENDADD               ;                               ;ILC;;REVB
        031534  020137  002562                                                 CMP R1,ENDADD
        031540  001231                                                         BNE B50
        031542                                                          E50:;;;;;;
 9090   031542  104423                CACHON                         ;TURN ON CACHE
 9091   031544  000207                RETURN                         ;
```

```
 9093 031546                        MTP045: SUBTST  <<MTP045        SYNDROMES TO CSR ON DOUBLE BIT ERROR TEST>>
                                    ;*********************************************************************
                                    ;*SUBTEST       MTP045  SYNDROMES TO CSR ON DOUBLE BIT ERROR TEST
                                    ;*********************************************************************
 9094                                       ;
 9095                                       ;  THIS TEST CHECKS TO SEE IF THE DOUBLE BIT ERROR INDICATOR IS SET
 9096                                       ;  ON A DOUBLE BIT ERROR AND THE CORRECT SYNDROMES ARE LATCHED INTO THE
 9097                                       ;  CSR.  THIS TEST IS THEN REPEATED WITH MULTIPLE ERROR CHECK/SYNDROME BITS
 9098                                       ;
 9099 031546  104424                       CACHOFF                 ;TURN OFF CACHE
 9100 031550  104513                       CBREG                   ;ENABLE CHECK/SYNDROME BIT REGISTER
 9101 031552                               LET PASSNO := #0        ;CLEAR LOOP COUNTER
      031552  005037  002266                                                       CLR PASSNO
 9102 031556                               LET GOOD := #3744       ;GOOD DATA
      031556  012737  003744  002044                                               MOV #3744,GOOD
 9103 031564                               LET CSR := #3144        ;DBE CHECK BITS FOR CSR
      031564  012737  003144  002150                                               MOV #3144,CSR
 9104 031572                               REPEAT                  ;
      031572                                                                  853:;;;;;;
 9105 031572  005237  002266                  INC PASSNO           ;
 9106 031576  104425                       LOADCSR                 ;WRITE DBE CHECK BITS TO CSR
 9107 031600                               LET (R1) := #0          ;WRITE ZEROS AND DBL ERROR CHK BITS A=0
      031600  005011                                                              CLR (R1)
 9108 031602  104503                       CLR1CSR                 ;CLEAR CSR OUT
 9109 031604  005711                       TST (R1)                ;READ A=0 TO GET DOUBLE BIT ERROR
 9110 031606  104426                       READCSR                 ;WAS UNCORRECABLE ERROR BIT SET???
 9111 031610                               IF #BIT15 OFF.IN CSR    ;
      031610  032737  100000  002150                                               BIT #BIT15,CSR
      031616  001007                                                              BNE L310
 9112 031620                                  SET HEADER           ;
      031620  012737  177777  002612                                               MOV  #-1,HEADER
 9113 031626                                  LET BAD := CSR       ;
      031626  013737  002150  002052                                               MOV CSR,BAD
 9114 031634  104063                          ERROR +63            ;BIT NOT SET
 9115 031636                               END                     ;
      031636                                                                  L310:;;;;;;
 9116 031636  104514                       SYNREG                  ;ENABLE SYNDROME BIT REGISTER
 9117 031640  104426                       READCSR                 ;READ CSR FOR CORRECT SYNDROME BITS
 9118 031642  000240                       NOP                     ;DEBUG AIDE
 9119 031644  042737  174033  002150       BIC #^C3744,CSR         ;MASK SYNDROMES OUT
 9120 031652                               IF CSR NE GOOD THEN     ;CHECK IF DOUBLE ERROR BIT IS SET
      031652  023737  002150  002044                                               CMP CSR,GOOD
      031660  001407                                                              BEQ L311
 9121 031662                                  LET BAD := CSR       ;BAD DATA
      031662  013737  002150  002052                                               MOV CSR,BAD
 9122 031670                                  SET HEADER           ;
      031670  012737  177777  002612                                               MOV  #-1,HEADER
 9123 031676  104042                          ERROR +42            ;
 9124 031700                               END                     ;
      031700                                                                  L311:;;;;;;
 9125 031700  005011                       CLR (R1)                ;CLEAR LUT
 9126 031702                               LET GOOD := #3604       ;REPEAT WITH MULTIPLE ERROR SYNDROMES
      031702  012737  003604  002044                                               MOV #3604,GOOD
 9127 031710                               LET CSR := #3004        ;MULTIPLE ERROR CHECK BITS
      031710  012737  003004  002150                                               MOV #3004,CSR
 9128 031716                            UNTIL PASSNO EQ #2         ;
      031716  023727  002266  000002                                               CMP PASSNO,#2
```

```
        031724  001322                                          BNE B53
        031726                                          E53:::::::
   9129 031726  104503          CLR1CSR         ;
   9130 031730  104423          CACHON          ;
   9131 031732  000207          RETURN
```

```
 9133 031734                          MTP046: SUBTST  <<MTP046        CHECK SINGLE BIT ERRORS WITH ECC DISABLED>>
                                      ;*********************************************************************************
                                      ;*SUBTEST       MTP046  CHECK SINGLE BIT ERRORS WITH ECC DISABLED
                                      ;*********************************************************************************
 9134                                         ;
 9135                                         ; THIS TEST CHECKS TO SEE THAT FOR EACH BIT OF A DATA WORD THAT A SBE
 9136                                         ; IS TREATED LIKE A UNCORRECTABLE ERROR WITH ECC DISABLED AND TRAPS
 9137                                         ; ARE DETECTED.
 9138                                         ;
 9139 031734  005037  002266             CLR  PASSNO                          ;CLEAR OUTER LOOP COUNTER
 9140 031740  104424                     CACHOFF                              ;TURN OFF CACHE
 9141 031742                              REPEAT                               ;
      031742                                                                                  B54:;;;;;;
 9142 031742                              LET PASSNO := PASSNO + #1            ;
      031742  005237  002266                                                                      INC PASSNO
 9143 031746  005000                      CLR  R0                              ;CLEAR DATA
 9144 031750  105037  002264              CLRB PASFLG                          ;CLEAR PASFLG
 9145 031754  104513                      CBREG                                ;ENABLE CHECK/SYNDROME BIT REGISTER
 9146 031756                              REPEAT                               ;
      031756                                                                             B55:;;;;;;
 9147 031756                                   LET PASFLG :B= PASFLG + #1       ;INCREMENT LOOP COUNTER
      031756  105237  002264                                                                   INCB PASFLG
 9148 031762                                   LET R4  := #-1                   ;INDEX TO SINGLE BIT ERROR TABLE
      031762  012704  177777                                                                   MOV #-1,R4
 9149 031766                                   LET NOPAR := #1                  ;ENABLE PARITY ACTION
      031766  012737  000001  002076                                                           MOV #1,NOPAR
 9150 031774                                   LET BITNO := #0                  ;CLEAR INNER LOOP COUNTER
      031774  005037  002324                                                                   CLR BITNO
 9151 032000                                   IFB PASFLG EQ #1                 ;SELECT DATA TO BE CORRECTED BY PASSNO
      032000  123727  002264  000001                                                           CMPB PASFLG,#1
      032006  001003                                                                          BNE L313
 9152 032010                                      LET R5 := #1                  ;DATA=0;BIT TO BE CORRECTED IS A ONE
      032010  012705  000001                                                                   MOV #1,R5
 9153 032014                                   ELSE                             ;
      032014  000402                                                                           BR L314
      032016                                                                             L313:;;;;;;;
 9154 032016                                      LET R5 := #177776             ;DATA=177776;BIT TO BE CORRECTED IS A ZERO
      032016  012705  177776                                                                   MOV #177776,R5
 9155 032022                                   END                              ;
      032022                                                                             L314:;;;;;;;
 9156 032022                                   REPEAT                           ;
      032022                                                                             B56:;;;;;;;
 9157 032022                                     LET PARCNT := #0               ;CLEAR PARITY COUNTER
      032022  005037  002072                                                                   CLR PARCNT
 9158 032026  005237  002324                     INC BITNO                      ;INCREMENT BIT POINTER
 9159 032032                                     LET R4 := R4 + #1              ;POINT TO NEXT SET OF CHECK BITS
      032032  005204                                                                           INC R4
 9160 032034                                     LET R2 :B= PTABLE(R4)          ;GET NEXT SET OF CHECK BITS
      032034  116402  030276                                                                   MOVB PTABLE(R4),R2
 9161 032040  072227  000005                     ASH #5,R2                      ;SHIFT TO LINE UP IN CSR
 9162 032044  052702  000006                     BIS #BIT2!BIT1,R2              ;ENABLE DIAG MODE
 9163 032050                                     LET CSR := R2                  ;GET CHECK BITS TO BE WRITTEN
      032050  010237  002150                                                                   MOV R2,CSR
 9164 032054  104425                             LOADCSR                        ;LOAD CSR WITH DATA
 9165 032056                                     LET (R1) := R0                 ;WRITE DATA TO TEST ADDRESS
      032056  010011                                                                           MOV R0,(R1)
 9166 032060                                     IF PASSNO EQ #1                ;WRITE CSR
```

```
        032060  023727  002266  000001                                                  CMP PASSNO,#1
        032066  001002                                                                  BNE L315
 9167   032070  104471                      ECC1DIS             ;FIRST PASS  ;ECC DISABLE,NO PBL
 9168   032072                          ELSE                    ;
        032072  000401                                                                  BR L316
        032074                                                              L315:;;;;;;
 9169   032074  104507                      ENA1SBE             ;SECOND PASS ;ECC DISABLE,PBL ENABLED
 9170   032076                          END                     ;
        032076                                                              L316:;;;;;;
 9171   032076  005711                  TST (R1)                ;CORRECT SBE
 9172   032100  004737  032220          CALL CHKTRP             ;CHECK FOR CORRECT TRAP
 9173   032104  104426                  READCSR                 ;READ THE CSR FOR UNCORRECTABLE ERROR
 9174   032106                          IF #BIT15 OFF.IN CSR    ;IS UNCORRECTABLE ERROR BIT SET????
        032106  032737  100000  002150                                                  BIT #BIT15,CSR
        032114  001007                                                                  BNE L317
 9175   032116                              LET BAD := CSR      ;
        032116  013737  002150  002052                                                  MOV CSR,BAD
 9176   032124                              SET HEADER          ;
        032124  012737  177777  002612                                                  MOV  #-1,HEADER
 9177   032132  104045                      ERROR +45           ;
 9178   032134                          END                     ;
        032134                                                              L317:;;;;;;
 9179   032134  104503                  CLR1CSR                 ;
 9180   032136  005011                  CLR (R1)                ;CLEAR LUT
 9181   032140                          IFB PASFLG EQ #1        ;SHIFT NEW DATA DEPENDING ON PASFLG
        032140  123727  002264  000001                                                  CMPB PASFLG,#1
        032146  001002                                                                  BNE L320
 9182   032150  006305                      ASL  R5             ;SHIFT BITNO TO THE LEFT
 9183   032152                          ELSE                    ;
        032152  000402                                                                  BR L321
        032154                                                              L320:;;;;;;
 9184   032154  000261                      SEC                 ;SET CARRY BIT AND.....
 9185   032156  006105                      ROL   R5            ;ROTATE LEFT
 9186   032160                          END                     ;
        032160                                                              L321:;;;;;;
 9187   032160                      UNTIL BITNO EQ #16.         ;UNTIL ALL BITS ARE DONE
        032160  023727  002324  000020                                                  CMP BITNO,#16.
        032166  001315                                                                  BNE B56
        032170                                                              E56:;;;;;;
 9188   032170  005100                  COM R0                  ;COMPLEMENT DATA AND REPEAT
 9189   032172                      UNTILB PASFLG EQ #2         ;UNTIL 2 PASSES ARE COMPLETE!
        032172  123727  002264  000002                                                  CMPB PASFLG,#2
        032200  001266                                                                  BNE B55
        032202                                                              E55:;;;;;;
 9190   032202                  UNTIL PASSNO EQ #2              ;
        032202  023727  002266  000002                                                  CMP PASSNO,#2
        032210  001254                                                                  BNE B54
        032212                                                              E54:;;;;;;
 9191   032212  104503                  CLR1CSR                 ;
 9192   032214  104423                  CACHON                  ;TURN CACHE
 9193   032216  000207                  RETURN                  ;
 9194
 9195
 9196   032220                  CHKTRP: IF PASSNO EQ #1         ;PASS 1 CHECK FOR NO TRAP
        032220  023727  002266  000001                                                  CMP PASSNO,#1
        032226  001011                                                                  BNE L325
 9197   032230                              IF PARCNT EQ #1     ;
```

```
        032230  023727  002072  000001
        032236  001004
 9198   032240                          SET HEADER                  ;
        032240  012737  177777  002612
 9199   032246  104057                  ERROR +57                   ;
 9200   032250                      END                             ;
        032250
 9201   032250                  ELSE                                ;
        032250  000410
        032252
 9202   032252                      IF PARCNT NE #1                 ;
        032252  023727  002072  000001
        032260  001404
 9203   032262                          SET HEADER                  ;
        032262  012737  177777  002612
 9204   032270  104064                  ERROR +64                   ;
 9205   032272                      END                             ;
        032272
 9206   032272                  END                                 ;
        032272
 9207   032272  000207          RETURN                              ;
```

```
        CMP PARCNT,#1
        BNE L326

        MOV  #-1,HEADER


L326:;;;;;;

        BR L327
L325:;;;;;;
        CMP PARCNT,#1
        BEQ L330

        MOV  #-1,HEADER


L330:;;;;;;

L327:;;;;;;
```

```
 9209 032274                                MTP047: SUBTST  <<MTP047        NO CSR UPDATE ON SBE WITH EXSISTING DBE>>
                                            ;*********************************************************************************
                                            ;*SUBTEST       MTP047  NO CSR UPDATE ON SBE WITH EXSISTING DBE
                                            ;*********************************************************************************
 9210                                               ;
 9211                                               ;  THIS TEST CHECKS TO SEE THAT THE CSR CONTENTS WILL NOT CHANGE
 9212                                               ;  WITH A SINGLE BIT ERROR WHEN A DOUBLE BIT ERROR ALREADY
 9213                                               ;  EXISTS.
 9214                                               ;
 9215 032274  104424                               CACHOFF                         ;TURN OFF CACHE
 9216 032276                                        LET R4 := BANK                  ;GET BANK NUMBER
      032276  013704  002102                                                                    MOV BANK,R4
 9217 032302  072427  000011                       ASH #9.,R4                      ;SHIFT INTO PLACE
 9218 032306  042704  170037                       BIC #^C7740,R4                  ;MASK OUT UNWANTED BITS
 9219 032312  052704  100000                       BIS #BIT15,R4                   ;SET UP GOOD DATA
 9220 032316  104513                               CBREG                           ;ENABLE CHECK/SYNDROME BIT REGISTER
 9221 032320                                        LET CSR := #3144                ;CHECK BITS FOR DOUBLE BIT ERROR
      032320  012737  003144  002150                                                            MOV #3144,CSR
 9222 032326  104425                               LOADCSR                         ;
 9223 032330                                        LET (R1) := #0                  ;WRITE DBE CHECK BITS
      032330  005011                                                                           CLR (R1)
 9224 032332                                        LET CSR := #104                 ;WRITE SBE CHECK BITS
      032332  012737  000104  002150                                                            MOV #104,CSR
 9225 032340  104425                               LOADCSR                         ;
 9226 032342                                        LET (R2) := #0                  ;WRITE SBE CHECK BITS AT ADDRESS + 4K
      032342  005012                                                                           CLR (R2)
 9227 032344  104503                               CLR1CSR                         ;CLEAR CSR
 9228 032346  005711                               TST (R1)                        ;READ DBE LOCATION
 9229 032350  104426                               READCSR                         ;READ FOR CSR DBE INDICATOR
 9230 032352  042737  020000  002150                BIC #BIT13,CSR                  ;CLEAR INHIBIT MODE POINTER
 9231 032360                                        IF CSR NE R4                    ;
      032360  023704  002150                                                                    CMP CSR,R4
      032364  001411                                                                           BEQ L331
 9232 032366                                           LET BAD := CSR               ;
      032366  013737  002150  002052                                                            MOV CSR,BAD
 9233 032374                                           LET GOOD := R4               ;
      032374  010437  002044                                                                    MOV R4,GOOD
 9234 032400                                           SET HEADER                   ;
      032400  012737  177777  002612                                                            MOV  #-1,HEADER
 9235 032406  104063                                   ERROR +63                    ;
 9236 032410                                        END                             ;
      032410                                                                L331:;;;;;;;
 9237 032410  052704  000020                       BIS #20,R4                      ;SET BIT IN GOOD DATA
 9238 032414  005712                               TST (R2)                        ;READ SBE
 9239 032416  104426                               READCSR                         ;READ CSR FOR NO CHANGE
 9240 032420  042737  020000  002150                BIC #BIT13,CSR                  ;CLEAR INHIBIT MODE POINTER
 9241 032426                                        IF CSR NE R4                    ;
      032426  023704  002150                                                                    CMP CSR,R4
      032432  001411                                                                           BEQ L332
 9242 032434                                           LET BAD := CSR               ;
      032434  013737  002150  002052                                                            MOV CSR,BAD
 9243 032442                                           LET GOOD := R4               ;
      032442  010437  002044                                                                    MOV R4,GOOD
 9244 032446                                           SET HEADER                   ;
      032446  012737  177777  002612                                                            MOV  #-1,HEADER
 9245 032454  104051                                   ERROR +51
 9246 032456                                        END                             ;
```

```
                032456                                                  L332:;;;;;;
   9247 032456  104503          CLR1CSR                 ;CLEAR 1 CSR
   9248 032460  005011          CLR (R1)                ;
   9249 032462  005012          CLR (R2)                ;
   9250 032464  104423          CACHON                  ;TURN ON CACHE
   9251 032466  000207          RETURN
```

```
 9253                                           .SBTTL  MISC SUBROUTINES
 9254
 9255 032470                                REGCOPY:SUBTST  <<SUBR  COPY R0 TO R4,R1 TO R3, & R2 TO R5>>
                                            ;*****************************************************************************
                                            ;*SUBTEST       SUBR    COPY R0 TO R4,R1 TO R3, & R2 TO R5
                                            ;*****************************************************************************
 9256 032470  010004                                MOV     R0,R4
 9257 032472  010103                                MOV     R1,R3
 9258 032474  010205                                MOV     R2,R5
 9259 032476  000207                                RETURN
 9260
 9261 032500                                FLIPWARN:SUBTST <<FLIP WARNING CONSTANTS IN WORST CASE NOISE TESTS>>
                                            ;*****************************************************************************
                                            ;*SUBTEST       FLIP WARNING CONSTANTS IN WORST CASE NOISE TESTS
                                            ;*****************************************************************************
 9262 032500                                        PUSH    R0
      032500  010046                                                                  MOV R0, (SP)
 9263 032502  005237  002616                        INC     FLIPLOC
 9264 032506  042737  177774  002616                BIC     #^C3,FLIPLOC
 9265 032514  022737  000001  002616                CMP     #1,FLIPLOC
 9266 032522  001414                                BEQ     1$
 9267 032524  022737  000002  002616                CMP     #2,FLIPLOC
 9268 032532  001413                                BEQ     2$
 9269 032534  022737  000003  002616                CMP     #3,FLIPLOC
 9270 032542  001414                                BEQ     3$
 9271 032544  005000                                CLR     R0
 9272 032546  013704  002614                        MOV     ONES,R4
 9273 032552  000414                                BR      4$
 9274 032554                                1$:     CLEAR   R0,R4
      032554  005000                                                                  CLR  R0
      032556  005004                                                                  CLR  R4
 9275 032560  000411                                BR      4$
 9276 032562  012700  000401                2$:     MOV     #401,R0
 9277 032566  013704  002614                        MOV     ONES,R4
 9278 032572  000404                                BR      4$
 9279 032574  012700  000401                3$:     MOV     #401,R0
 9280 032600  012704  000401                        MOV     #401,R4
 9281 032604  010037  024762                4$:     MOV     R0,WARN2
 9282 032610  010037  024776                        MOV     R0,WARN3
 9283 032614  010037  025022                        MOV     R0,WARN4
 9284 032620  010037  025036                        MOV     R0,WARN5
 9285 032624                                        POP     R0
      032624  012600                                                                  MOV (SP)+,R0
 9286 032626  000207                                RETURN
```

```
 9288 032630                            BACKGND:SUBTST  <<SUBR  WRITE BACKGROUND>>
                                        ;*****************************************************************************
                                        ;*SUBTEST        SUBR    WRITE BACKGROUND
                                        ;*****************************************************************************
 9289                                           ;WRITES DATA FROM R2
 9290 032630  104415                            SAVREG
 9291 032632  012700  060000                    MOV     #FIRST,R0
 9292 032636  012701  040000                    MOV     #SIZE,R1
 9293 032642  012737  000207  024644            MOV     #207,MTP000+4           ;WARNING PUTTING "RETURN" AFTER WRITE
 9294 032650  012737  024640  002262            MOV     #MTP000,SUPD0ADD
 9295 032656  004737  024446                    CALL    SUPD03
 9296 032662  012737  000240  024644            MOV     #240,MTP000+4           ;RESTORE 'NOP' AFTER WRITE
 9297 032670  104416                            RESREG
 9298 032672  000207                            RETURN
 9299
```

```
 9301 032674                          GETCSR: SUBTST  <<SUBR  GET CSR INFORMATION FROM CONFIGURATION TABLE>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       SUBR    GET CSR INFORMATION FROM CONFIGURATION TABLE
                                      ;*****************************************************************************
 9302                                         ;INPUTS : NONE
 9303                                         ;
 9304                                         ;OUTPUT : CSRNO = CSR NUMBER
 9305                                         ;
 9306 032674  013702  002104                 MOV     BANKINDEX,R2            ;GET INDEX INTO CONFIG TABLE
 9307 032700  016203  002664                 MOV     CONFIG(R2),R3           ;MOV IT INTO R3
 9308 032704  000303                         SWAB    R3                      ;
 9309 032706  006303                         ASL     R3                      ;
 9310 032710  042703  177741                 BIC     #^C36,R3                ;CLEAR OFF SOME BITS
 9311 032714  010337  002152                 MOV     R3,CSRNO                ;SAVE CSR NUMBER
 9312 032720  000207                         RETURN
```

```
 9315 032722                            PCONFIG:SUBTST  <<SUBR  PRINT CONFIGURATION MAP>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       SUBR    PRINT CONFIGURATION MAP
                                        ;*****************************************************************************
 9316 032722                                    PUSH    TKVEC,TKVEC+2,R0
      032722  013746  000060                                                          MOV TKVEC,-(SP)
      032726  013746  000062                                                          MOV TKVEC+2,-(SP)
      032732  010046                                                                 MOV R0,-(SP)
 9317 032734  010637  033334                    MOV     SP,PCONFS               ;SAVE LAST GOOD SP
 9318 032740  012737  033302  000060           MOV     #PCONF2,TKVEC
 9319 032746  012737  000340  000062           MOV     #340,TKVEC+2
 9320 032754  017700  147664                    MOV     @$TKB,R0                ;KILL ANY OLD INTERRUPT
 9321 032760  042737  000200  177776           BIC     #BIT7,PSW               ;LOWER CPU PRIORITY TO 140
 9322 032766  052777  000100  147646           BIS     #BIT6,@$TKS             ;ENABLE KEYBOARD INTERRUPTS
 9323
 9324 032774                                    TYPE    MSG001
      032774  104401  065123                    TYPEIT  ,MSG001
                                                .DSABL  CRF
 9325 033000                                    TYPE    MSG002
      033000  104401  065205                    TYPEIT  ,MSG002
                                                .DSABL  CRF
 9326 033004                                    TYPE    MSG003
      033004  104401  065262                    TYPEIT  ,MSG003
                                                .DSABL  CRF
 9327 033010  022737  000060  002556           CMP     #60,LASTBANK
 9328 033016  002006                            BGE     NOOJ
 9329                                           ;IF FAT PAPER ON TERMINAL GOTO 1$
 9330 033020                                    IF #SW4 SET.IN @SWR THEN JUMPTO PCONF1
      033020  032777  000020  147610                                                  BIT #SW4,@SWR
      033026  001402                                                                 BEQ L333
      033030  000137  033242                                                        JMP PCONF1
      033034                                                                 L333:;;;;;;
 9331 033034  012700  000074          NOOJ:     MOV     #60.,R0
 9332 033040  010004                            MOV     R0,R4
 9333 033042                                    CLEAR   R1,R3
      033042  005001                                                                 CLR  R1
      033044  005003                                                                 CLR  R3
 9334 033046                                    TYPE    MSG004
      033046  104401  065367                    TYPEIT  ,MSG004
                                                .DSABL  CRF
 9335 033052  004737  033336                    CALL    TCONFIG                 ;GO TYPE CONFIGURATION (1ST HALF)
 9336 033056  022737  000060  002556           CMP     #60,LASTBANK
 9337 033064  002106                            BGE     PCONF2
 9338 033066                                    TYPE    $CRLF
      033066  104401  002660                    TYPEIT  ,$CRLF
                                                .DSABL  CRF
 9339 033072                                    TYPE    MSG017                  ;PRINT SPACE(S)
      033072  104401  066076                    TYPEIT  ,MSG017
                                                .DSABL  CRF
 9340 033076                                    TYPE    MSG11A
      033076  104401  065570                    TYPEIT  ,MSG11A
                                                .DSABL  CRF
 9341 033102                                    TYPE    $CRLF
      033102  104401  002660                    TYPEIT  ,$CRLF
                                                .DSABL  CRF
 9342 033106                                    TYPE    MSG017                  ;PRINT SPACE(S)
      033106  104401  066076                    TYPEIT  ,MSG017
```

```
                                        .DSABL  CRF
 9343 033112                            TYPE    MSG011
      033112  104401  065656            TYPEIT  ,MSG011
                                        .DSABL  CRF
 9344 033116                            TYPE    $CRLF
      033116  104401  002660            TYPEIT  ,$CRLF
                                        .DSABL  CRF
 9345 033122                            TYPE    MSG017                  ;PRINT SPACE(S)
      033122  104401  066076            TYPEIT  ,MSG017
                                        .DSABL  CRF
 9346 033126                            TYPE    MSG012
      033126  104401  065744            TYPEIT  ,MSG012
                                        .DSABL  CRF
 9347 033132  012701  000360            MOV     #60.*2*2,R1
 9348 033136  010103                    MOV     R1,R3
 9349 033140  004737  033336            CALL    TCONFIG
 9350 033144  022737  000170  002556  NOOJ1:  CMP     #170,LASTBANK
 9351 033152  002053                    BGE     PCONF2
 9352 033154                            TYPE    $CRLF
      033154  104401  002660            TYPEIT  ,$CRLF
                                        .DSABL  CRF
 9353 033160                            TYPE    MSG017                  ;PRINT SPACE(S)
      033160  104401  066076            TYPEIT  ,MSG017
                                        .DSABL  CRF
 9354 033164                            TYPE    MSG11B
      033164  104401  066041            TYPEIT  ,MSG11B
                                        .DSABL  CRF
 9355 033170                            TYPE    $CRLF
      033170  104401  002660            TYPEIT  ,$CRLF
                                        .DSABL  CRF
 9356 033174                            TYPE    MSG017                  ;PRINT SPACE(S)
      033174  104401  066076            TYPEIT  ,MSG017
                                        .DSABL  CRF
 9357 033200                            TYPE    MSG11C
      033200  104401  066043            TYPEIT  ,MSG11C
                                        .DSABL  CRF
 9358 033204                            TYPE    $CRLF
      033204  104401  002660            TYPEIT  ,$CRLF
                                        .DSABL  CRF
 9359 033210                            TYPE    MSG017                  ;PRINT SPACE(S)
      033210  104401  066076            TYPEIT  ,MSG017
                                        .DSABL  CRF
 9360 033214                            TYPE    MSG11D
      033214  104401  066045            TYPEIT  ,MSG11D
                                        .DSABL  CRF
 9361 033220  012701  000740            MOV     #740,R1
 9362 033224  010103                    MOV     R1,R3
 9363 033226  012700  000010            MOV     #8.,R0
 9364 033232  010004                    MOV     R0,R4
 9365 033234  004737  033336            CALL    TCONFIG
 9366 033240  000420                    BR      PCONF2
 9367
 9368 033242  012700  000170  PCONF1:  MOV     #120.,R0
 9369 033246  010004                    MOV     R0,R4
 9370 033250                            CLEAR   R1,R3
      033250  005001                                                    CLR  R1
      033252  005003                                                    CLR  R3
```

```
 9371 033254                                    TYPE    MSG014                  ;SPACE
      033254  104401  066060                    TYPEIT  ,MSG014
                                                .DSABL  CRF
 9372 033260                                    TYPE    MSG011
      033260  104401  065656                    TYPEIT  ,MSG011
                                                .DSABL  CRF
 9373 033264                                    TYPE    MSG004
      033264  104401  065367                    TYPEIT  ,MSG004
                                                .DSABL  CRF
 9374 033270                                    TYPE    MSG012
      033270  104401  065744                    TYPEIT  ,MSG012
                                                .DSABL  CRF
 9375 033274  004737  033336                    CALL    TCONFIG
 9376 033300  000721                            BR      NOOJ1
 9377
 9378 033302  013706  033334          PCONF2:   MOV     PCONFS,SP               ;RESTORE STACK
 9379 033306  042777  000100  147326            BIC     #BIT6,@$TKS
 9380 033314  117700  147324                    MOVB    @$TKB,R0                ;READ CHAR TO KILL FLAG
 9381 033320                                    POP     R0,TKVEC+2,TKVEC
      033320  012600                                                            MOV (SP)+,R0
      033322  012637  000062                                                    MOV (SP)+,TKVEC+2
      033326  012637  000060                                                    MOV (SP)+,TKVEC
 9382 033332  000207                            RETURN
 9383
 9384 033334  000000                PCONFS:     0                               ;STACK SAVED HERE!
```

```
 9387 033336                                    SUBTST  <<SUBR  TYPE CONFIGURATION>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       SUBR    TYPE CONFIGURATION
                                        ;*****************************************************************************
 9388                                   ;*****************************************************************************
 9389                                   ;CALL:  MOV     #N,R0           ;N=NUMBER OF CHARACTERS
 9390                                   ;       MOV     R0,R4           ;BACKUP
 9391                                   ;       MOV     #K.R1           ;INDEX CONSTANT
 9392                                   ;       MOV     R1,R3           ;BACKUP
 9393                                   ;       CALL    TCONFIG         ;ACTUAL CALL
 9394                                   ;       RETURN                  ;ONLY RETURN
 9395                                   ;*****************************************************************************
 9396
 9397                                           ;************
 9398                                           ;** ERROR **
 9399                                           ;************
 9400 033336  012737  000340  177776  TCONFIG:MOV     #340,PSW        ;DISABLE INTERUPTS
 9401 033344                                    TYPE    MSG005
      033344  104401  065475                   TYPEIT  ,MSG005
                                                .DSABL  CRF
 9402 033350  032761  000001  002664  1$:     BIT     #BIT0,CONFIG(R1)        ;ERROR ON THIS BANK?
 9403 033356  001403                           BEQ     2$                      ;NO - SKIP
 9404 033360                                    TYPE    MSG013                  ;PRINT "X"
      033360  104401  066056                   TYPEIT  ,MSG013
                                                .DSABL  CRF
 9405 033364  000402                           BR      3$
 9406 033366                            2$:     TYPE    MSG014                  ;PRINT SPACE
      033366  104401  066060                   TYPEIT  ,MSG014
                                                .DSABL  CRF
 9407 033372  062701  000004            3$:     ADD     #4,R1                   ;BUMP POINTER
 9408 033376  077014                           SOB     R0,1$                   ;LOOP UNTIL DONE
 9409 033400  010400                           MOV     R4,R0
 9410 033402  010301                           MOV     R3,R1
```

```
 9413                                    ;*****************
 9414                                    ;** INTERLEAVE **
 9415                                    ;*****************
 9416                                    ;THIS IS AN ENTRY POINT FROM ERROR REPORTS
 9417 033404  012737  000340  177776  TCFIG1: MOV     #340,PSW        ;DISABLE INTERUPTS
 9418 033412  112737  000040  066062          MOVB    #' ,MSG015              ;MOVE A BLANK IN TO BE PRINTED
 9419 033420                                  TYPE    MSG015
      033420  104401  066062                  TYPEIT  ,MSG015
                                               .DSABL  CRF
 9420 033424                                  IF NOTAB NE #0 THEN $RETURN
      033424  005737  002372                                                  TST NOTAB
      033430  001401                                                          BEQ L334
      033432  000207                                                          RTS PC
      033434                                                              L334:;;;;;;
 9421 033434  010400                          MOV     R4,R0
 9422 033436  010301                          MOV     R3,R1
 9423
 9424                                    ;*****************
 9425                                    ;** MEMORY TYPE **
 9426                                    ;*****************
 9427                                       .ENABL  LSB
 9428 033440                                  TYPE    MSG009
      033440  104401  065544                  TYPEIT  ,MSG009
                                               .DSABL  CRF
 9429 033444  033761  002106  002664  TCFIG2: BIT     CPUBIT,CONFIG(R1)
 9430 033452  001432                          BEQ     17$
 9431 033454  016105  002666                  MOV     CONFIG+2(R1),R5
 9432 033460  000305                          SWAB    R5
 9433 033462  042705  177770                  BIC     #^C7,R5                 ;GET MEMORY TYPE
 9434 033466  020527  000003                  CMP     R5,#3                   ;CLEAR NON INTERESTING BITS
 9435 033472  003022                          BGT     17$                     ;IS IT A LEGAL MEMORY TYPE
 9436 033474                                  IF #BIT0 SET.IN R5              ;IF IF SO BRANCH!!!!!!!
      033474  032705  000001                                                  ;IS IT AN ECC MEMORY????
      033500  001413                                                          BIT #BIT0,R5
                                                                              BEQ L335
 9437 033502                                    IF #BIT1 SET.IN R5            ;IS IT A MSV11-P OR A MSV11-J???
      033502  032705  000002                                                  BIT #BIT1,R5
      033506  001404                                                          BEQ L336
 9438 033510  112737  000120  066062              MOVB        #'P,MSG015      ;IT IS A MSV11-P
 9439 033516                                    ELSE                          ;
      033516  000403                                                          BR L337
      033520                                                              L336:;;;;;;
 9440 033520  112737  000105  066062              MOVB        #'E,MSG015      ;IT IS A MSV11-J
 9441 033526                                    END                           ;
      033526                                                              L337:;;;;;;
 9442 033526                                  ELSE                            ;
      033526  000403                                                          BR L340
      033530                                                              L335:;;;;;;
 9443 033530  112737  000120  066062              MOVB        #'P,MSG015      ;IT IS A MSV11-L/P
 9444 033536                                  END                             ;
      033536                                                              L340:;;;;;;
 9445 033536  000403                          BR      8$
 9446 033540  112737  000040  066062  17$:     MOVB    #' ,MSG015
 9447 033546                                  TYPE    MSG015
      033546  104401  066062                  TYPEIT  ,MSG015
                                               .DSABL  CRF
 9448 033552                                  IF NOTAB NE #0 THEN $RETURN
      033552  005737  002372                                                  TST NOTAB
```

```
        033556  001401                                                          BEQ L341
        033560  000207                                                          RTS PC
        033562                                                          L341:;;;;;;
 9449   033562  062701  000004          ADD     #4,R1                   ;BUMP POINTER
 9450   033566  077052                  SOB     R0,TCFIG2               ;LOOP UNTIL DONE
 9451   033570  010400                  MOV     R4,R0
 9452   033572  010301                  MOV     R3,R1
 9453                                   .DSABL  LSB
 9454
 9455                                   ;*********
 9456                                   ;** CSR **
 9457                                   ;*********
 9458   033574                          TYPE    MSG016
        033574  104401  066064          TYPEIT  ,MSG016
                                        .DSABL  CRF
 9459   033600  112737  000040  066062  TCFIG3: MOVB    #' ,MSG015
 9460   033606  016105  002664          MOV     CONFIG(R1),R5
 9461   033612  032705  000002          BIT     #BIT1,R5
 9462   033616  001414                  BEQ     16$
 9463   033620  042705  170377          BIC     #^C7400,R5
 9464   033624  000305                  SWAB    R5
 9465   033626  022705  000011          CMP     #9.,R5
 9466   033632  100002                  BPL     10$
 9467   033634  062705  000007          ADD     #7,R5
 9468   033640  062705  000060  10$:    ADD     #60,R5                  ;MAKE ASCII
 9469   033644  110537  066062          MOVB    R5,MSG015               ;PLUG INTO MEMORY
 9470   033650                  16$:    TYPE    MSG015
        033650  104401  066062          TYPEIT  ,MSG015
                                        .DSABL  CRF
 9471   033654                          IF NOTAB NE #0 THEN $RETURN
        033654  005737  002372                                                 TST NOTAB
        033660  001401                                                         BEQ L342
        033662  000207                                                         RTS PC
        033664                                                          L342:;;;;;;
 9472   033664  062701  000004          ADD     #4,R1                   ;BUMP POINTER
 9473   033670  077035                  SOB     R0,TCFIG3
 9474   033672  010400                  MOV     R4,R0
 9475   033674  010301                  MOV     R3,R1
 9476
 9477                                   ;***************
 9478                                   ;** PROTECTED **
 9479                                   ;***************
 9480   033676                          TYPE    MSG010
        033676  104401  065556          TYPEIT  ,MSG010
                                        .DSABL  CRF
 9481   033702  105761  002664  11$:    TSTB    CONFIG(R1)              ;BANK PROTECTED?
 9482   033706  100006                  BPL     14$                     ;NO - SKIP
 9483   033710  112737  000120  066062  MOVB    #'P,MSG015
 9484   033716                  13$:    TYPE    MSG015
        033716  104401  066062          TYPEIT  ,MSG015
                                        .DSABL  CRF
 9485   033722  000402                  BR      15$
 9486   033724                  14$:    TYPE    MSG014                  ;PRINT SPACE
        033724  104401  066060          TYPEIT  ,MSG014
                                        .DSABL  CRF
 9487   033730  062701  000004  15$:    ADD     #4,R1                   ;BUMP POINTER
 9488   033734  077016                  SOB     R0,11$                  ;LOOP UNTIL DONE
```

```
 9489 033736  010400                    MOV     R4,R0
 9490 033740  010301                    MOV     R3,R1
 9491 033742  000207                    RETURN
```

```
                                        .SBTTL  TRAP    PARITY ERROR HANDLER
                                ;*******************************************************************************
                                ;VECTOR TO HERE FROM TRAPS TO 114
                                ;IGNORE ERRORS BUT COUNT IF NOPAR FLAG = 1.
                                ;*******************************************************************************
                                ;
                                ;       CODE    ACTION
                                ;       ----    ------
                                ;         0     PRINT UNEXPECTED PARITY TRAP
                                ;         1     COUNT ERROR
                                ;         2     SET "ABORT" / SETUP "BADPC" / RETURN VIA PCBUMP
                                ;         3     RETURN VIA "PARTHERE"
                                ;
033744  022737  000001  002076  PARITY: CMP     #1,NOPAR                ;COUNTING PARITY ERRORS?
033752  001003                          BNE     1$                      ;NO - SKIP
033754  005237  002072                  INC     PARCNT                  ;PARITY ERROR COUNTER + 1
033760  000002                          RTI
033762  022737  000002  002076  1$:     CMP     #2,NOPAR                ;ACTION CODE = 2 ?
033770  001013                          BNE     2$                      ;NO   SKIP
033772                                  SET     ABORTFLAG               ;YES
033772  012737  177777  002144                                                  MOV  #-1,ABORTFLAG
034000  004737  034152                  CALL    BADSTACK                ;FIND BAD SP,PC,PSW OFF STACK
034004  063716  002326                  ADD     PCBUMP,(SP)             ;UPDATE RETURN PC
034010  042766  000004  000002          BIC     #BIT2,2(SP)             ;SHOW FAILURE BY .NE.
034016  000002                          RTI
034020  022737  000003  002076  2$:     CMP     #3,NOPAR                ;ACTION CODE - 3 ?
034026  001003                          BNE     3$                      ;NO - SKIP
034030  013716  002304                  MOV     PARTHERE,(SP)
034034  000002                          RTI
034036  004737  034152          3$:     CALL    BADSTACK                ;FIND BAD SP,PC,PSW OFF STACK
034042                                  FATAL   32
034042  005237  002064                  INC     FATAL$                  ;SET FATAL INDICATOR
034046  104032                          ERROR   +32
                                        .DSABL  CRF
```

```
                                        .SBTTL  TRAP    NON-EXISTANT MEMORY (HOLES) HANDLER
                                ;*******************************************************************************
                                ;VECTOR TO HERE (SOMETIMES) FROM TRAPS TO 4
                                ;       CODE IN NONEM DETERMINES ACTION AS FOLLOWS:
                                ; 1)    IGNORE ERRORS BUT COUNT IF NONEM (NO NON-EXISTANT MEMORY) FLAG = 1.
                                ; 2)    TO EXIT PATTERN 0 DURING SIZING IF NON-EXIST MEM ERROR
                                ;*******************************************************************************

034050  022737  000001  002100  NONEXIST:CMP     #1,NONEM                ;COUNTING NON EXISTANT MEMORY ERRORS?
034056  001011                          BNE     2$                      ;NO - SKIP
034060  005237  002070                  INC     NEMCNT                  ;BUMP NON-EXISTANT MEMORY COUNTER
034064  022737  000001  002070          CMP     #1,NEMCNT               ;FIRST ERROR?
034072  001002                          BNE     1$                      ;NO - SKIP
034074  010037  002034                  MOV     R0,ADDRESS              ;ASSUME R0 CONTAINS THE ADDRESS ACCESSED
034100  000002                  1$:     RTI
034102  005237  002070          2$:     INC     NEMCNT                  ;BUMP NON-EXISTANT MEMORY COUNTER
034106  012701  000001                  MOV     #1,R1                   ;DUMMY UP R1 FOR A FORCED SOB EXIT
034112  000002                          RTI

                                ;*******************************************************************************
                                        .SBTTL  TRAP    TIMEOUT (TRAP TO 4) HANDLER
034114  004737  034152          TIMEOUT:CALL    BADSTACK                ;FIND BAD SP,PC,PSW OFF STACK
034120                                  FATAL   6
034120  005237  002064                  INC     FATAL$                  ;SET FATAL INDICATOR
034124  104006                          ERROR   +6
                                        .DSABL  CRF
                                ;*******************************************************************************
                                        .SBTTL  TRAP    MEMORY MANAGEMENT (TRAP TO 250) HANDLER
034126  004737  034152          MMTRAP: CALL    BADSTACK                ;FIND BAD SP,PC,PSW OFF STACK
034132                                  FATAL   7
034132  005237  002064                  INC     FATAL$                  ;SET FATAL INDICATOR
034136  104007                          ERROR   +7
                                        .DSABL  CRF
                                        .SBTTL  TRAP    RESERVED INSTRUCTION HANDLER
034140  004737  034152          PDP1105:CALL    BADSTACK                ;FIND BAD SP,PC,PSW OFF STACK
034144                                  FATAL   5
034144  005237  002064                  INC     FATAL$                  ;SET FATAL INDICATOR
034150  104005                          ERROR   +5
                                        .DSABL  CRF


034152                          BADSTACK:SUBTST <<FIND BAD SP, PC, & PSW FROM STACK>>
                                ;*******************************************************************************
                                ;*SUBTEST        FIND BAD SP, PC, & PSW FROM STACK
                                ;*******************************************************************************
034152  010637  002026                  MOV     SP,BADSP
034156  062737  000002  002026          ADD     #2,BADSP
034164  016637  000002  002022          MOV     2(SP),BADPC
034172  016637  000004  002032          MOV     4(SP),BADPSW
034200  000207                          RETURN
```

```
 9571                                           .SBTTL  TRAP    KERNEL TRAP HANDLER
 9572                                   ;*****************************************************************************
 9573                                   ;KERNEL IS A TRAP THAT COMES HERE
 9574                                   ;*****************************************************************************
 9575
 9576 034202  042766  140000  000002  $KERNEL:       BIC     #140000,2(SP)
 9577 034210  000002                           RTI
 9578                                   ;*****************************************************************************
 9579                                           .SBTTL  TRAP    ENERGIZE TRAP HANDLER
 9580 034212  052737  000001  177572  $ENERGIZE:BIS   #BIT0,MMR0
 9581 034220  000002                           RTI
 9582                                   ;*****************************************************************************
 9583                                           .SBTTL  TRAP    DEENERGIZE TRAP HANDLER
 9584 034222  042737  000001  177572  $DEENERGIZE:BIC #BIT0,MMR0
 9585 034230  000002                           RTI
 9586                                   ;*****************************************************************************
 9587                                           .SBTTL  TRAP    CACHON TRAP HANDLER
 9588 034232  005737  002544          $CACHN: TST     CACHKN          ;IS THERE A CACHE
 9589 034236  001406                           BEQ     1$              ;NO - RETURN
 9590 034240  013737  002544  177746          MOV     CACHKN,CONTRL   ;SETUP CACHE AS PER CONSTANT (USUALLY 1 = FULLY ON)
 9591 034246  052737  000001  177746          BIS     #BIT0,CONTRL    ;DISABLE TRAPS (BUT NOT ABORTS)
 9592 034254  000002                   1$:     RTI
 9593                                   ;*****************************************************************************
 9594                                           .SBTTL  TRAP    CACHOFF TRAP HANDLER
 9595 034256  005737  002544          $CACHF: TST     CACHKN          ;IS THERE A CACHE?
 9596 034262  001403                           BEQ     1$              ;NO - RETURN
 9597                                           ;DISABLE TRAPS (NOT ABORTS), FORCE MISSES, FLUSH, BYPASS
 9598 034264  053737  002550  177746          BIS     CACHKF,CONTRL
 9599 034272  000002                   1$:     RTI
```

```
 9602                                   .SBTTL  TRAP    LOAD CSR TRAP HANDLER
 9603                                   ;LOAD CORRECT CSR WITH DATA IN CSR
 9604                                   ;PROGRAM CSR'S ASSERT INHIBIT MODE POINTER WHEN LOADED
 9605 034274                    $LOADC: PUSH    R0,R1                   ;SAVE REGISTERS
      034274  010046                                                                    MOV R0,-(SP)
      034276  010146                                                                    MOV R1,-(SP)
 9606 034300  013700  002152            MOV     CSRNO,R0                ;CREATE CSR ADDRESS
 9607 034304                            IF INHECC IS TRUE THEN GOTO 3$  ;DON'T WANT INH. MODE POINTER ON
      034304  005737  002536                                                           TST INHECC
      034310  001021                                                                   BNE 3$
 9608 034312  005737  002532            TST     PGMCSR                  ;PROGRAM IN INTERLEAVED SPACE?
 9609 034316  100007                    BPL     1$                      ;BRANCH IF NOT
 9610 034320  113701  002533            MOVB    PGMCSR+1,R1             ;CHECK SECOND CSR
 9611 034324  042701  177740            BIC     #^C37,R1                ;CLEAR UNNECESSARY BITS
 9612 034330  020137  002152            CMP     R1,CSRNO                ;IS THIS THE CURRENT CSR?
 9613 034334  001404                    BEQ     2$                      ;BRANCH IF IT IS
 9614 034336  123737  002532  002152  1$:       CMPB    PGMCSR,CSRNO            ;IS THIS THE CURRENT CSR?
 9615 034344  001003                    BNE     3$                      ;BRANCH IF NOT
 9616 034346  052737  020000  002150  2$:       BIS     #BIT13,CSR              ;SET THE INHIBIT MODE POINTER TO  1ST 16K
 9617 034354  013760  002150  172100  3$:       MOV     CSR,CSRADD(R0)          ;LOAD THE CSR
 9618 034362                            POP     R1,R0                   ;RESTORE REGISTERS
      034362  012601                                                                    MOV (SP)+,R1
      034364  012600                                                                    MOV (SP)+,R0
 9619 034366  000002                    RTI
 9620
 9621                                   .SBTTL  TRAP    READ CSR TRAP HANDLER
 9622                                   ;READ THE CORRECT CSR INTO LOCATIONS CSR
 9623 034370                    $READC: PUSH    R0
      034370  010046                                                                    MOV R0,-(SP)
 9624 034372  013700  002152            MOV     CSRNO,R0
 9625 034376  016037  172100  002150    MOV     CSRADD(R0),CSR          ;READ IT
 9626 034404                            POP     R0
      034404  012600                                                                    MOV (SP)+,R0
 9627 034406  000002                    RTI
```

```
                                        .SBTTL  TRAP    TEST (R1) & READ CSR CAREFULLY
034410                          $TSTRD: PUSH    R0,R2,R3
034410  010046                                                                    MOV R0,-(SP)
034412  010246                                                                    MOV R2,-(SP)
034414  010346                                                                    MOV R3,-(SP)
034416  012700  172100                  MOV     #CSRADD,R0              ;CREATE CSR ADDRESS
034422  063700  002152                  ADD     CSRNO,R0
034426  005002                          CLR     R2
034430  005737  002532                  TST     PGMCSR
034434  100007                          BPL     1$
034436  113703  002533                  MOVB    PGMCSR+1,R3
034442  042703  000200                  BIC     #BIT7,R3
034446  020337  002152                  CMP     R3,CSRNO
034452  001404                          BEQ     2$
034454  123737  002532  002152  1$:     CMPB    PGMCSR,CSRNO
034462  001002                          BNE     3$
034464  012702  020000          2$:     MOV     #BIT13,R2
034470  004737  034542          3$:     CALL    TSTRD1
                                        ;IF SINGLE BIT ERROR ONLY - SET CARRY BIT
034474                          5$:     POP     R3,R2,R0
034474  012603                                                                    MOV (SP)+,R3
034476  012602                                                                    MOV (SP)+,R2
034500  012600                                                                    MOV (SP)+,R0
034502                                  IF #BIT4 SET.IN CSR AND #BIT15 OFF.IN CSR
034502  032737  000020  002150                                                    BIT #BIT4,CSR
034510  001410                                                                    BEQ L343
034512  032737  100000  002150                                                    BIT #BIT15,CSR
034520  001004                                                                    BNE L343
034522  052766  000001  000002            BIS   #BIT0,2(SP)
034530                                  ELSE
034530  000403                                                                    BR L344
034532                                                                  L343:;;;;;;
034532  042766  000001  000002            BIC   #BIT0,2(SP)
034540                                  END ;OF IF #BIT4
034540                                                                  L344:;;;;;;
034540  000002                          RTI

034542  010210                  TSTRD1: MOV     R2,(R0)                 ;
034544                                  TESTAREA                        ;
034544  053737  002552  177776         BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                        .DSABL  CRF
034552  105711                          TSTB    (R1)                    ;
034554  042737  140000  177776         BIC     #BIT15!BIT14,PSW        ;
034562  011037  002150                  MOV     (R0),CSR                ;
034566  000207                          RETURN                          ;
```

```
 9661                                          .SBTTL  TRAP    ECC DISABLE ALL CSR'S TRAP HANDLER
 9662 034570  012737  000002  002150  $ECCDIS:MOV     #BIT1,CSR
 9663 034576  004737  035314                  CALL    CSROUT
 9664 034602  000002                          RTI
 9665                                          .SBTTL  TRAP    ECC DISABLE OF 1 SELECTED CSR TRAP HANDLER
 9666 034604  012737  000002  002150  $ECC1DIS:MOV    #BIT1,CSR
 9667 034612  104425                  LOADCSR
 9668 034614  000002                          RTI
 9669                                          .SBTTL  TRAP    INITIALIZE ALL CSR'S TRAP HANDLER
 9670 034616  012737  000001  002150  $ECCINIT:MOV    #BIT0,CSR
 9671 034624  004737  035314                  CALL    CSROUT
 9672 034630  000002                          RTI
 9673                                          .SBTTL  TRAP    INITIALIZE 1 SELECTED CSR TRAP HANDLER
 9674 034632  012737  000001  002150  $ECC1INIT:MOV   #BIT0,CSR
 9675 034640  104425                  LOADCSR
 9676 034642  000002                          RTI
 9677                                          .SBTTL  TRAP    ENABLE SBE PARITY TRAPS ON ALL CSR'S
 9678 034644  012737  000003  002150  $ENASBE:MOV     #BIT0!BIT1,CSR
 9679 034652  004737  035314                  CALL    CSROUT
 9680 034656  000002                          RTI
 9681                                          .SBTTL  TRAP    ENABLE SBE PARITY TRAPS ON 1 SELECTED CSR
 9682 034660  012737  000003  002150  $ENA1SBE:MOV    #BIT0!BIT1,CSR
 9683 034666  104425                  LOADCSR
 9684 034670  000002                          RTI
 9685                                          .SBTTL  TRAP    WRITE CHECKBITS THRU ALL CSR'S TRAP HANDLER
 9686 034672  013737  002314  002150  $CBCSR: MOV     CHECK,CSR               ;BITS 11-5
 9687 034700  052737  000006  002150          BIS     #BIT1!BIT2,CSR          ;CHECK MODE
 9688 034706  004737  035314                  CALL CSROUT
 9689 034712  000002                          RTI
 9690                                          .SBTTL  TRAP    WRITE CHECKBITS THRU 1 SELECTED CSR TRAP HANDLER
 9691 034714  013737  002314  002150  $CB1CSR:MOV     CHECK,CSR               ;BITS 11-5
 9692 034722  052737  000006  002150          BIS     #BIT1!BIT2,CSR          ;CHECK MODE
 9693 034730  104425                  LOADCSR
 9694 034732  000002                          RTI
```

```
 9697                                   .SBTTL  TRAP    WAS THERE A SBE ON ANY CSR TRAP HANDLER
 9698 034734                    $WASSBE:PUSH    R1,R4
      034734  010146                                                                  MOV R1,-(SP)
      034736  010446                                                                  MOV R4,-(SP)
 9699 034740  013701  002224            MOV     TOTCSRS,R1      ;GET CSR'S BYTE
 9700 034744  005004                    CLR     R4
 9701 034746                            BEGIN LWSBE
      034746                                                                 B57:;;;;;;;
 9702 034746                              FOR CSRNO := #0 TO #36 BY #2
      034746  005037  002152                                                          CLR CSRNO
      034752                                                                 B60:;;;;;;;
 9703 034752  006301                        ASL         R1
 9704 034754                              ON.ERROR
      034754  103010                                                                 BCC L345
 9705 034756  104426                        READCSR
 9706 034760                              IF #BIT4 SET.IN CSR
      034760  032737  000020  002150                                                 BIT #BIT4,CSR
      034766  001403                                                                 BEQ L346
 9707 034770                                SET     R4
      034770  012704  177777                                                        MOV  #-1,R4
 9708 034774                              LEAVE LWSBE
      034774  000411                                                                BR E57
 9709 034776                              END ;OF IF #BIT4
      034776                                                                 L346:;;;;;;;
 9710 034776                            END ;OF ON.ERROR
      034776                                                                 L345:;;;;;;;
 9711 034776                            IF R1 EQ #0 THEN LEAVE LWSBE
      034776  005701                                                                TST R1
      035000  001407                                                                BEQ E57
 9712 035002                            END ;OF FOR CSRNO
      035002  062737  000002  002152                                                 ADD #2,CSRNO
      035010  023727  002152  000036                                                 CMP CSRNO,#36
      035016  003755                                                                 BLE B60
      035020                                                                 E60:;;;;;;;;
 9713 035020                        END LWSBE
      035020                                                                 E57:;;;;;;;
 9714 035020  006004                    ROR     R4              ;SET C BIT FOR ERROR
 9715 035022                            POP     R4,R1
      035022  012604                                                                 MOV (SP)+,R4
      035024  012601                                                                 MOV (SP)+,R1
 9716 035026                            ON.ERROR
      035026  103004                                                                 BCC L347
 9717 035030  052766  000001  000002        BIS   #BIT0,2(SP)
 9718 035036                            ELSE
      035036  000403                                                                BR L350
      035040                                                                 L347:;;;;;;;
 9719 035040  042766  000001  000002        BIC   #BIT0,2(SP)
 9720 035046                            END ;OF ON.ERROR
      035046                                                                 L350:;;;;;;;
 9721 035046  000002                    RTI
 9722                                   .SBTTL  TRAP    WAS THERE A SBE IN 1 SELECTED CSR TRAP HANDLER
 9723                                   ;ON RETURN IF CARRY IS SET THERE WAS A SBE
 9724 035050  104426            $WAS1SBE:READCSR
 9725 035052  042766  000001  000002        BIC     #BIT0,2(SP)     ;CLR C BIT ON STACK
 9726 035060  032737  000020  002150        BIT     #BIT4,CSR
 9727 035066  001403                        BEQ     1$
 9728 035070  052766  000001  000002        BIS     #BIT0,2(SP)     ;SET C BIT ON STACK
```

```
 9729 035076  000002                1$:     RTI
```

```
 9732                                   .SBTTL  TRAP    WAS THERE A DBE ON ANY CSR TRAP HANDLER
 9733 035100                    $WASDBE:PUSH    R1,R4                                   MOV R1, (SP)
      035100  010146                                                                     MOV R4,-(SP)
      035102  010446
 9734 035104  013701  002224            MOV     TOTCSRS,R1      ;GET CSR'S BYTE
 9735 035110  005004                    CLR     R4
 9736 035112                            BEGIN LWDBE
      035112                                                                    B61:;;;;;;
 9737 035112                              FOR CSRNO := #0 TO #36 BY #2
      035112  005037  002152                                                            CLR CSRNO
      035116                                                                    B62:;;;;;;
 9738 035116  006301                        ASL         R1
 9739 035120                                ON.ERROR
      035120  103010                                                                   BCC L351
 9740 035122  104426                         READCSR
 9741 035124                                 IF #BIT15 SET.IN CSR
      035124  032737  100000  002150                                                    BIT #BIT15,CSR
      035132  001403                                                                    BEQ L352
 9742 035134                                   SET     R4
      035134  012704  177777                                                            MOV  #-1,R4
 9743 035140                                   LEAVE LWDBE
      035140  000411                                                                   BR E61
 9744 035142                                 END ;OF IF #BIT4
      035142                                                                    L352:;;;;;;
 9745 035142                               END ;OF ON.ERROR
      035142                                                                    L351:;;;;;;
 9746 035142                             IF R1 EQ #0 THEN LEAVE LWDBE
      035142  005701                                                                   TST R1
      035144  001407                                                                   BEQ E61
 9747 035146                             END ;OF FOR CSRNO
      035146  062737  000002  002152                                                    ADD #2,CSRNO
      035154  023727  002152  000036                                                    CMP CSRNO,#36
      035162  003755                                                                   BLE B62
      035164                                                                    E62:;;;;;;;
 9748 035164                            END LWDBE
      035164                                                                    E61:;;;;;;
 9749 035164  006004                    ROR     R4              ;SET C BIT FOR ERROR
 9750 035166                            POP     R4,R1
      035166  012604                                                                   MOV (SP)+,R4
      035170  012601                                                                   MOV (SP)+,R1
 9751 035172                            ON.ERROR
      035172  103004                                                                   BCC L353
 9752 035174  052766  000001  000002      BIS   #BIT0,2(SP`
 9753 035202                            ELSE
      035202  000403                                                                   BR L354
      035204                                                                    L353:;;;;;;
 9754 035204  042766  000001  000002      BIC   #BIT0,2(SP)
 9755 035212                            END ;OF ON.ERROR
      035212                                                                    L354:;;;;;;
 9756 035212  000002                    RTI
 9757                                   .SBTTL  TRAP    WAS THERE A DBE ON 1 SELECTED CSR TRAP HANDLER
 9758                                   ;ON RETURN IF CARRY IS SET THERE WAS A DBE
 9759 035214  104426            $WAS1DBE:READCSR
 9760 035216  005737  002150            TST     CSR             ;DBE?
 9761 035222  100004                    BPL     3$              ;NO - SKIP
 9762 035224  052766  000001  000002    BIS     #BIT0,2(SP)     ;SET C BIT ON STACK
 9763 035232  000002                    RTI
```

```
 9764 035234  042766  000001  000002  3$:     BIC     #BIT0,2(SP)     ;CLR C BIT ON STACK
 9765 035242  000002                         RTI
```

```
 9768                                           .SBTTL  TRAP    CLEAR ALL ECC CSR'S TRAP HANDLER
 9769 035244                            $CLRCSR:CLEAR  CSR
      035244  005037  002150                                                        CLR  CSR
 9770 035250  004737  035314                    CALL    CSROUT
 9771 035254  000002                            RTI
 9772                                           .SBTTL  TRAP    CLEAR 1 SELECTED CSR TRAP HANDLER
 9773 035256                            $CLR1CSR:CLEAR  CSR
      035256  005037  002150                                                        CLR  CSR
 9774 035262  104425                            LOADCSR
 9775 035264  000002                            RTI
 9776                                           .SBTTL  TRAP    ECC DISABLE, CHECK MODE, & WRITE CHECKBITS IN ALL CSR'S TRAP HANDLER
 9777                                           ;CHECKBITS ALREADY IN LOC "CSR"
 9778 035266  052737  000006  002150  $CHKDIS: BIS     #BIT1!BIT2,CSR          ;ECC DISABLE & DIAG CHECK MODE
 9779 035274  004737  035314                    CALL    CSROUT
 9780 035300  000002                            RTI
 9781                                           .SBTTL  TRAP    ECC DISABLE, CHECK MODE, & WRITE CHECKBITS IN 1 SELECTED CSR
 9782                                           ;CHECKBITS ALREADY IN LOC "CSR"
 9783 035302  052737  000006  002150  $CHK1DIS:BIS     #BIT1!BIT2,CSR          ;ECC DISABLE & DIAG CHECK MODE
 9784 035310  104425                            LOADCSR
 9785 035312  000002                            RTI
```

```
 9788 035314                            CSROUT: SUBTST  <<SUBR  WRITE IN ALL CSR'S>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       SUBR    WRITE IN ALL CSR'S
                                        ;*****************************************************************************
 9789 035314                                    PUSH    R1
      035314  010146                                                                    MOV R1,-(SP)
 9790 035316  013701  002224                    MOV     TOTCSRS,R1      ;GET CSR'S BYTE
 9791 035322                                    BEGIN LCSROUT
      035322                                                                    B63:;;;;;;
 9792 035322                                      FOR CSRNO := #0 TO #36 BY #2
      035322  005037  002152                                                    CLR CSRNO
      035326                                                                    B64:;;;;;;
 9793 035326  006301                                ASL         R1
 9794 035330                                      ON.ERROR
      035330  103001                                                            BCC L355
 9795 035332  104425                                  LOADCSR
 9796 035334                                      END ;OF ON.ERROR
      035334                                                                    L355:;;;;;;
 9797 035334                                      IF R1 EQ #0 THEN LEAVE LCSROUT
      035334  005701                                                           TST R1
      035336  001407                                                           BEQ E63
 9798 035340                                      END ;OF FOR CSRNO
      035340  062737  000002  002152                                           ADD #2,CSRNO
      035346  023727  002152  000036                                           CMP CSRNO,#36
      035354  003764                                                           BLE B64
      035356                                                                    E64:;;;;;;;
 9799 035356                                    END LCSROUT
      035356                                                                    E63:;;;;;;
 9800 035356                                    POP     R1
      035356  012601                                                           MOV (SP)+,R1
 9801 035360  000207                            RETURN
 9802
 9803 035362                            $INVALID:       SUBTST  <<TRAP  INVALIDATE BACKGROUND PATTERN>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       TRAP    INVALIDATE BACKGROUND PATTERN
                                        ;*****************************************************************************
 9804 035362                                    PUSH    R0,R1
      035362  010046                                                            MOV R0,-(SP)
      035364  010146                                                            MOV R1,-(SP)
 9805 035366  013701  002102                    MOV     BANK,R1
 9806 035372  006301                            ASL     R1
 9807 035374  006301                            ASL     R1
 9808 035376  042761  020000  002666            BIC     #BIT13,CONFIG+2(R1)
 9809 035404                                    POP     R1,R0
      035404  012601                                                           MOV (SP)+,R1
      035406  012600                                                           MOV (SP)+,R0
 9810 035410  000002                            RTI
```

```
 9812 035412                            $ERRGEN:        SUBTST<<TRAP    GENERATE AND TEST ERROR ADDRESS>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       TRAP    GENERATE AND TEST ERROR ADDRESS
                                        ;*****************************************************************************
 9813 035412                                    PUSH    R0,R1,R2,R3
      035412  010046                                                                           MOV R0,-(SP)
      035414  010146                                                                           MOV R1,-(SP)
      035416  010246                                                                           MOV R2,-(SP)
      035420  010346                                                                           MOV R3,-(SP)
 9814 035422  013703  002104                    MOV     BANKINDEX,R3
 9815 035426  005737  002456                    TST     NOSUPER
 9816 035432  001003                            BNE     6$
 9817 035434  013700  172246                    MOV     SIPAR3,R0               ;GENERATE WHAT ERRCR ADDR SHOULD BE
 9818 035440  000402                            BR      7$
 9819 035442  013700  177646            6$:     MOV     UIPAR3,R0
 9820 035446  072027  177773            7$:     ASH     #-5,R0
 9821 035452  005737  002132                    TST     EQFLAG
 9822 035456  001002                            BNE     1$
 9823 035460  042700  177600                    BIC     #^C177,R0
 9824 035464  000301                    1$:     SWAB    R1                      ;GET CURRENT ADDRESS BITS 11 AND 12
 9825 035466  006201                            ASR     R1
 9826 035470  006201                            ASR     R1
 9827 035472  006201                            ASR     R1
 9828 035474  042701  177775                    BIC     #^C2,R1
 9829 035500  060100                            ADD     R1,R0                   ;ADD THEM TO THE ADJUSTED PAR VALUE
 9830                                           ;GET ERROR ADDRESS FROM CSR UNDER TEST
 9831 035502  013701  002150                    MOV     CSR,R1
 9832 035506  072127  177773                    ASH     #-5,R1
 9833 035512  042701  177600                    BIC     #^C177,R1
 9834 035516  005737  002454                    TST     NO22BIT                 ;IS THIS AN 11/83,11/23-B OR 11/23 ?
 9835 035522  001024                            BNE     2$                      ;BRANCH IF NOT NECESSARY
 9836 035524  005737  002132                    TST     EQFLAG                  ;IS IT EQB?
 9837 035530  001421                            BEQ     2$                      ;BRANCH IF NOT
 9838 035532                                    PUSH    R0                      ;SAVE GENERATED ERROR ADDRESS
      035532  010046                                                                          MOV R0,-(SP)
 9839 035534  013702  002152                    MOV     CSRNO,R2                ;GET CSR NUMBER
 9840 035540  052762  040000  172100            BIS     #BIT14,CSRADD(R2)       ;TURN ON EQB BIT CAREFULLY
 9841 035546  016200  172100                    MOV     CSRADD(R2),R0           ;GET CSR CONTENTS
 9842 035552  042762  040000  172100            BIC     #BIT14,CSRADD(R2)       ;TURN OFF EQB BIT CAREFULLY
 9843 035560  042700  177037                    BIC     #^C740,R0               ;CLEAR EVERYTHING BUT ERROR ADDR
 9844 035564  006300                            ASL     R0
 9845 035566  006300                            ASL     R0                      ;SHIFT ADDR BITS 18-21 INTO POSITION
 9846 035570  060001                            ADD     R0,R1                   ;ADD TO CURRENT ERROR ADDRESS
 9847 035572                                    POP     R0
      035572  012600                                                                           MOV (SP)+,R0
 9848 035574  020001                    2$:     CMP     R0,R1                   ;COMPARE REAL AND GENERATED ERR. ADDR.
 9849 035576  001420                            BEQ     5$                      ;BRANCH IF THEY ARE THE SAME
 9850 035600  005737  002136                    TST     INTFLAG                 ;INTERLEAVED?
 9851 035604  001411                            BEQ     3$                      ;NO - WE HAVE AN ERROR
 9852 035606  062700  000100                    ADD     #100,R0
 9853 035612  005737  002140                    TST     INT64K                  ;64K INTERLEAVED MEMORY?
 9854 035616  001002                            BNE     4$
 9855 035620  062700  000100                    ADD     #100,R0
 9856 035624  020001                    4$:     CMP     R0,R1
 9857 035626  001404                            BEQ     5$
 9858 035630  005737  002066            3$:     TST     SKPERR                  ;ARE WE SUPPOSED TO SKIP ERROR P.O.?
 9859 035634  001001                            BNE     5$                      ;YES - SKIP ERROR PRINTOUT
```

```
 9860 035636  104462                          PERR36                          ;ELSE PRINT ERROR ADDRESS ERROR
 9861 035640  010137  002460          5$:     MOV     R1,ERRADD               ;SAVE CSR'S ERROR ADDRESS
 9862 035644  005037  002066                  CLR     SKPERR                  ;ENABLE THE ERROR PRINTOUT AGAIN
 9863 035650                                  POP     R3,R2,R1,R0             ;RESTORE REGISTERS
      035650  012603                                                                  MOV (SP)+,R3
      035652  012602                                                                  MOV (SP)+,R2
      035654  012601                                                                  MOV (SP)+,R1
      035656  012600                                                                  MOV (SP)+,R0
 9864 035660  000002                          RTI
 9865
 9866 035662                          $CBREG: SUBTST  <<TRAP          ENABLE CHECKBIT REGISTER>>
                                      ;*****************************************************************************
                                      ;*SUBTEST        TRAP            ENABLE CHECKBIT REGISTER
                                      ;*****************************************************************************
 9867 035662  005037  002150                  CLR     CSR                     ;
 9868 035666  052737  000004  002150          BIS     #BIT2,CSR               ;ENABLE DIAGNOSTIC MODE
 9869 035674  104425                          LOADCSR                         ;LOAD CSR REGISTER
 9870 035676  000002                          RTI                             ;
 9871
 9872 035700                          $SYNREG: SUBTST <<TRAP          ENABLE SYNDROME BIT REGISTER>>
                                      ;*****************************************************************************
                                      ;*SUBTEST        TRAP            ENABLE SYNDROME BIT REGISTER
                                      ;*****************************************************************************
 9873 035700  005037  002150                  CLR     CSR                     ;
 9874 035704  052737  040004  002150          BIS     #BIT14!BIT2,CSR         ;ENABLE DIAGNOSTIC MODE
 9875 035712  104425                          LOADCSR                         ;LOAD CSR REGISTER
 9876 035714  000002                          RTI                             ;
 9877
```

```
 9880 035716                                    SUBTST<<SUBR    MAPPER>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       SUBR    MAPPER
                                        ;*****************************************************************************
 9881                                   ;THIS SUBROUTINE MAPS THE MEMORY BANK (16K WORDS = 1 BANK)
 9882                                   ;IN R3 TO THE TEST PATTERN AREA (SUPERVISOR VIRTUAL (60000 - 157777) FOR
 9883                                   ;THE 11/83 ; USER VIRTUAL (60000 - 157777) FOR ALL OTHERS.
 9884                                   ;
 9885                                   ;
 9886                                   ;CALL   MOV     BANKNO,R3               ;SET UP BANK ARGUEMENT
 9887                                   ;       CALL    MAPPER                  ;ACTUAL CALL
 9888                                   ;       RETURN                          ;ONLY RETURN
 9889
 9890                                           ;SET SUPERVISOR/USER UP FOR 1 TO 1 MAP
 9891 035716                            MAPPER: PUSH    R0,R1,R2,R4,R5
      035716  010046                                                                    MOV R0,-(SP)
      035720  010146                                                                    MOV R1,-(SP)
      035722  010246                                                                    MOV R2,-(SP)
      035724  010446                                                                    MOV R4,-(SP)
      035726  010546                                                                    MOV R5,-(SP)
 9892 035730  012700  172340                    MOV     #KIPAR0,R0              ;FIRST AREA TO MAP TO
 9893 035734  012701  172240                    MOV     #SIPAR0,R1              ;FIRST ADDRESS REGISTER
 9894 035740  012704  172200                    MOV     #SIPDR0,R4              ;FIRST DESCRIPTOR REGISTER
 9895 035744  005737  002456                    TST     NOSUPER                 ;CAN WE USE SUPERVISOR MODE?
 9896 035750  001404                           BEQ     4$                      ;YES, BRANCH
 9897 035752  012701  177640                    MOV     #UIPAR0,R1              ;FIRST ADDRESS REGISTER
 9898 035756  012704  177600                    MOV     #UIPDR0,R4              ;FIRST DESCRIPTOR REGISTER
 9899 035762  012702  077406            4$:     MOV     #77406,R2               ;CONSTANT FOR 4K PAGE, UP, R/W
 9900 035766  012705  000010                    MOV     #8.,R5                  ;COUNTER
 9901 035772  012021                    1$:     MOV     (R0)+,(R1)+             ;PUT IN SUPERVISOR ADDRESS
 9902 035774  010224                           MOV     R2,(R4)+                ;PUT IN SUPERVISOR DESCRIPTOR
 9903 035776  077503                           SOB     R5,1$                   ;LOOP TILL DONE
 9904 036000  012741  177600                    MOV     #177600, (R1)           ;CORRECT LAST FIELD FOR PERIPHERALS PAGE
 9905 036004  022737  000005  004010    30$:    CMP     #5,PROTYP               ;IS THIS A 11/73?
 9906 036012  001007                           BNE     40$                     ;BRANCH IF NOT
 9907 036014  012704  172206                    MOV     #SIPDR0+6,R4            ;POINT TO PDR 3
 9908 036020  012705  000004                    MOV     #4.,R5                  ;COUNTER=4
 9909 036024  052724  100000            35$:    BIS     #BIT15,(R4)+            ;SET UNCONDITIONAL CACHE BYPASS IN PDR3-6
 9910 036030  077503                           SOB     R5,35$
 9911                                           ;SET UP SUPERVISOR/USER FOR TEST AREA
 9912 036032  022703  000200            40$:    CMP     #200,R3                 ;MAP NOTHING (1 TO 1)?
 9913 036036  001516                           BEQ     3$                      ;YES - SKIP
 9914 036040  072327  000011                    ASH     #9.,R3                  ;BANK 1 STARTS AT 100,000 LESS 6 LSB'S
 9915                                                                           ;FOR MEMORY MANAGEMENT = 1000
 9916 036044  012701  172246                    MOV     #SIPAR3,R1              ;SETUP FOR AUTO INCREMENTING
 9917 036050  005737  002456                    TST     NOSUPER                 ;DO WE HAVE SUPERVISOR MODE?
 9918 036054  001402                           BEQ     5$                      ;YES - BRANCH
 9919 036056  012701  177646                    MOV     #UIPAR3,R1              ;SETUP FOR AUTO INCREMENTING
 9920 036062  012702  000004            5$:     MOV     #4,R2                   ;COUNTER
 9921 036066  010321                    2$:     MOV     R3,(R1)+                ;PLUG IN PAR INFO
 9922 036070  062703  000200                    ADD     #200,R3                 ;BUMP ADDRESS 4K
 9923 036074  077204                           SOB     R2,2$                   ;LOOP TILL DONE
 9924 036076  005737  002240                    TST     SPLTCSR
 9925 036102  001442                           BEQ     9$
 9926 036104  162701  000010                    SUB     #10,R1
 9927 036110  010102                           MOV     R1,R2
 9928 036112  062702  000004                    ADD     #4,R2
```

```
 9929 036116  022737  000001  002240          CMP     #1,SPLTCSR
 9930 036124  001403                          BEQ     10$
 9931 036126  010200                          MOV     R2,R0
 9932 036130  010102                          MOV     R1,R2
 9933 036132  010001                          MOV     R0,R1
 9934 036134  012122                  10$:    MOV     (R1)+,(R2)+
 9935 036136  011112                          MOV     (R1),(R2)
 9936 036140  013700  002104                  MOV     BANKINDEX,R0
 9937 036144  005737  002140                  TST     INT64K
 9938 036150  001403                          BEQ     11$
 9939 036152  012700  004000                  MOV     #4000,R0
 9940 036156  000402                          BR      12$
 9941 036160  012700  010000          11$:    MOV     #10000,R0
 9942 036164  005737  002456          12$:    TST     NOSUPER
 9943 036170  001403                          BEQ     13$
 9944 036172  012701  177652                  MOV     #UIPAR5,R1
 9945 036176  000402                          BR      14$
 9946 036200  012701  172252          13$:    MOV     #SIPAR5,R1
 9947 036204  060021                  14$:    ADD     R0,(R1)+
 9948 036206  060011                          ADD     R0,(R1)
 9949                                         ;IF WE ONLY HAVE AN 124K SYSTEM, WE DON'T WANT TO TEST THE
 9950                                         ;LAST 4K, WHERE THE Q BUS DEVICE PAGE IS. INSTEAD, THE
 9951                                         ;PROGRAM WILL REMAP THE LAST 4K TO 8-12K. ALSO, IF THERE
 9952                                         ;IS A BANK 177 ON AN 11/83, THE PROGRAM WILL REMAP THE LAST
 9953                                         ;4K TO 8-12K FOR THE SAME REASON.
 9954 036210  022737  000007  002556  9$:     CMP     #7,LASTBANK
 9955 036216  001010                          BNE     7$
 9956 036220  005737  002454                  TST     NO22BIT                 ;11/83,11/23-B OR 23?
 9957 036224  001423                          BEQ     3$                      ;BRANCH IF SO
 9958 036226  022737  000007  002102          CMP     #7,BANK                 ;BANK 7?
 9959 036234  001017                          BNE     3$                      ;NO - BRANCH
 9960 036236  000404                          BR      8$
 9961 036240  022737  000177  002102  7$:     CMP     #177,BANK
 9962 036246  001012                          BNE     3$
 9963 036250  005737  002456          8$:     TST     NOSUPER
 9964 036254  001404                          BEQ     6$
 9965 036256  013737  177652  177654          MOV     UIPAR5,UIPAR6
 9966 036264  000403                          BR      3$
 9967 036266  013737  172252  172254  6$:     MOV     SIPAR5,SIPAR6
 9968 036274                          3$:     POP     R5,R4,R2,R1,R0
      036274  012605                                                          MOV (SP)+,R5
      036276  012604                                                          MOV (SP)+,R4
      036300  012602                                                          MOV (SP)+,R2
      036302  012601                                                          MOV (SP)+,R1
      036304  012600                                                          MOV (SP)+,R0
 9969 036306  000207                  RETURN
 9970                                 .SBTTL  TRAP    MAP KERNEL (ALMOST 1 TO 1) TRAP HANDLER
 9971 036310                  $KMAP:  PUSH    R0,R1,R2,R3,R4
      036310  010046                                                          MOV R0,-(SP)
      036312  010146                                                          MOV R1,-(SP)
      036314  010246                                                          MOV R2,-(SP)
      036316  010346                                                          MOV R3,-(SP)
      036320  010446                                                          MOV R4,-(SP)
 9972 036322  005000                  CLR     R0                      ;1ST AREA TO MAP TO
 9973 036324  012701  172340          MOV     #KIPAR0,R1              ;FIRST ADDRESS
 9974 036330  012702  077406          MOV     #77406,R2               ;CONSTANT FOR 4K PAGE,UP,R/W
 9975 036334  012703  172300          MOV     #KIPDR0,R3              ;1ST PAGE DESCRIPTOR REGISTER
```

```
 9976 036340  012704  000010              MOV     #8.,R4                  ;COUNTER
 9977 036344  010021              1$:     MOV     R0,(R1)+                ;PUT IN KERNEL ADDRESS
 9978 036346  010223                      MOV     R2,(R3)+                ;PUT IN KERNEL DISCRIPTOR
 9979 036350  062700  000200              ADD     #200,R0                 ;ADD ADDRESS CONSTANT FOR 4K CHANGE
 9980 036354  077405                      SOB     R4,1$                   ;LOOP TILL DONE
 9981 036356  012741  177600              MOV     #177600,-(R1)           ;THE PERIPHERALS PAGE TO KIPAR7
 9982 036362  012741  177400              MOV     #177400, (R1)           ;AND NEXT LOWER PAGE TO KIPAR6
 9989 036366                              POP     R4,R3,R2,R1,R0
      036366  012604                                                              MOV (SP)+,R4
      036370  012603                                                              MOV (SP)+,R3
      036372  012602                                                              MOV (SP)+,R2
      036374  012601                                                              MOV (SP)+,R1
      036376  012600                                                              MOV (SP)+,R0
 9990 036400  000002                      RTI
```

```
 9993 036402                          RELOCATE:SUBTST <<RELOCATE PROGRAM>>
                                      ;*************************************************************************
                                      ;*SUBTEST       RELOCATE PROGRAM
                                      ;*************************************************************************
 9994 036402                                  IF #SW12 SET.IN @SWR THEN $RETURN ERROR
      036402  032777  010000  144226                                              BIT #SW12,@SWR
      036410  001402                                                              BEQ L356
      036412  000261                                                             SEC
      036414  000207                                                             RTS PC
      036416                                                                 L356:;;;;;;;
 9995 036416                                  IF APTFLAG IS TRUE OR ACTFLAG IS TRUE
      036416  005737  002352                                                     TST APTFLAG
      036422  001003                                                             BNE L357
      036424  005737  002350                                                     TST ACTFLAG
      036430  001405                                                             BEQ L360
      036432                                                                 L357:;;;;;;;
 9996 036432                                    IF $PASS NE #0 THEN $RETURN ERROR
      036432  005737  056654                                                     TST $PASS
      036436  001402                                                             BEQ L361
      036440  000261                                                             SEC
      036442  000207                                                             RTS PC
      036444                                                                 L361:;;;;;;;
 9997 036444                                  END; OF IF APTFLAG
      036444                                                                 L360:;;;;;;;
 9998 036444                                  BEGIN LOADERBANK
      036444                                                                 B65:;;;;;;;
 9999 036444                                    FOR BANK := #1 TO LASTBANK
      036444  012737  000001  002102                                              MOV #1,BANK
      036452                                                                 B66:;;;;;;;
10000 036452  004737  040052                    CALL EXBANK
10001 036456                                    IF ACFLAG IS TRUE AND PFLAG IS FALSE AND BMFLAG IS FALSE
      036456  005737  002116                                                     TST ACFLAG
      036462  001431                                                             BEQ L362
      036464  005737  002122                                                     TST PFLAG
      036470  001026                                                             BNE L362
      036472  005737  002130                                                     TST BMFLAG
      036476  001023                                                             BNE L362
10002 036500  013700  002102                      MOV       BANK,R0
10003 036504  010037  002432                      MOV       R0,LOADBANK
10004 036510  013701  002576                      MOV       LOADHOME,R1
10005 036514  004737  037442                      CALL      BANKMOV
10006 036520  004737  037774                      CALL      NEWLOAD          ;MAP NEW LOADER BANK IN KERNEL
10007 036524  013701  002104                      MOV       BANKINDEX,R1
10008 036530  052761  100000  002666              BIS       #BIT15,CONFIG+2(R1)      ;MARK LOADER
10009 036536  042761  020000  002666              BIC       #BIT13,CONFIG+2(R1)      ;INVALIDATE BACKGROUND PATTERN
10010 036544                                      LEAVE LOADERBANK
      036544  000416                                                                 BR E65
10011 036546                                    END ;OF IF ACFLAG
      036546                                                                 L362:;;;;;;;
10012 036546                                  END ;OF FOR BANK
      036546  005237  002102                                                     INC BANK
      036552  023737  002102  002556                                              CMP BANK,LASTBANK
      036560  003734                                                             BLE B66
      036562                                                                 E66:;;;;;;;
10013 036562                                  IF #SW13 OFF.IN @SWR
      036562  032777  020000  144046                                              BIT #SW13,@SWR
      036570  001002                                                             BNE L363
```

```
10014 036572                                    TYPE        MSG075          ;RELOCATION NOT POSSIBLE
      036572  104401  070176                  TYPEIT  ,MSG075
                                              .DSABL  CRF
10015 036576                                    END ;OF IF #SW13
      036576                                                                L363:;;;;;;
10016 036576                                    $RETURN ERROP
      036576  000261                                                               SEC
      036600  000207                                                               RTS PC
10017 036602                                  END LOADERBANK
      036602                                                                E65:;;;;;;
10018 036602                                  BEGIN FINDBANK
      036602                                                                B67:;;;;;;
10019 036602  013702  002556                  MOV     LASTBANK,R2
10020 036606  006302                          ASL     R2
10021 036610  006302                          ASL     R2              ;R2 <- R2 * 4
10022 036612                                    FOR R1 := #2*2 TO R2 BY #4
      036612  012701  000004                                                       MOV #2*2,R1
      036616                                                                B70:;;;;;;
10023 036616                                      IF #BIT7!BIT0 OFF.IN CONFIG(R1) ;IF NO ERRORS & NOT PROGRAM SPACE
      036616  032761  000201  002664                                               BIT #BIT7!BIT0,CONFIG(R1)
      036624  001035                                                               BNE L364
10024 036626                                        IF #BIT15 OFF.IN CONFIG+2(R1) ;IF NOT LOADER BANK
      036626  032761  100000  002666                                               BIT #BIT15,CONFIG+2(R1)
      036634  001031                                                               BNE L365
10025 036636                                          IF CPUBIT SET.IN CONFIG(R1) ;IF ACCESSABLE
      036636  033761  002106  002664                                               BIT CPUBIT,CONFIG(R1)
      036644  001425                                                               BEQ L366
10026 036646                                            IF #BIT8 OFF.IN CONFIG+2(R1) THEN LEAVE FINDBANK ;IF PARITY
      036646  032761  000400  002666                                               BIT #BIT8,CONFIG+2(R1)
      036654  001460                                                               BEQ E67
10027 036656                                              IF #BIT6 SET.IN CONFIG(R1) AND #BIT7 OFF.IN CONFIG(R1)
      036656  032761  000100  002664                                               BIT #BIT6,CONFIG(R1)
      036664  001405                                                               BEQ L367
      036666  032761  000200  002664                                               BIT #BIT7,CONFIG(R1)
      036674  001001                                                               BNE L367
10028                                                 ;IF 1ST PROTECTABLE ECC BANK
10029 036676                                          LEAVE FINDBANK
      036676  000447                                                               BR E67
10030 036700                                          END ;OF IF #BIT6
      036700                                                                L367:;;;;;;
10031 036700                                          IF INHECC IS FALSE
      036700  005737  002536                                                       TST INHECC
      036704  001005                                                               BNE L370
10032 036706                                            SET   INHECC
      036706  012737  177777  002536                                               MOV  # 1,INHECC
10033 036714  010137  002540                            MOV   R1,INHBANK
10034 036720                                          END; OF IF INHECC
      036720                                                                L370:;;;;;;
10035 036720                                        END ;OF IF CPUBIT
      036720                                                                L366:;;;;;;
10036 036720                                      END ;OF IF #BIT15
      036720                                                                L365:;;;;;;
10037 036720                                    END ;OF IF #BIT7
      036720                                                                L364:;;;;;;
10038 036720                                  END ;OF FOR
      036720  062701  000004                                                       ADD #4,R1
      036724  020102                                                               CMP R1,R2
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```
        036726  003733                                                          BLE B70
        036730                                                          E70:;;;;;;;
 10039  036730                          IF FULLREL IS FALSE
        036730  005737  002542                                                  TST FULLREL
        036734  001012                                                          BNE L371
 10040  036736                            IF INHECC IS TRUE
        036736  005737  002536                                                  TST INHECC
        036742  001407                                                          BEQ L372
 10041  036744  013701  002540                    MOV    INHBANK,R1
 10042  036750  023727  002300  000030            CMP    REALPAT,#30     ;IS THIS PATTERN 30?
 10043  036756  001421                            BEQ    RELENT1         ;YES - SKIP MESSAGE
 10044  036760  000420                            BR     RELENT1
 10045  036762                                  END; OF IF INHECC
        036762                                                          L372:;;;;;;
 10046  036762                                END; OF IF FULLREL
        036762                                                          L371:;;;;;;
 10047  036762  005037  002536                  CLR   INHECC            ;MAKE SURE FLAG IS TURNED OFF!
 10048  036766                                  IF #SW13 OFF.IN @SWR
        036766  032777  020000  143642                                          BIT #SW13,@SWR
        036774  001006                                                         BNE L373
 10049  036776  023727  002300  000030            CMP         REALPAT,#30     ;IS THIS PATTERN 30?
 10050  037004  001402                            BEQ         SKUB            ;YES - SKIP MESSAGE
 10051  037006                                    TYPE        MSG075          ;RELOCATION NOT POSSIBLE
        037006  104401  070176                TYPEIT  ,MSG075
                                               .DSABL  CRF
 10052  037012                                  END ;OF IF #SW13
        037012                                                          L373:;;;;;;
 10053  037012                        SKUB:     $RETURN ERROR
        037012  000261                                                          SEC
        037014  000207                                                          RTS PC
 10054  037016                              END FINDBANK
        037016                                                          E67:;;;;;;
 10055  037016                              CLEAR   INHECC              ;IF WE RELOCATED PROPERLY, THIS SHOULD BE OFF!
        037016  005037  002536                                                  CLR  INHECC
 10056  037022  042761  020000  002666  RELENT1: BIC     #BIT13,CONFIG+2(R1) ;INVALIDATE BACKGROUND PATTERN
 10057  037030  005000                            CLR     R0
 10058  037032  071027  000004                    DIV     #4,R0
 10059  037036                        RELOC1: LET NEWBANK := R0
        037036  010037  002310                                                  MOV R0,NEWBANK
 10060  037042  013737  002532  002534            MOV     PGMCSR,PGMCSR+2     ;SAVE CURRENT PGM. CSR
 10061  037050  004737  037610                    CALL    USERMAP             ;MAP NEWBANK TO USER PAR
 10062  037054                                    USER                        ;ENTER USER MODE
        037054  052737  140000  177776            BIS     #BIT15!BIT14,PSW            ;GO TO USER MODE
                                               .DSABL  CRF
 10063  037062                                  BMOV    0,100000,SIZE       ;MOVE PROGRAM
        037062  004537  041024                      JSR R5,BLOCK3
        037066  040000                              SIZE
        037070  100000                              100000
        037072  000000                              0
                                                    .DSABL      CRF
 10064  037074  104417                            KERNEL                      ;ENTER KERNEL MODE
 10065  037076  042737  000001  177572  JMPRL1:   BIC     #BIT0,MMR0          ;DEENERGIZE MEMORY MANAGEMENT
 10066  037104  004737  037672                    CALL    NEWKERNEL
 10067  037110  013700  002310                    MOV     NEWBANK,R0
 10068  037114  006300                            ASL     R0
 10069  037116  006300                            ASL     R0                  ;R0 <  R0 * 4
 10070  037120  016002  002664                    MOV     CONFI  R0),R2
```

```
10071 037124  000302                    SWAB    R2
10072 037126  042702  177760            BIC     #^C17,R2
10073 037132  006302                    ASL     R2
10074 037134  052737  000001  177572    BIS     #BIT0,MMR0              ;ENERGIZE MEMORY MANAGEMENT
10075 037142  010237  002532            MOV     R2,PGMCSR               ;PUT NEW PGM. CSR INTO PGMCSR
10076 037146  032760  010000  002666    BIT     #BIT12,CONFIG+2(R0)     ;IS THE NEW BANK INTERLEAVED?
10077 037154  001412                    BEQ     1$                      ;BRANCH IF NOT INTERLEAVED
10078 037156  016002  002664            MOV     CONFIG(R0),R2
10079 037162  042702  007777            BIC     #^C170000,R2
10080 037166  072227  177775            ASH     #-3,R2
10081 037172  052702  100000            BIS     #BIT15,R2
10082 037176  050237  002532            BIS     R2,PGMCSR
10083 037202                      1$:   SET     RLFLAG
      037202  012737  177777  002126                                    MOV  #-1,RLFLAG
10084 037210                            $RETURN NOERROR
      037210  000241                                                    CLC
      037212  000207                                                    RTS PC
```

```
10087 037214                          UNRELOCATE:SUBTST       <<UNRELOCATE PROGRAM>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       UNRELOCATE PROGRAM
                                      ;*****************************************************************************
10088
10089 037214                                  ;RESTORE LOADERS
                                      PUSH    R0
      037214  010046                                                              MOV R0, (SP)
10090 037216  013701  002432                  MOV     LOADBANK,R1
10091 037222  013700  002576                  MOV     LOADHOME,R0
10092 037226  004737  037442                  CALL    BANKMOV
10093 037232  004737  037774                  CALL    NEWLOAD                 ;MAP NEW LOADER BANK IN KERNEL SPACE
10094 037236                                  PUSH    BANK
      037236  013746  002102                                                      MOV BANK,-(SP)
10095 037242  013737  002432  002102          MOV     LOADBANK,BANK
10096 037250  004737  040052                  CALL    EXBANK
10097 037254  013701  002104                  MOV     BANKINDEX,R1
10098 037260  042761  100000  002666          BIC     #BIT15,CONFIG+2(R1)     ;CLEAR LOADER FLAG
10099 037266  013737  002576  002102          MOV     LOADHOME,BANK
10100 037274  004737  040052                  CALL    EXBANK
10101 037300  013701  002104                  MOV     BANKINDEX,R1
10102 037304  042761  020000  002666          BIC     #BIT13,CONFIG+2(R1)     ;INVALIDATE BACKGROUND PATTERN
10103 037312                                  POP     BANK
      037312  012637  002102                                                      MOV (SP)+,BANK
10104 037316                                  CLEAR   INHECC                  ;MAKE SURE ECC TESTS ARE NOT INHIBITED!
      037316  005037  002536                                                      CLR  INHECC
10105
10106                                         ;RESTORE BANK 0
10107 037322  042737  020000  002666          BIC     #BIT13,CONFIG+2         ;INVALIDATE BACKGROUND PATTERN
10108 037330                                  LET NEWBANK := #0
      037330  005037  002310                                                      CLR NEWBANK
10109 037334  004737  037610                  CALL    USERMAP                 ;MAP NEWBANK TO USER PAR
10110 037340                                  USER                            ;ENTER USER MODE
      037340  052737  140000  177776          BIS     #BIT15!BIT14,PSW                ;GO TO USER MODE
                                              .DSABL  CRF
10111 037346                                  BMOV    0,100000,SIZE           ;MOVE PROGRAM
      037346  004537  041024                      JSR R5,BLOCK3
      037352  040000                              SIZE
      037354  100000                              100000
      037356  000000                              0
                                                  .DSABL      CRF
10112 037360  104417                          KERNEL                          ;ENTER KERNEL MODE
10113 037362  042737  000001  177572          BIC     #BIT0,MMR0              ;DEENERGIZE MEMORY MANAGEMENT
10114 037370  004737  037672                  CALL    NEWKERNEL
10115 037374  013737  002534  002532          MOV     PGMCSR+2,PGMCSR         ;RESTORE PREVIOUS PGM. CSR
10116 037402  052737  000001  177572          BIS     #BIT0,MMR0              ;ENERGIZE MEMORY MANAGEMENT
10117 037410  005037  002126                  CLR     RLFLAG
10118 037414  012700  002666          1$:     MOV     #CONFIG+2,R0    ;MOVE 2ND WORD OF CONFIG TO R0
10119 037420  042710  020000          2$:     BIC     #BIT13,(R0)     ;CLEAR BACKGROUND VALID BIT
10120 037424  062700  000004                  ADD     #4,R0           ;INCREMENT TO NEXT BANK
10121 037430  020027  003620                  CMP     R0,#3620        ;DONE?
10122 037434  003771                          BLE     2$              ;NO - BRANCH
10123 037436                                  POP     R0
      037436  012600                                                              MOV (SP)+,R0
10124 037440  000207                          RETURN
10125
```

```
 10128 037442                          BANKMOV:SUBTST  <<MOVE BANKS>>
                                       ;*****************************************************************************
                                       ;*SUBTEST       MOVE BANKS
                                       ;*****************************************************************************
 10129                                         ;MOVE 3/4 OF A BANK
 10130                                         ;CALLING SEQUENCE
 10131                                         ;R0 = DESTINATION BANK
 10132                                         ;R1 = SOURCE BANK
 10133 037442  104415                          SAVREG
 10134 037444  004737  037610                  CALL    USERMAP
 10135 037450  104416                          RESREG
 10136 037452  104415                          SAVREG
 10137 037454  072027  000011                  ASH     #9.,R0
 10138 037460  072127  000011                  ASH     #9.,R1
 10139 037464  012702  177650                  MOV     #UIPAR4,R2
 10140 037470  012703  000200                  MOV     #200,R3
 10141
 10142 037474  010122                          MOV     R1,(R2)+                ;MAP 1ST HALF BANK
 10143 037476  060301                          ADD     R3,R1                   ;BUMP BY 4K
 10144 037500  010122                          MOV     R1,(R2)+
 10145 037502  060301                          ADD     R3,R1
 10146
 10147 037504  010022                          MOV     R0,(R2)+
 10148 037506  060300                          ADD     R3,R0
 10149 037510  010022                          MOV     R0,(R2)+
 10150 037512  060300                          ADD     R3,R0
 10151
 10152 037514                                  USER
       037514  052737  140000  177776          BIS     #BIT15!BIT14,PSW                ;GO TO USER MODE
                                               .DSABL  CRF
 10153 037522                                  BMOV    100000,140000,SIZE/2    ;MOV 1ST HALF BANK
       037522  004537  041024                      JSR R5,BLOCK3
       037526  020000                              SIZE/2
       037530  140000                              140000
       037532  100000                              100000
                                                   .DSABL      CRF
 10154 037534  104417                          KERNEL                  ;ENTER KERNEL MODE
 10155
 10156 037536  012702  177650                  MOV     #UIPAR4,R2
 10157
 10158 037542  010122                          MOV     R1,(R2)+                ;MAP 2ND HALF BANK
 10159 037544  060301                          ADD     R3,R1                   ;BUMP BY 4K
 10160 037546  010122                          MOV     R1,(R2)+
 10161 037550  060301                          ADD     R3,R1
 10162
 10163 037552  010022                          MOV     R0,(R2)+
 10164 037554  060300                          ADD     R3,R0
 10165 037556  010022                          MOV     R0,(R2)+
 10166 037560  060300                          ADD     R3,R0
 10167
 10168 037562                                  USER
       037562  052737  140000  177776          BIS     #BIT15!BIT14,PSW                ;GO TO USER MODE
                                               .DSABL  CRF
 10169 037570                                  BMOV    100000,140000,SIZE/4    ;MOV 3ND FOURTH OF BANK
       037570  004537  041024                      JSR R5,BLOCK3
       037574  010000                              SIZE/4
       037576  140000                              140000
```

```
        037600  100000                          100000
                                                .DSABL      CRF
 10170  037602  104417                  KERNEL                      ;ENTER KERNEL MODE
 10171
 10172  037604  104416                  RESREG
 10173  037606  000207                  RETURN
```

```
 10176 037610                           USERMAP:SUBTST  <<SUBR  MAP USER TO NEW BANK>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       SUBR    MAP USER TO NEW BANK
                                        ;*****************************************************************************
 10177 037610  012701  177640                  MOV     #UIPAR0,R1              ;COPY KERNEL PAR'S & PDR'S (0-3)
 10178 037614  012702  172340                  MOV     #KIPAR0,R2
 10179 037620  012703  177600                  MOV     #UIPDR0,R3
 10180 037624  012704  172300                  MOV     #KIPDR0,R4
 10181 037630  012705  000004                  MOV     #4,R5
 10182 037634  012221                  1$:     MOV     (R2)+,(R1)+
 10183 037636  011423                          MOV     (R4),(R3)+
 10184 037640  077503                          SOB     R5,1$
 10185
 10186 037642  013700  002310                  MOV     NEWBANK,R0
 10187 037646  072027  000011                  ASH     #9.,R0                  ;BANK 1 STARTS AT 100,000 LESS 6 LSB'S
 10188                                                                         ;FOR MEMORY MANAGEMENT = 1000
 10189 037652  012705  000004                  MOV     #4,R5
 10190 037656  010021                  2$:     MOV     R0,(R1)+                ;SETUP UIPAR(4-7)
 10191 037660  062700  000200                  ADD     #200,R0                 ;BUMP ADDRESS 4K
 10192 037664  011423                          MOV     (R4),(R3)+              ;SETUP UIPDR(4-7)
 10193 037666  077505                          SOB     R5,2$
 10194 037670  000207                          RETURN
 10195
 10196 037672                           NEWKERNEL:SUBTST        <<SUBR  SETUP KERNEL PAR'S FOR NEW BANK>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       SUBR    SETUP KERNEL PAR'S FOR NEW BANK
                                        ;*****************************************************************************
 10197 037672                                   PUSH    R0,R1,R5
       037672  010046                                                                   MOV R0,-(SP)
       037674  010146                                                                   MOV R1,-(SP)
       037676  010546                                                                   MOV R5,-(SP)
 10198 037700  012700  172340                  MOV     #KIPAR0,R0
 10199 037704  013701  002310                  MOV     NEWBANK,R1
 10200 037710  072127  000011                  ASH     #9.,R1                  ;BANK 1 STARTS AT 100,000 LESS 6 LSB'S
 10201                                                                         ;FOR MEMORY MANAGEMENT = 1000
 10202 037714  012705  000004                  MOV     #4,R5
 10203 037720  010120                  1$:     MOV     R1,(R0)+                ;SETUP KIPAR(0-3)
 10204 037722  062701  000200                  ADD     #200,R1
 10205 037726  077504                          SOB     R5,1$
 10206 037730                                   POP     R5,R1,R0
       037730  012605                                                                   MOV (SP)+,R5
       037732  012601                                                                   MOV (SP)+,R1
       037734  012600                                                                   MOV (SP)+,R0
 10207 037736  000207                          RETURN
 10208
 10209 037740                           MAPKERNAL:SUBTST <<SUBR MAP KERNAL PARS 4 AND 5 TO A BANK>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       SUBR    MAP KERNAL PARS 4 AND 5 TO A BANK
                                        ;*****************************************************************************
 10210
 10211 037740  013705  002102                  MOV BANK,R5             ;MOV BANK NUMBER TO R5
 10212 037744  072527  000011                  ASH #9.,R5              ;R5 ENTERS 100000 LESS SHIFT TO CREATE MAPPING
 10213 037750  013737  172350  002272          MOV KIPAR4,SAVPAR       ;SAVE OLD PAR
 10214 037756  010537  172350                  MOV R5,KIPAR4           ;GET NEW PAR'S
 10215 037762  062705  000200                  ADD #200,R5             ;
 10216 037766  010537  172352                  MOV R5,KIPAR5           ;
 10217 037772  000207                          RETURN                  ;
```

```
10218
10219 037774                          NEWLOAD:SUBTST  <<SUBR  SETUP KERNEL PAR'S FOR NEW LOADER BANK>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       SUBR    SETUP KERNEL PAR'S FOR NEW LOADER BANK
                                      ;*****************************************************************************
10220                                         ;R0 CONTAINS THE DESTINATION BANK
10221 037774                                  PUSH    R0,R1
      037774  010046                                                                  MOV R0,-(SP)
      037776  010146                                                                  MOV R1,-(SP)
10222 040000  012701  172350                  MOV     #KIPAR4,R1
10223 040004  072027  000011                  ASH     #9.,R0                  ;BANK 1 STARTS AT 100000 LESS 6 LSB'S (1000)
10224 040010  010021                          MOV     R0,(R1)+                ;SETUP KIPAR4
10225 040012  062700  000200                  ADD     #200,R0
10226 040016  010021                          MOV     R0,(R1)+                ;SETUP KIPAR5
10227 040020                                  POP     R1,R0
      040020  012601                                                                  MOV (SP)+,R1
      040022  012600                                                                  MOV (SP)+,R0
10230 040024  000207                          RETURN
10231
10232 040026                          UNMAP:  SUBTST  <<SUBR  UNMAP KERNAL PAR'S 4 AND 5>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       SUBR    UNMAP KERNAL PAR'S 4 AND 5
                                      ;*****************************************************************************
10233 040026  013737  002272  172350          MOV     SAVPAR,KIPAR4           ;RESTORE KIPAR4
10234 040034  062737  000200  002272          ADD     #200,SAVPAR             ;ADD 200 FOR NEXT PAR
10235 040042  013737  002272  172352          MOV     SAVPAR,KIPAR5           ;RESTORE KIPAR5
10236 040050  000207                          RETURN                          ;
```

```
 10237 040052                           EXBANK: SUBTST  <<SUBR  EXAMINE BANK>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       SUBR    EXAMINE BANK
                                        ;*****************************************************************************
 10238                                  ;DOES THE FOLLOWING:
 10239                                  ;(1)  SETS UP "BANKINDEX" AND R1 BASED ON VALUE OF "BANK".
 10240                                  ;(2)  SETS THE "MKFLAG" IF THE BANK IS ECC.
 10241                                  ;(3)  SETS THE "KPFLAG" IF THE BANK IS THE PROTECTED REGION OF ECC MEMORY.
 10242                                  ;(4)  SETS THE "ACFLAG" IF THE BANK CAN BE ACCESSED BY THIS CPU.
 10243                                  ;(5)  SETS THE "PFLAG" IF THE BANK IS IN PROGRAM SPACE.
 10244                                  ;(6)  SETS THE  "RRFLAG" IF RELOCATION IS REQUIRED TO TEST THIS BANK; HOWEVER,
 10245                                  ;     IT COMPLEMENTS THIS FLAG IF THE RELOCATION FLAG "RLFLAG" IS SET (THIS IS
 10246                                  ;     NECESSARY FOR THE USE OF THE RECURSIVE "MODE" SUBROUTINES). THE "RRFLAG"
 10247                                  ;     IS ALWAYS SET TO DISABLE TESTING IF FIELD SERVICE MODE  "SELECTED BANKS"
 10248                                  ;     ARE BEING TESTED AND THIS BANK IS NOT SELECTED.
 10249                                  ;(7)  SETS THE "BMFLAG" IF THE BANK IS A BAD MEMORY;  HOWEVER, IT  COMPLEMENTS
 10250                                  ;     THIS FLAG IF THE "WORST" FLAG IS NOT SET  (THIS IS NECESSARY FOR THE USE
 10251                                  ;     OF THE RECURSIVE "MODE" SUBROUTINES).
 10252                                  ;(8) SETS THE "INTFLAG" IF THE BANK IS INTERLEAVED.
 10253                                  ;(9) SETS THE "INT64K" FLAG IF THE BANK IS INTERLEAVED ON 64K WORD BOUNDS.
 10254                                  ;(10) SETS THE "SKIPMK" FLAG IF THIS BANK IS INTERLEAVED, AND HAS ALREADY
 10255                                  ;     BEEN TESTED.
 10256                                  ;
 10257 040052                                   PUSH    R0,R1,R2
       040052  010046                                                                   MOV R0,-(SP)
       040054  010146                                                                   MOV R1,-(SP)
       040056  010246                                                                   MOV R2,-(SP)
 10258 040060                                   CLEAR   MKFLAG,KPFLAG
       040060  005037  002120                                                           CLR  MKFLAG
       040064  005037  002114                                                           CLR  KPFLAG
 10259 040070                                   SET     ACFLAG
       040070  012737  177777  002116                                                   MOV  #-1,ACFLAG
 10260 040076                                   CLEAR   PFLAG,RRFLAG,BMFLAG
       040076  005037  002122                                                           CLR  PFLAG
       040102  005037  002124                                                           CLR  RRFLAG
       040106  005037  002130                                                           CLR  BMFLAG
 10261 040112                                   CLEAR   INTFLAG,INT64K,SKIPMK
       040112  005037  002136                                                           CLR  INTFLAG
       040116  005037  002140                                                           CLR  INT64K
       040122  005037  002342                                                           CLR  SKIPMK
 10262 040126  013701  002102                   MOV     BANK,R1
 10263 040132  006301                          ASL     R1
 10264 040134  006301                          ASL     R1              ;R1 <- R1 * 4
 10265 040136  010137  002104                  MOV     R1,BANKINDEX
 10266 040142  032761  000100  002664          BIT     #BIT6,CONFIG(R1)        ;PROTECTED REGION OF ECC MEMORY?
 10267 040150  001403                          BEQ     1$                      ;NO - SKIP
 10268 040152                                   SET     KPFLAG
       040152  012737  177777  002114                                                   MOV  #-1,KPFLAG
 10269 040160  012700  000002          1$.     MOV     #BIT1,R0
 10270 040164                                   IF R0 SET.IN CPUBIT AND R0 OFF.IN CONFIG(R1)
       040164  030037  002106                                                           BIT R0,CPUBIT
       040170  001405                                                                   BEQ L374
       040172  030061  002664                                                           BIT R0,CONFIG(R1)
       040176  001002                                                                   BNE L374
 10271 040200  005037  002116                     CLR   ACFLAG
 10272 040204                                   END ;OF IF R0
       040204                                                                   L374:::::::
```

```
10273 040204  005737  002116              TST     ACFLAG                  ;ACTIVE MEMORY?
10274 040210  001415                      BEQ     2$                      ;BRANCH IF NOT
10275 040212  016102  002666              MOV     CONFIG+2(R1),R2
10276 040216  000302                      SWAB    R2
10277 040220  042702  177770              BIC     #^C7,R2                 ;ISOLATE MEM TYPE BITS
10278 040224  020227  000003              CMP     R2,#3                   ;IS THIS AN ILLEGAL MEM TYPE?
10279 040230  003405                      BLE     2$                      ;BRANCH IF NOT
10280 040232                              SET     BMFLAG                ;SET BAD BANK FLAG
      040232  012737  177777  002130                                                      MOV  #-1,BMFLAG
10281 040240  000137  040446              JMP     ENEXBK                  ;JUMP OVER REST OF FLAG TESTS
10282 040244  032761  000400  002666  2$: BIT     #BIT8,CONFIG+2(R1)      ;IS THERE ECC THERE?
10283 040252  001403                      BEQ     3$                      ;NO - SKIP
10284 040254                              SET     MKFLAG                  ;YES - SET MKFLAG
      040254  012737  177777  002120                                                      MOV  #-1,MKFLAG
10285 040262  032761  000200  002664  3$: BIT     #BIT7,CONFIG(R1)        ;BANK = PROGRAM SPACE?
10286 040270  001406                      BEQ     5$                      ;NO - SKIP
10287 040272                              SET     PFLAG,RRFLAG
      040272  012737  177777  002122                                                      MOV  #-1,PFLAG
      040300  012737  177777  002124                                                      MOV  #-1,RRFLAG
10288 040306  005737  002126        5$:   TST     RLFLAG                  ;IS PROGRAM RELOCATED?
10289 040312  001402                      BEQ     6$                      ;NO - SKIP
10290 040314  005137  002124              COM     RRFLAG                  ;YES - COMPLEMENT RELOCATION REQUIRED FLAG
10291 040320  032761  000001  002664  6$: BIT     #BIT0,CONFIG(R1)        ;ERRORS PRESENT IN THIS BANK?
10292 040326  001403                      BEQ     8$                      ;NO - SKIP
10293 040330                              SET     BMFLAG
      040330  012737  177777  002130                                                      MOV  #-1,BMFLAG
10294 040336  005737  002600        8$:   TST     WORST                   ;IS THIS A WORST FIRST PASS?
10295 040342  001002                      BNE     9$                      ;YES - SKIP
10296 040344  005137  002130              COM     BMFLAG                  ;NO - COMPLEMENT BAD MEMORY FLAG
10297 040350                        9$:   IF SELONLY IS TRUE AND #BIT14 OFF.IN CONFIG+2(R1)
      040350  005737  002002                                                              TST SELONLY
      040354  001407                                                                     BEQ L375
      040356  032761  040000  002666                                                     BIT #BIT14,CONFIG+2(R1)
      040364  001003                                                                     BNE L375
10298 040366                              SET   RRFLAG
      040366  012737  177777  002124                                                      MOV  #  1,RRFLAG
10299 040374                              END ;OF IF SELONLY
      040374                                                                  L375:;;;;;;;
10300 040374  032761  010000  002666        BIT     #BIT12,CONFIG+2(R1)     ;IS THIS BANK INTERLEAVED?
10301 040402  001421                      BEQ     ENEXBK                  ;BRANCH IF IT IS NOT
10302 040404                              SET     INTFLAG
      040404  012737  177777  002136                                                      MOV  #-1,INTFLAG
10303 040412  032761  004000  002666        BIT     #BIT11,CONFIG+2(R1)     ;IS THIS BANK INTERLEAVED WITH 64K BOARDS?
10304 040420  001403                      BEQ     10$                     ;BRANCH IF IT IS NOT
10305 040422                              SET     INT64K
      040422  012737  177777  002140                                                      MOV  #-1,INT64K
10306 040430  032761  000040  002664 10$: BIT     #BIT5,CONFIG(R1)        ;SHOULD THIS BANK BE TESTED?
10307 040436  001403                      BEQ     ENEXBK                  ;BRANCH IF IT SHOULD
10308 040440                              SET     SKIPMK
      040440  012737  177777  002342                                                      MOV  #-1,SKIPMK
10309 040446                        ENEXBK: POP   R2,R1,R0                ;RESTORE REGISTERS
      040446  012602                                                                     MOV (SP)+,R2
      040450  012601                                                                     MOV (SP)+,R1
      040452  012600                                                                     MOV (SP)+,R0
10310 040454  000207                      RETURN
```

```
 10313 040456                          BANKOK: SUBTST  <<SUBR  BANK OK?>>
                                       ;*****************************************************************************
                                       ;*SUBTEST       SUBR    BANK OK?
                                       ;*****************************************************************************
 10314                                         ;TEST TO INSURE THAT THE TYPE OF MEMORY IN THE PRESENT BANK
 10315                                         ;IS OF THE TYPE WE ARE TESTING "TMFLAG".
 10316                                         ;RESULT IS RETURNED IN THE CONDITION CODES (OK = (=0)).
 10317 040456  013700  002134                 MOV     TMFLAG,R0
 10318 040462  005100                         COM     R0
 10319 040464  013701  002120                 MOV     MKFLAG,R1
 10320 040470  074001                         XOR     R0,R1
 10321 040472  000207                         RETURN                          ;OK = (=OK)
 10322
 10323 040474                          INCRPT:
 10324 040474                          INCPAT: SUBTST  <<SUBR  INCREMENT PATTERN TESTING >>
                                       ;*****************************************************************************
                                       ;*SUBTEST       SUBR    INCREMENT PATTERN TESTING
                                       ;*****************************************************************************
 10325                                         ;INCREMENT THE PATTERN & SET UP THE CONDITION CODES
 10326                                         ;RESULT - Z BIT SET INDICATES OVERFLOW
 10327 040474  005237  002112                 INC     PATTERN
 10328 040500  022737  000030  002112         CMP     #30,PATTERN             ;SET UP CONDITION CODES
 10329 040506  000207                         RETURN                          ;NOT EQUAL TO ZERO IS GOOD (NO OVERFLOW)
 10330
 10331 040510                          SETPAT:
 10332 040510                          HIPAT:  SUBTST  <<SUBR  SET HIGHEST PATTERN TESTING TYPE>>
                                       ;*****************************************************************************
                                       ;*SUBTEST       SUBR    SET HIGHEST PATTERN TESTING TYPE
                                       ;*****************************************************************************
 10333 040510  012737  000027  002112         MOV     #27,PATTERN             ;SET HIGHEST PATTERN
 10334 040516  000207                         RETURN
 10335
 10336 040520                          INCBNK: SUBTST  <<SUBR  INCREMENT BANK & TEST>>
                                       ;*****************************************************************************
                                       ;*SUBTEST       SUBR    INCREMENT BANK & TEST
                                       ;*****************************************************************************
 10337                                         ;RESULTS RETURNED IN CONDITION CODES
 10338 040520  005237  002102                 INC     BANK
 10339 040524  023737  002556  002102         CMP     LASTBANK,BANK           ;TOO FAR?
 10340 040532  000207                         RETURN
```

```
 10343 040534                          QUIT:   SUBTST  <<QUIT ROUTINE>>
                                       ;*****************************************************************************
                                       ;*SUBTEST       QUIT ROUTINE
                                       ;*****************************************************************************
 10344                                         ;INITIALIZE ALL CSR'S
 10345                                         ;UNRELOCATE IF NECESSARY
 10346                                         ;FLUSH OUT ANY DBE'S
 10347                                         ;TURN OFF MEMORY MANAGEMENT
 10348                                         ;TURN OFF THE Q-BUS MAP
 10349                                         ;HALT
 10350 040534  104472                        ECCINIT         ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
 10351 040536                                SET4    #QUIT1          ;TRAPS TO 4 GOTO QUIT1
       040536  012737  040600  000004        MOV     #QUIT1,4
                                             .DSABL  CRF
 10352 040544                                IF RLFLAG IS TRUE THEN $CALL UNRELOCATE
       040544  005737  002126                                                        TST RLFLAG
       040550  001402                                                              BEQ L376
       040552  004737  037214                                                      JSR PC,UNRELOCATE
       040556                                                                L376:;;;;;;
 10353 040556  004737  022200                CALL    MT0030          ;FLUSH OUT DBE'S
 10354 040562  104421                        DEENERGIZE              ;TURN OFF MEMORY MANAGEMENT
 10355 040564  005737  002454                TST     N022BIT                 ;IS THIS AN 11/83,11/23-B OR 11/23?
 10356 040570  001003                        BNE     QUIT1
 10357 040572  042737  000040  172516        BIC     #BIT5,MMR3                      ;TURN OFF THE Q-BUS MAP
 10358 040600  000005                QUIT1:  RESET
 10359 040602  000000                        HALT
 10360
```

```
 10363 040604                       EXIT:   SUBTST  <<HALT PROGRAM>>
                                    ;*************************************************************************
                                    ;*SUBTEST       HALT PROGRAM
                                    ;*************************************************************************
 10364 040604  004737  040636               CALL    SHUTUP
 10365 040610                       EXIT2:  IF APTFLAG IS TRUE OR ACTFLAG IS TRUE
       040610  005737  002352                                                    TST APTFLAG
       040614  001003                                                           BNE L377
       040616  005737  002350                                                    TST ACTFLAG
       040622  001402                                                           BEQ L400
       040624                                                          L377:;;;;;;;
 10366 040624  000777                         BR      .
 10367 040626                               ELSE
       040626  000403                                                           BR L401
       040630                                                          L400:;;;;;;;
 10368 040630  000000               $EXHALT:  HALT
 10369 040632  000137  003670               JMP     START
 10370 040636                       END ;OF IF APTFLAG
       040636                                                          L401:;;;;;;;
 10371
 10372 040636                       SHUTUP: SUBTST  <<SHUTDOWN DIAGNOSTIC>>
                                    ;*************************************************************************
                                    ;*SUBTEST       SHUTDOWN DIAGNOSTIC
                                    ;*************************************************************************
 10373                                      ;INITIALIZE ALL CSR'S
 10374                                      ;UNRELOCATE
 10375                                      ;FLUSH OUT DBE'S
 10376                                      ;RESTORE LOADERS
 10377                                      ;TURN OFF MEMORY MANAGEMENT
 10378                                      ;UNMAP THE Q-BUS MAP
 10382 040636  104472                     ECCINIT         ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
 10383 040640                             IF RLFLAG IS TRUE THEN $CALL UNRELOCATE
       040640  005737  002126                                                    TST RLFLAG
       040644  001402                                                           BEQ L402
       040646  004737  037214                                                    JSR PC,UNRELOCATE
       040652                                                          L402:;;;;;;;
 10384 040652                             IF QUICK IS FALSE
       040652  005737  002436                                                    TST QUICK
       040656  001002                                                           BNE L403
 10385 040660  004737  022200               CALL  MT0030          ;FLUSH OUT DBE'S
 10386 040664                             END ;OF IF QUICK
       040664                                                          L403:;;;;;;;
 10387 040664  012700  000001             MOV     #1,R0           ;DESTINATION BANK
 10388 040670  013701  002576             MOV     LOADHOME,R1     ;SOURCE BANK
 10389 040674  004737  037442             CALL    BANKMOV
 10390 040700  104421                     DEENERGIZE              ;TURN OFF MEMORY MANAGEMENT
 10391 040702  005737  002454             TST     N022BIT         ;DOES THIS PDP-11 HAVE 22-BIT ADDR?
 10392 040706  001003                     BNE     1$              ;BRANCH IF NOT
 10393 040710  042737  000040  172516     BIC     #BIT5,MMR3              ;TURN OFF Q-BUS MAP
 10397 040716  000207               1$:   RETURN
 10398
 10399 040720                       APTDOWN:SUBTST  <<APT SHUTDOWN SEQUENCE>>
                                    ;*************************************************************************
                                    ;*SUBTEST       APT SHUTDOWN SEQUENCE
                                    ;*************************************************************************
 10400 040720                             MAP     #0                      ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK #0
       040720  010346                                                           MOV R3,-(SP)
```

```
        040722  012703  000000                  MOV     #0,R3
        040726  004737  035716                  CALL    MAPPER
                                                .DSABL  CRF
        040732  012603                                                                 MOV (SP)+,R3
 10401  040734                                   TESTAREA                ;ENTER TEST MODE
        040734  053737  002552  177776          BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                                .DSABL  CRF
 10402  040742  012737  040720  060024          MOV     #APTDOWN,FIRST+24
 10403  040750  012737  000340  060026          MOV     #340,FIRST+26
 10404  040756  012737  000000  120720          MOV     #0,FIRST+APTDOWN
 10405  040764  104417                          KERNEL                  ;ENTER KERNEL MODE
 10406  040766  000000                  APTHLT: HALT
```

```
10409 040770                            SUBTST  <<BLOCK MOVE SUBROUTINE>>
                                ;*******************************************************************************
                                ;*SUBTEST        BLOCK MOVE SUBROUTINE
                                ;*******************************************************************************
10410                                   ;BLOCK3 HAS 3 ARGUEMENTS
10411                                   ;BLOCK2 HAS 2 ARGUEMENTS
10412                                   ;BLOCK1 HAS 1 ARGUEMENTS
10413                                   ;
10414                                   ;ALL ARE CALLED BY THE BMOV MACRO
10415                                   .ENABL  LSB
10416 040770                    BLOCK1: PUSH    R0,R1,R2
       040770  010046                                                   MOV R0,-(SP)
       040772  010146                                                   MOV R1,-(SP)
       040774  010246                                                   MOV R2,-(SP)
10417 040776  012702  177640            MOV     #FASTCITY,R2
10418 041002  012701  000020            MOV     #16.,R1
10419 041006  000413                    BR      3$
10420
10421 041010                    BLOCK2: PUSH    R0,R1,R2
       041010  010046                                                   MOV R0,-(SP)
       041012  010146                                                   MOV R1,-(SP)
       041014  010246                                                   MOV R2,-(SP)
10422 041016  012701  000020            MOV     #16.,R1
10423 041022  000404                    BR      2$
10424
10425 041024                    BLOCK3: PUSH    R0,R1,R2
       041024  010046                                                   MOV R0,-(SP)
       041026  010146                                                   MOV R1,-(SP)
       041030  010246                                                   MOV R2,-(SP)
10426 041032  012501                    MOV     (R5)+,R1
10427 041034  012502            2$:     MOV     (R5)+,R2
10428 041036  012500            3$:     MOV     (R5)+,R0
10429
10430 041040  012022            1$:     MOV     (R0)+,(R2)+
10431 041042  077102                    SOB     R1,1$
10432 041044                            POP     R2,R1,R0
       041044  012602                                                   MOV (SP)+,R2
       041046  012601                                                   MOV (SP)+,R1
       041050  012600                                                   MOV (SP)+,R0
10433 041052  000205                    RTS     R5
10434                                   .DSABL  LSB
```

```
                                .SBTTL  FIELD SERVICE MODE

                        FIELDSERVICE:SUBTST     <<SUBR  FIELD SERVICE COMMAND MODE>>
                                ;*****************************************************************************
                                ;*SUBTEST        SUBR    FIELD SERVICE COMMAND MODE
                                ;*****************************************************************************
                                SAVREG
                                TYPE    MSG020          ;FIELD SERVICE COMMAND MODE
                                TYPEIT  ,MSG020
                                .DSABL  CRF

                                IF RLFLAG IS TRUE OR NOFSMODE IS TRUE
                                                                                TST RLFLAG
                                                                                BNE L404
                                                                                TST NOFSMODE
                                                                                BEQ L405
                                                                        L404:;;;;;;
                                  TYPE  MSG048          ;NOT AVAILABLE NOW - TRY LATER!
                                TYPEIT  ,MSG048
                                .DSABL  CRF
                                  RESREG
                                  RETURN
                                END ;OF IF RLFLAG
                                                                        L405:;;;;;;
                                TST     CACHKN
                                BEQ     1$
                                PUSH    CONTRL          ;SAVE CACHE STATUS
                                                                                MOV CONTRL,-(SP)
                        1$:     PUSH    CSRNO,KAMIKAZE  ;SAVE CSR & KAMIKAZE STATUS
                                                                                MOV CSRNO,-(SP)
                                                                                MOV KAMIKAZE,-(SP)
                                CACHOFF                 ;TURN CACHE OFF
                                SET     KAMIKAZE
                                                                                MOV  #-1,KAMIKAZE
                        FS1:    TYPE    MSG026          ;COMMAND:
                                TYPEIT  ,MSG026
                                .DSABL  CRF
                                RDDEC                   ;READ A DECIMAL NUMBER
                                POP     R0              ;COMMAND - > R0
                                                                                MOV (SP)+,R0
                                CMP     R0,#18.
                                BLOS    1$
                                TYPE    MSG021
                                TYPEIT  ,MSG021
                                .DSABL  CRF
                                BR      FS1
                        1$:     CASE R0
                                                                                MOV R0,-(SP)
                                                                                ASL @SP
                                                                                JSR PC,L406
                          FSCMD0                ;EXIT FIELD SERVICE COMMANDS
                          FSCMD1                ;READ CSR
                          FSCMD2                ;LOAD CSR
                          FSCMD3                ;EXAMINE MEMORY
                          FSCMD4                ;MODIFY MEMORY
                          FSCMD5                ;SELECT BANK & PATTERN
                          FSCMD6                ;TYPE CONFIGURATION MAP
```

```
 10468 041212  043352                    FSCMD7          ;SOB-A-LONG TEST
 10469 041214  043644                    FSCMD8          ;ERROR SUMMARY
 10470 041216  044072                    FSCMD9          ;REFRESH TEST
 10471 041220  044364                    FCMD10          ;SET FILL COUNT
 10472 041222  044412                    FCMD11          ;ENTER KAMIKAZE MODE
 10473 041224  044434                    FCMD12          ;EXIT KAMIKAZE MODE
 10474 041226  044454                    FCMD13          ;TURN CACHE OFF
 10475 041230  044476                    FCMD14          ;TURN CACHE ON
 10476 041232  044514                    FCMD15          ;TEST ONLY SELECTED BANKS
 10477 041234  044600                    FCMD16          ;RESUME TESTING ALL BANKS
 10478 041236  044642                    FCMD17          ;ENABLE TRACE
 10479 041240  044656                    FCMD18          ;DISABLE TRACE
 10480 041242                          END ;OF CASE
       041242                                                        L406:;;;;;;
       041242  062616                                                      ADD (SP)+,@SP
       041244  013646                                                      MOV @(SP)+,-(SP)
       041246  004736                                                      JSR PC,@(SP)+
 10481 041250  000733                  BR      FS1
```

```
10484 041252                          FSCMD0: SUBTST  <<COMMAND 0     EXIT>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       COMMAND 0       EXIT
                                      ;*****************************************************************************
10485 041252                                  TYPE    MSG103          ;LEAVING FIELD SERVICE MODE
      041252  104401  070535                 TYPEIT  ,MSG103
                                             .DSABL  CRF
10486 041256  062706  000002                 ADD     #2,SP
10487 041262                                  IF SKIPKAMI IS TRUE
      041262  005737  002010                                                          TST SKIPKAMI
      041266  001405                                                                  BEQ L407
10488 041270  062706  000002                   ADD   #2,SP                   ;THROW AWAY OLD KAMIKAZE FLAG
10489 041274  005037  002010                   CLR   SKIPKAMI
10490 041300                                  ELSE
      041300  000402                                                          BR L410
      041302                                                              L407:;;;;;;
10491 041302                                    POP   KAMIKAZE              ;RESTORE OLD KAMIKAZE FLAG
      041302  012637  002006                                                  MOV (SP)+,KAMIKAZE
10492 041306                                  END ;OF IF SKIPKAMI
      041306                                                              L410:;;;;;;
10493 041306                                  POP     CSRNO
      041306  012637  002152                                                  MOV (SP)+,CSRNO
10494 041312  005737  002544                 TST     CACHKN
10495 041316  001414                         BEQ     RES0
10496 041320                                  IF CACHKN EQ CACHKF             ;IF CACHE IS OFF
      041320  023737  002544  002550                                           CMP CACHKN,CACHKF
      041326  001003                                                          BNE L411
10497 041330  062706  000002                   ADD   #2,SP                   ;THROW AWAY CACHE STATUS
10498 041334                                  ELSE
      041334  000405                                                          BR L412
      041336                                                              L411:;;;;;;
10499 041336  005737  002544                   TST   CACHKN
10500 041342  001402                           BEQ   RES0
10501 041344                                   POP   CONTRL                 ;RESTORE CACHE STATUS
      041344  012637  177746                                                  MOV (SP)+,CONTRL
10502 041350                                  END ;OF IF CACHKN
      041350                                                              L412:;;;;;;
10503 041350  104416                   RES0:  RESREG
10504 041352  000207                         RETURN
10505
10506 041354                          FSCMD1: SUBTST  <<FS    COMMAND 1       READ CSR>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       FS      COMMAND 1       READ CSR
                                      ;*****************************************************************************
10507 041354  004737  044670                 CALL    WHICHCSR
10508 041360  010637  002306                 MOV     SP,FSSTACK
10509 041364                                 SET4    #RES1           ;TRAPS TO 4 GOTO RES1
      041364  012737  041430  000004         MOV     #RES1,4
                                             .DSABL  CRF
10510 041372  104426                         READCSR
10511 041374                                 SET     NOERROR
      041374  012737  177777  002430                                           MOV  #-1,NOERROR
10512 041402  104026                         ERROR   +26             ;USE ERROR ROUTINE FOR PRINTOUT
10513 041404                                 RES4                    ;RESET TRAPS TO 4 TO DEFAULT
      041404  012737  034114  000004         MOV     #TIMEOUT,4
      041412  022737  000005  004010         CMP     #5,PROTYP       ;IS THIS AN 11/83/84 ?
      041420  001002                         BNE     101$            ;BRANCH IF NOT
```

```
        041422  005037  177766                  CLR     CPUERR          ;CLEAR OUT THE CPU ERROR REGISTER BITS
        041426                          101$:
                                                                        ;THAT A EXPECTED TRAP COULD HAVE SET
                                                .DSABL  CRF
 10514  041426  000207                          RETURN
 10515  041430                          RES1:   TYPE    MSG025          ;THIS CSR DOES NOT EXIST
        041430  104401  066763                  TYPEIT  ,MSG025
                                                .DSABL  CRF
 10516  041434  013706  002306                  MOV     FSSTACK,SP
 10517  041440                                  RES4                    ;RESET TRAPS TO 4 TO DEFAULT
        041440  012737  034114  000004          MOV     #TIMEOUT,4
        041446  022737  000005  004010          CMP     #5,PROTYP       ;IS THIS AN 11/83/84 ?
        041454  001002                          BNE     101$            ;BRANCH IF NOT
        041456  005037  177766                  CLR     CPUERR          ;CLEAR OUT THE CPU ERROR REGISTER BITS
        041462                          101$:
                                                                        ;THAT A EXPECTED TRAP COULD HAVE SET
                                                .DSABL  CRF
 10518  041462  000207                          RETURN
```

```
 10521 041464                                FSCMD2: SUBTST  <<FS    COMMAND 2       LOAD CSR>>
                                             ;*****************************************************************************
                                             ;*SUBTEST       FS      COMMAND 2       LOAD CSR
                                             ;*****************************************************************************
 10522 041464  004737  044670                        CALL    WHICHCSR
 10523 041470  010637  002306                        MOV     SP,FSSTACK
 10524 041474                                        SET4    #RES2           ;TRAPS TO 4 GOTO RES2
       041474  012737  041576  000004                MOV     #RES2,4
                                                   .DSABL  CRF
 10525 041502  104426                              READCSR
 10526 041504                                      TYPE    MSG027
       041504  104401  067021                      TYPEIT  ,MSG027
                                                   .DSABL  CRF
 10527 041510                                      SET     NOERROR
       041510  012737  177777  002430                                                  MOV  #-1,NOERROR
 10528 041516  104026                              ERROR   +26             ;USE ERROR ROUTINE FOR PRINTOUT
 10529 041520                                      RES4                    ;RESET TRAPS TO 4 TO DEFAULT
       041520  012737  034114  000004              MOV     #TIMEOUT,4
       041526  022737  000005  004010              CMP     #5,PROTYP       ;IS THIS AN 11/83/84 ?
       041534  001002                              BNE     101$            ;BRANCH IF NOT
       041536  005037  177766                      CLR     CPUERR          ;CLEAR OUT THE CPU ERROR REGISTER BITS
       041542                              101$:                           ;THAT A EXPECTED TRAP COULD HAVE SET
                                                   .DSABL  CRF
 10530 041542                                      TYPE    MSG023          ;FIRST CSR WORD
       041542  104401  066747                      TYPEIT  ,MSG023
                                                   .DSABL  CRF
 10531 041546  104413                              RDOCT                   ;READ AN OCTAL NUMBER
 10532 041550                                      POP     CSR             ;PUT IN IN LOC "CSR"
       041550  012637  002150                                                          MOV (SP)+,CSR
 10533 041554  104425                              LOADCSR
 10534 041556  104426                              READCSR
 10535 041560                                      TYPE    MSG028
       041560  104401  067036                      TYPEIT  ,MSG028
                                                   .DSABL  CRF
 10536 041564                                      SET     NOERROR
       041564  012737  177777  002430                                                  MOV  #-1,NOERROR
 10537 041572  104026                              ERROR   +26             ;USE FOR PRINTOUT - NOT AN ERROR
 10538 041574  000207                              RETURN
 10539 041576                              RES2:   TYPE    MSG025          ;THIS CSR DOES NOT EXIST
       041576  104401  066763                      TYPEIT  ,MSG025
                                                   .DSABL  CRF
 10540 041602  013706  002306                      MOV     FSSTACK,SP
 10541 041606                                      RES4                    ;RESET TRAPS TO 4 TO DEFAULT
       041606  012737  034114  000004              MOV     #TIMEOUT,4
       041614  022737  000005  004010              CMP     #5,PROTYP       ;IS THIS AN 11/83/84 ?
       041622  001002                              BNE     101$            ;BRANCH IF NOT
       041624  005037  177766                      CLR     CPUERR          ;CLEAR OUT THE CPU ERROR REGISTER BITS
       041630                              101$:                           ;THAT A EXPECTED TRAP COULD HAVE SET
                                                   .DSABL  CRF
 10542 041630  000207                              RETURN
```

```
10545 041632                        FSCMD3: SUBTST  <<FS    COMMAND 3       EXAMINE MEMORY>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       FS      COMMAND 3       EXAMINE MEMORY
                                    ;*****************************************************************************
10546 041632                                PUSH    BANK,NOPAR,PARTHERE,4
      041632  013746  002102                                                          MOV BANK,-(SP)
      041636  013746  002076                                                          MOV NOPAR,-(SP)
      041642  013746  002304                                                          MOV PARTHERE,-(SP)
      041646  013746  000004                                                          MOV 4,-(SP)
10547 041652  012737  000002  002076          MOV     #2,NOPAR        ;INDICATE PARITY ACTION
10548 041660                                TYPE    MSG029          ;EXAMINE MEMORY
      041660  104401  067052                TYPEIT  ,MSG029
                                            .DSABL  CRF
10549 041664                        1$:     TYPE    MSG031          ;PHYSICAL ADDRESS (0-17775776)??
      041664  104401  067111                TYPEIT  ,MSG031
                                            .DSABL  CRF
10550 041670  104413                        RDOCT                   ;READ OCTAL NUMBER ONTO STACK & $HIOCT
10551 041672  013737  056146  002102        MOV     $HIOCT,BANK     ;PUT MSB'S IN BANK
10552 041700                                POP     R0              ;PUT LSB'S IN R0
      041700  012600                                                                  MOV (SP)+,R0
10553 041702  000241                        CLC
10554 041704  006100                        ROL     R0
10555 041706  006137  002102                ROL     BANK
10556 041712  000241                        CLC
10557 041714  006000                        ROR     R0
10558 041716  023737  002102  002556        CMP     BANK,LASTBANK   ;CHECK FOR BANK TOO HIGH
10559 041724  003357                        BGT     1$              ;BRANCH IF TRUE
10560 041726  062700  060000                ADD     #FIRST,R0
10561 041732  032700  000001                BIT     #BIT0,R0        ;CHECK FOR ODD ADDRESS
10562 041736  001352                        BNE     1$              ;BRANCH IF ODD ADDRESS
10563 041740  020027  157776                CMP     R0,#LAST        ;CHECK FOR ADDRESS OVER 16K
10564 041744  101347                        BHI     1$              ;BRANCH IF OVER 16K
10565 041746  012737  042020  002304        MOV     #3$,PARTHERE    ;INCASE OF ABORTS
10566 041754                                SET4    #4$             ;TRAPS TO 4 GOTO 4$
      041754  012737  042026  000004        MOV     #4$,4
                                            .DSABL  CRF
10567 041762                                MAP     BANK                    ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
      041762  010346                                                                  MOV R3,-(SP)
      041764  013703  002102                MOV     BANK,R3
      041770  004737  035716                CALL    MAPPER
                                            .DSABL  CRF
      041774  012603                                                                  MOV (SP)+,R3
10568 041776                                TESTAREA                ;ENTER TEST MODE
      041776  053737  002552  177776        BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                            .DSABL  CRF
10569 042004  011001                        MOV     (R0),R1
10570 042006  104417                        KERNEL                  ;ENTER KERNEL MODE
10571 042010                                TYPOCS  R1
      042010  010146                        MOV     R1,-(SP)        ;;SAVE R1 FOR TYPEOUT
      042012  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
      042014     006                        .BYTE   6               ;;TYPE 6 DIGITS
      042015     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
                                            .DSABL  CRF
10572 042016  000410                        BR      EXCMD3
10573
10574 042020                        3$:     TYPE    MSG032                  ;PARITY ABORT
      042020  104401  067151                TYPEIT  ,MSG032
```

```
                                        .DSABL  CRF
 10575 042024  000405                   BR      EXCMD3
 10576
 10577 042026  062706  000004    4$:    ADD     #4,SP                   ;FIX STACK
 10578 042032                           TYPE    MSG033                  ;TIMEOUT TRAP
       042032  104401  067170            TYPEIT  ,MSG033
                                        .DSABL  CRF
 10579 042036  000400                   BR      EXCMD3
 10580
 10581 042040  104417              EXCMD3: KERNEL                  ;ENTER KERNEL MODE
 10582 042042                           POP     4,PARTHERE,NOPAR,BANK
       042042  012637  000004                                                  MOV (SP)+,4
       042046  012637  002304                                                  MOV (SP)+,PARTHERE
       042052  012637  002076                                                  MOV (SP)+,NOPAR
       042056  012637  002102                                                  MOV (SP)+,BANK
 10583 042062                           RES4                    ;RESET TRAPS TO 4 TO DEFAULT
       042062  012737  034114  000004    MOV     #TIMEOUT,4
       042070  022737  000005  004010    CMP     #5,PROTYP       ;IS THIS AN 11/83/84 ?
       042076  001002                    BNE     101$            ;BRANCH IF NOT
       042100  005037  177766            CLR     CPUERR          ;CLEAR OUT THE CPU ERROR REGISTER BITS
       042104                     101$:                          ;THAT A EXPECTED TRAP COULD HAVE SET
                                        .DSABL  CRF
 10584 042104  000207                   RETURN
```

```
10587 042106                        FSCMD4: SUBTST  <<FS    COMMAND 4       MODIFY MEMORY>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       FS      COMMAND 4       MODIFY MEMORY
                                    ;*****************************************************************************
10588 042106                                PUSH    BANK,NOPAR,PARTHERE,4
      042106  013746  002102                                                          MOV BANK,-(SP)
      042112  013746  002076                                                          MOV NOPAR,-(SP)
      042116  013746  002304                                                          MOV PARTHERE,-(SP)
      042122  013746  000004                                                          MOV 4,-(SP)
10589 042126  012737  000003  002076          MOV     #3,NOPAR                ;INDICATE PARITY ACTION
10590 042134                                  TYPE    MSG036                  ;MODIFY MEMORY
      042134  104401  067276                 TYPEIT  ,MSG036
                                             .DSABL  CRF
10591 042140                        1$:       TYPE    MSG031          ;PHYSICAL ADDRESS (0-17775776)??
      042140  104401  067111                 TYPEIT  ,MSG031
                                             .DSABL  CRF
10592 042144  104413                         RDOCT                   ;READ OCTAL NUMBER ONTO STACK & $HIOCT
10593 042146  013737  056146  002102         MOV     $HIOCT,BANK     ;PUT MSB'S IN BANK
10594 042154                                  POP     R0              ;PUT LSB'S IN R0
      042154  012600                                                                  MOV (SP)+,R0
10595 042156  000241                         CLC
10596 042160  006100                         ROL     R0
10597 042162  006137  002102                 ROL     BANK
10598 042166  000241                         CLC
10599 042170  006000                         ROR     R0
10600 042172                                 IF BANK GT LASTBANK THEN GOTO 1$  ;CHECK FOR BANK TOO HIGH
      042172  023737  002102  002556                                                  CMP BANK,LASTBANK
      042200  003357                                                                  BGT 1$
10601 042202  062700  060000                 ADD     #FIRST,R0
10602 042206                                 IF #BIT0 SET.IN R0 THEN GOTO 1$ ;CHECK FOR ODD ADDRESS
      042206  032700  000001                                                          BIT #BIT0,R0
      042212  001352                                                                  BNE 1$
10603 042214                                 IF R0 HI #LAST THEN GOTO 1$     ;CHECK FOR ADDRESS OVER 16K
      042214  020027  157776                                                          CMP R0,#LAST
      042220  101347                                                                  BHI 1$
10604 042222  012737  042270  002304         MOV     #3$,PARTHERE            ;INCASE OF ABORTS
10605 042230                                  SET4    #4$             ;TRAPS TO 4 GOTO 4$
      042230  012737  042276  000004         MOV     #4$,4
                                             .DSABL  CRF
10606 042236                                 MAP     BANK                    ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
      042236  010346                                                                  MOV R3,-(SP)
      042240  013703  002102                 MOV     BANK,R3
      042244  004737  035716                 CALL    MAPPER
                                             .DSABL  CRF
      042250  012603                                                                  MOV (SP)+,R3
10607 042252  104511                         INVALIDATE
10608 042254                                 TESTAREA                ;ENTER TEST MODE
      042254  053737  002552  177776         BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                             .DSABL  CRF
10609 042262  011001                         MOV     (R0),R1
10610                                        ;GETTING HERE MEANS WE GOT LUCKY - NO TRAPS
10611 042264  104417                         KERNEL                  ;ENTER KERNEL MODE
10612 042266  000410                         BR      5$
10613
10614 042270                        3$:       TYPE    MSG032                  ;PARITY ABORT
      042270  104401  067151                 TYPEIT  ,MSG032
                                             .DSABL  CRF
```

```
 10615 042274  000431                        BR      EXCMD4                  ;EXIT
 10616
 10617 042276  062706  000004          4$:   ADD     #4,SP             ;FIX STACK
 10618 042302                                TYPE    MSG033            ;TIMEOUT TRAP
       042302  104401  067170                TYPEIT  ,MSG033
                                            .DSABL  CRF
 10619 042306  000424                        BR      EXCMD4                  ;EXIT
 10620
 10621 042310                          5$:   TYPE    MSG037                  ;OLD DATA WAS
       042310  104401  067315                TYPEIT  ,MSG037
                                            .DSABL  CRF
 10622 042314                                TYPOCS  R1                      ;PRINT IT
       042314  010146                        MOV     R1,-(SP)          ;;SAVE R1 FOR TYPEOUT
       042316  104403                        TYPOS                     ;;GO TYPE--OCTAL ASCII
       042320     006                        .BYTE   6                 ;;TYPE 6 DIGITS
       042321     000                        .BYTE   0                 ;;SUPPRESS LEADING ZEROS
                                            .DSABL  CRF
 10623 042322                                TYPE    MSG039                  ;INPUT NEW DATA
       042322  104401  067352                TYPEIT  ,MSG039
                                            .DSABL  CRF
 10624 042326  104413                        RDOCT                            READ ON OCTAL NUMBER ONTO THE STACK
 10625 042330                                POP     R1                      ;GET NEW NUMBER
       042330  012601                                                                        MOV (SP)+,R1
 10626 042332                                TESTAREA                  ;ENTER TEST MODE
       042332  053737  002552  177776        BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                            .DSABL  CRF
 10627 042340  010110                        MOV     R1,(R0)                 ;PUT IT IN MEMORY
 10628 042342  011001                        MOV     (R0),R1                 ;READ IT AGAIN
 10629 042344  104417                        KERNEL                    ;ENTER KERNEL MODE
 10630 042346                                TYPE    MSG038                  ;DATA IS NOW
       042346  104401  067334                TYPEIT  ,MSG038
                                            .DSABL  CRF
 10631 042352                                TYPOCS  R1                      ;PRINT IT
       042352  010146                        MOV     R1,-(SP)          ;;SAVE R1 FOR TYPEOUT
       042354  104403                        TYPOS                     ;;GO TYPE--OCTAL ASCII
       042356     006                        .BYTE   6                 ;;TYPE 6 DIGITS
       042357     000                        .BYTE   0                 ;;SUPPRESS LEADING ZEROS
                                            .DSABL  CRF
 10632
 10633 042360  104417                EXCMD4: KERNEL                    ;ENTER KERNEL MODE
 10634 042362                                POP     4,PARTHERE,NOPAR,BANK
       042362  012637  000004                                                          MOV (SP)+,4
       042366  012637  002304                                                          MOV (SP)+,PARTHERE
       042372  012637  002076                                                          MOV (SP)+,NOPAR
       042376  012637  002102                                                          MOV (SP)+,BANK
 10635 042402                                RES4                      ;RESET TRAPS TO 4 TO DEFAULT
       042402  012737  034114  000004        MOV     #TIMEOUT,4
       042410  022737  000005  004010        CMP     #5,PROTYP         ;IS THIS AN 11/83/84 ?
       042416  001002                        BNE     101$              ;BRANCH IF NOT
       042420  005037  177766                CLR     CPUERR            ;CLEAR OUT THE CPU ERROR REGISTER BITS
       042424                          101$:
                                                                      ;THAT A EXPECTED TRAP COULD HAVE SET
                                            .DSABL  CRF
 10636 042424  000207                        RETURN
```

```
 10639 042426                       FSCMD5: SUBTST  <<FS    COMMAND 5       SELECT BANK & PATTERN>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       FS      COMMAND 5       SELECT BANK & PATTERN
                                    ;*****************************************************************************
 10640 042426                               PUSH    BANK,PATTERN,TESTADD,PCBUMP,TKVEC,TKVEC+2
       042426  013746  002102                                                          MOV BANK,-(SP)
       042432  013746  002112                                                          MOV PATTERN,-(SP)
       042436  013746  002412                                                          MOV TESTADD,-(SP)
       042442  013746  002326                                                          MOV PCBUMP,-(SP)
       042446  013746  000060                                                          MOV TKVEC,-(SP)
       042452  013746  000062                                                          MOV TKVEC+2,-(SP)
 10641 042456  010637  002306               MOV     SP,FSSTACK              ;SAVE LAST GOOD STACK POINTER
 10642 042462                               TYPE    MSG040                  ;SELECT BANK & PATTERN TEST
       042462  104401  067374               TYPEIT  ,MSG040
                                           .DSABL  CRF
 10643 042466                       1$:     TYPE    MSG030                  ;BANK(0-177)?
       042466  104401  067072               TYPEIT  ,MSG030
                                           .DSABL  CRF
 10644 042472  104413                       RDOCT                           ;READ AN OCTAL NUMBER ONTO THE STACK
 10645 042474                               POP     BANK                    ;PUT IT IN BANK
       042474  012637  002102                                                          MOV (SP)+,BANK
 10646 042500                               IF BANK GT LASTBANK THEN GOTO 1$  ;CHECK FOR BANK TOO HIGH
       042500  023737  002102  002556                                                  CMP BANK,LASTBANK
       042506  003367                                                                 BGT 1$
 10647
 10648 042510  013701  002102               MOV     BANK,R1
 10649 042514  006301                       ASL     R1
 10650 042516  006301                       ASL     R1
 10651 042520                               IF CPUBIT OFF.IN CONFIG(R1)
       042520  033761  002106  002664                                                  BIT CPUBIT,CONFIG(R1)
       042526  001003                                                                 BNE L413
 10652 042530                                 TYPE  MSG041                  ;BANK NOT ACCESSABLE
       042530  104401  067420               TYPEIT  ,MSG041
                                           .DSABL  CRF
 10653 042534                                GOTO 1$
       042534  000754                                                                 BR 1$
 10654 042536                               END ;OF IF
       042536                                                                  L413:;;;;;;
 10655
 10656 042536                       2$:     TYPE    MSG042                  ;PATTERN(0-45)?
       042536  104401  067445               TYPEIT  ,MSG042
                                           .DSABL  CRF
 10657 042542  104413                       RDOCT                           ;READ AN OCTAL NUMBER ONTO THE STACK
 10658 042544                               POP     PATTERN                 ;PUT IT IN PATTERN
       042544  012637  002112                                                          MOV (SP)+,PATTERN
 10659 042550                               IF PATTERN GT #47 THEN GOTO 2$  ;CHECK FOR PATTERN TO HIGH
       042550  023727  002112  000047                                                  CMP PATTERN,#47
       042556  003367                                                                 BGT 2$
 10660 042560                               IF PATTERN EQ #0
       042560  005737  002112                                                          TST PATTERN
       042564  001004                                                                 BNE L414
 10661 042566                                 TYPE  MSG043                  ;PATTERN 0 DATA IS?
       042566  104401  067463               TYPEIT  ,MSG043
                                           .DSABL  CRF
 10662 042572  104413                        RDOCT                          ;READ AN OCTAL NUMBER ONTO THE STACK
 10663 042574                                POP   R2                       ;PUT IT IN R2
       042574  012602                                                                 MOV (SP)+,R2
```

```
10664 042576                                    END ;OF IF
      042576                                                                L414:;;;;;;
10665
10666
10667 042576                                    MAP     BANK                    ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
      042576  010346                                                                MOV R3,-(SP)
      042600  013703  002102                    MOV     BANK,R3
      042604  004737  035716                    CALL    MAPPER
                                                .DSABL  CRF
      042610  012603                                                                MOV (SP)+,R3
10668 042612  104511                            INVALIDATE
10669 042614  004737  040052                    CALL    EXBANK                  ;SET NEW MARGINS
10670 042620                                    IF RRFLAG IS TRUE
      042620  005737  002124                                                        TST RRFLAG
      042624  001404                                                                BEQ L415
10671 042626                                      TYPE  MSG049                  ;BANK REQUIRES RELOCATION
      042626  104401  067617                    TYPEIT  ,MSG049
                                                .DSABL  CRF
10672 042632  000137  043246                      JMP CMD5C
10673 042636                                    END ;OF IF RRFLAG
      042636                                                                L415:;;;;;;
10674 042636                                    TYPE    MSG046          ;TO ESCAPE TYPE ANY KEY!
      042636  104401  067505                    TYPEIT  ,MSG046
                                                .DSABL  CRF
10675 042642  013737  002152  002154            MOV     CSRNO,SAVCSR    ;SAVE OLD CSR NUMBER
10676 042650  013702  002102                    MOV     BANK,R2         ;
10677 042654  072227  000002                    ASH     #2,R2           ;GENERATE INDEX INTO CONFIGURATION TABLE
10678 042660  016203  002664                    MOV     CONFIG(R2),R3   ;R3 = LOW WORD OF CONFIGURATION TABLE FOR THIS BANK
10679 042664  072327  177770                    ASH     #-10,R3         ;POSITION CSR CODE IN BITS 0 3
10680 042670  042703  177760                    BIC     #^C17,R3        ;CLEAR ALL BUT THE CSR CODE
10681 042674  006303                            ASL     R3              ;ADJUST CSR NUMBER
10682 042676  010337  002152                    MOV     R3,CSRNO        ;
10683 042702  012737  043246  000060            MOV     #CMD5C,TKVEC
10684 042710  012737  000340  000062            MOV     #340,TKVEC+2
10685 042716  017700  137722                    MOV     @$TKB,R0                ;KILL ANY OLD INTERRUPT
10686 042722  042737  000200  177776            BIC     #BIT7,PSW               ;LOWER CPU PRIORITY TO 140
10687 042730  052777  000100  137704            BIS     #BIT6,@$TKS             ;ENABLE KEYBOARD INTERRUPTS
10688
10689
10690 042736                                    SET     HEADER,MUT
      042736  012737  177777  002612                                                MOV  #-1,HEADER
      042744  012737  177777  002110                                                MOV  #-1,MUT
10691 042752  013701  002102          CMD5B:    MOV     BANK,R1
10692 042756  006301                            ASL     R1
10693 042760  006301                            ASL     R1
10694 042762  005037  002240                    CLR     SPLTCSR
10695 042766  005037  002264                    CLR     PASFLG
10696 042772  012737  060000  002412            MOV     #FIRST,TESTADD
10697 043000  012737  060002  002414            MOV     #FIRST+2,TESTADD+2
10698 043006                                    IF #BIT12 SET.IN CONFIG+2(R1)
      043006  032761  010000  002666                                                BIT #BIT12,CONFIG+2(R1)
      043014  001413                                                                BEQ L416
10699 043016  005237  002240                      INC   SPLTCSR
10700 043022                                      MAP   BANK
      043022  010346                                                                MOV R3,-(SP)
      043024  013703  002102                    MOV     BANK,R3
      043030  004737  035716                    CALL    MAPPER
```

```
                                        .DSABL  CRF
        043034  012603                                                    MOV (SP)+,R3
10701   043036  012737  120000  002414          MOV   #120000,TESTADD+2
10702   043044                                  END; OF IF #BIT12
        043044                                                          L416:;;;;;;
10703   043044                                  IF #SW0 SET.IN @SWR
        043044  032777  000001  137564                                    BIT #SW0,@SWR
        043052  001402                                                    BEQ L417
10704   043054  104470                            ECCDIS                ;DISABLE ERROR CORRECTION
10705   043056                                  ELSE
        043056  000405                                                    BR L420
        043060                                                          L417:;;;;;;
10706   043060                                    PUSH  CSRNO
        043060  013746  002152                                          MOV CSRNO,-(SP)
10707   043064  104502                            CLRCSR                ;CLEAR CSRS
10708   043066                                    POP   CSRNO
        043066  012637  002152                                          MOV (SP)+,CSRNO
10709   043072                                  END ;OF IF
        043072                                                          L420:;;;;;;
10710   043072  012737  000002  002076          MOV     #2,NOPAR        ;PARITY ACTION
10711   043100  012737  000002  002326          MOV     #2,PCBUMP       ;TRAPS ADD 2 TO PC
10712   043106  013700  002112                  MOV     PATTERN,R0
10713   043112  006300                          ASL     R0
10714   043114  004770  043126                  CALL    @FSPAT(R0)
10715   043120  005037  002076                  CLR     NOPAR
10716   043124  000712                          BR      CMD5B           ;LOOP TILL KEYBOARD INTERRUPT
10717
10718   043126  017510                  FSPAT:  MT0000  ;<1 SEC         DATA PATTERN TEST
10719   043130  017544                          MT0001  ;<1 SEC         ADDRESS TEST
10720   043132  017640                          MT0002  ;<1 SEC         COMPLEMENT ADDRESS TEST
10721   043134  017754                          MT0003  ; 1 SEC         3 XOR 9 WORST CASE NOISE TEST
10722   043136  020070                          MT0004  ; 1 SEC         ROTATING ZEROS TEST
10723   043140  020140                          MT0005  ; 1 SEC         ROTATING ONES TEST
10724   043142  020222                          MT0006  ;<1 SEC         INITIAL DATA TEST
10725   043144  020256                          MT0007  ;<1 SEC         ADDRESS BIT TEST
10726   043146  020320                          MT0010  ;<1 SEC         BYTE ADDRESSING TEST
10727   043150  024220                          MT0999  ;<1 SEC         NULL TEST TO KEEP TABLE ORDER
10728   043152  024220                          MT0999  ;<1 SEC         NULL TEST TO KEEP TABLE ORDER
10729   043154  024220                          MT0999  ;<1 SEC         NULL TEST TO KEEP TABLE ORDER
10730   043156  020354                          MT0014  ; 1 SEC         BASIC DOUBLE BIT ERROR TEST
10731   043160  024220                          MT0999  ;<1 SEC         NULL TEST TO KEEP TABLE ORDER
10732   043162  024220                          MT0999  ;<1 SEC         NULL TEST TO KEEP TABLE ORDER
10733   043164  020434                          MT0017  ;<1 SEC         HOLDING 1'S & 0'S TEST
10734   043166  020456                          MT0020  ; 1 SEC         SYNDROMES TO CSR ON SBE TEST
10735   043170  020536                          MT0021  ; 1 SEC         MARCHING 0'S & 1'S TEST
10736   043172  021026                          MT0022  ;10 SEC         REFRESH & SHIFTING DIAGONAL TEST
10737   043174  021060                          MT0023  ;10 SEC         SHIFTING DIAGONAL TEST
10738   043176  021124                          MT0024  ;20 SEC         FAST GALLOPING PATTERN TEST
10739   043200  024220                          MT0999  ;<1 SEC         NULL TEST TO KEEP TABLE ORDER
10740   043202  021332                          MT0026  ;<1 SEC         RANDOM DATA TEST
10741   043204  021610                          MT0027  ; 1 SEC         UNIQUE BANK TEST
10742   043206  022200                          MT0030  ; 1 SEC         FLUSH OUT DBE'S TEST
10743   043210  022454                          MT0031  ; 3 SEC         SOB-A-LONG TEST
10744   043212  022644                          MT0032  ;<1 SEC         WRITE RECOVERY TEST
10745   043214  023160                          MT0033  ;35 SEC         BRANCH GOBBLE TEST
10746   043216  023346                          MT0034  ; 1 SEC         SOFT ERROR TEST
10747   043220  023446                          MT0035  ;<1 SEC         WORST CASE NOISE PARITY TEST
```

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 10748 043222  023560                        MT0036  ; 1 SEC          CORRECTION CODE TEST
 10749 043224  023622                        MT0037  ;<1 SEC          ECC DISABLE TEST
 10750 043226  024220                        MT0999  ,<1 SEC          NULL TEST TO KEEP TABLE ORDER
 10751 043230  023660                        MT0041  ; 1 SEC          ADDRESS TO CSR ON DOUBLE BIT ERROR TEST
 10752 043232  023740                        MT0042  ;<1 SEC          EXTENDED Q-BUS ADDRESS TEST
 10753 043234  023774                        MT0043  ; 1 SEC          WRITE BYTE CLEARS SBE TEST
 10754 043236  024024                        MT0044  ; 5 SEC          SHIFTING 1/0'S THROUGH THE CHECK BITS
 10755 043240  024104                        MT0045  ; 1 SEC          SYNDROMES TO CSR ON DBE TEST
 10756 043242  024134                        MT0046  ; 1 SEC          CHECK SINGLE BIT ERROR WITH ECC DISABLED TEST
 10757 043244  024164                        MT0047  ;<1 SEC          NO CSR UPDATE WITH SBE ON DBE TEST
 10758
 10759 043246  013706  002306          CMD5C:  MOV     FSSTACK,SP              ;RECOVER OLD STACK POINTER
 10760 043252  042777  000100  137362          BIC     #BIT6,@$TKS
 10761 043260                                  POP     TKVEC+2,TKVEC
       043260  012637  000062                                                  MOV (SP)+,TKVEC+2
       043264  012637  000060                                                  MOV (SP)+,TKVEC
 10762 043270  117700  137350                  MOVB    @$TKB,R0                ;GET CHARACTER TO GET RID OF FLAG
 10763 043274                                  POP     PCBUMP,TESTADD
       043274  012637  002326                                                  MOV (SP)+,PCBUMP
       043300  012637  002412                                                  MOV (SP)+,TESTADD
 10764 043304                                  POP     PATTERN,BANK
       043304  012637  002112                                                  MOV (SP)+,PATTERN
       043310  012637  002102                                                  MOV (SP)+,BANK
 10765 043314                                  MAP     BANK                    ;REMAP OLD BANK
       043314  010346                                                          MOV R3,-(SP)
       043316  013703  002102                  MOV     BANK,R3
       043322  004737  035716                  CALL    MAPPER
                                               .DSABL  CRF
       043326  012603                                                          MOV (SP)+,R3
 10766 043330  004737  040052                  CALL    EXBANK
 10767 043334  013737  002154  002152          MOV     SAVCSR,CSRNO            ;RESTORE CSRNO.
 10768 043342  000207                          RETURN
```

```
 10770 043344                       FSCMD6: SUBTST  <<FS    COMMAND 6       TYPE CONFIGURATION MAP>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       FS      COMMAND 6       TYPE CONFIGURATION MAP
                                    ;*****************************************************************************
 10771 043344  004737  032722              CALL    PCONFIG
 10772 043350  000207                      RETURN
 10773
```

```
 10776 043352                       FSCMD7: SUBTST  <<FS    COMMAND 7       SOB-A-LONG TEST>>
                                    ;*********************************************************************
                                    ;*SUBTEST       FS      COMMAND 7       SOB-A-LONG TEST
                                    ;*********************************************************************
 10777 043352                               PUSH    BANK,PATTERN,TKVEC,TKVEC+2,NOPAR
       043352  013746  002102                                                    MOV BANK,-(SP)
       043356  013746  002112                                                    MOV PATTERN,-(SP)
       043362  013746  000060                                                    MOV TKVEC,-(SP)
       043366  013746  000062                                                    MOV TKVEC+2,-(SP)
       043372  013746  002076                                                    MOV NOPAR,-(SP)
 10778 043376  010637  002306                     MOV     SP,FSSTACK            ;SAVE LAST GOOD STACK POINTER
 10779 043402                               TYPE    MSG055                      ;SOB-A-LONG TEST
       043402  104401  067671                     TYPEIT  ,MSG055
                                                  .DSABL  CRF
 10780
 10781 043406                               IF #SW0 SET.IN @SWR
       043406  032777  000001  137222                                            BIT #SW0,@SWR
       043414  001402                                                           BEQ L421
 10782 043416  104470                       ECCDIS                              ;DISABLE ERROR CORRECTION
 10783 043420                               ELSE
       043420  000401                                                           BR L422
       043422                                                                 L421:;;;;;;
 10784 043422  104502                       CLRCSR                              ;CLEAR CSRS
 10785 043424                               END ;OF IF
       043424                                                                 L422:;;;;;;
 10786 043424                               TYPE    MSG056                      ;BELL = EACH PASS COMPLETE
       043424  104401  067712                     TYPEIT  ,MSG056
                                                  .DSABL  CRF
 10787
 10788 043430                               TYPE    MSG046                      ;TO ESCAPE TYPE ANY KEY!
       043430  104401  067505                     TYPEIT  ,MSG046
                                                  .DSABL  CRF
 10789 043434  012737  043560  000060             MOV     #CMD7C,TKVEC
 10790 043442  012737  000340  000062             MOV     #340,TKVEC+2
 10791 043450  017700  137170                     MOV     @$TKB,R0            ;KILL ANY OLD INTERRUPT
 10792 043454  042737  000200  177776             BIC     #BIT7,PSW           ;LOWER CPU PRIORITY TO 140
 10793 043462  052777  000100  137152             BIS     #BIT6,@$TKS         ;ENABLE KEYBOARD INTERRUPTS
 10794
 10795
 10796 043470                               SET     HEADER,MUT
       043470  012737  177777  002612                                            MOV  #-1,HEADER
       043476  012737  177777  002110                                            MOV  #-1,MUT
 10797
 10798 043504                       CMD7B:  FOR BANK := #0 TO LASTBANK
       043504  005037  002102                                                    CLR BANK
       043510                                                                 B71:;;;;;;
 10799 043510  004737  040052                 CALL EXBANK
 10800 043514                                 IF ACFLAG IS TRUE AND RRFLAG IS FALSE
       043514  005737  002116                                                    TST ACFLAG
       043520  001406                                                           BEQ L423
       043522  005737  002124                                                    TST RRFLAG
       043526  001003                                                           BNE L423
 10801 043530  104511                   INVALIDATE
 10802 043532  004737  022454                 CALL MT0031
 10803 043536                                END ;OF IF ACFLAG
       043536                                                                 L423:;;;;;;
 10804 043536                               END ;OF FOR BANK
```

```
_VMJAAO MSV11-J MEMORY DIAG.    MACRO V05.01b Friday 15-Feb-85 16:10  Page 350 1
FS      COMMAND 7       SOB-A-LONG TEST                                                 SEQ 0323

        043536  005237  002102                                                  INC BANK
        043542  023737  002102  002556                                          CMP BANK,LASTBANK
        043550  003757                                                          BLE B71
        043552                                                          E71:::::::
 10805  043552                          TYPE    $BELL                   ;RING BELL
        043552  104401  002653          TYPEIT  ,$BELL
                                        .DSABL  CRF
 10806  043556                          GOTO    CMD7B
        043556  000752                                                          BR CMD7B
 10807
 10808  043560  013706  002306  CMD7C:  MOV     FSSTACK,SP                      ;RECOVER OLD STACK POINTER
 10809  043564  042777  000100  137050  BIC     #BIT6,@$TKS
 10810  043572  117700  137046          MOVB    @$TKB,R0                        ;READ CHAR TO KILL FLAG
 10811  043576                          POP     NOPAR,TKVEC+2,TKVEC,PATTERN,BANK
        043576  012637  002076                                                  MOV (SP)+,NOPAR
        043602  012637  000062                                                  MOV (SP)+,TKVEC+2
        043606  012637  000060                                                  MOV (SP)+,TKVEC
        043612  012637  002112                                                  MOV (SP)+,PATTERN
        043616  012637  002102                                                  MOV (SP)+,BANK
 10812  043622                          MAP     BANK                    ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
        043622  010346                                                          MOV R3,-(SP)
        043624  013703  002102          MOV     BANK,R3
        043630  004737  035716          CALL    MAPPER
                                        .DSABL  CRF
        043634  012603                                                          MOV (SP)+,R3
 10813  043636  004737  040052          CALL    EXBANK
 10814  043642  000207                  RETURN
```

```
 10817 043644                          FSCMD8: SUBTST  <<FS    COMMAND 8       ERROR SUMMARY>>
                                       ;*****************************************************************************
                                       ;*SUBTEST       FS      COMMAND 8       ERROR SUMMARY
                                       ;*****************************************************************************
 10818 043644                                  PUSH    R0,R2,R3,BANK
       043644  010046                                                                  MOV R0,-(SP)
       043646  010246                                                                  MOV R2,-(SP)
       043650  010346                                                                  MOV R3,-(SP)
       043652  013746  002102                                                         MOV BANK,-(SP)
 10819 043656  013737  056654  002434          MOV     $PASS,TEMP
 10820 043664  005337  002434                  DEC     TEMP
 10821 043670                                  TYPDEC  TEMP
       043670  013746  002434                  MOV     TEMP,-(SP)      ;;SAVE TEMP FOR TYPEOUT
       043674  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
                                               .DSABL  CRF
 10822 043676  013737  172350  002270          MOV     KIPAR4,SAV4             ;;;I.L.C.;REV B
 10823 043704  012737  001000  172350          MOV     #1000,KIPAR4            ;;;I.L.C.;REV B
 10824 043712                                  TYPE    MSG125                  ;PASSES COMPLETED
       043712  104401  071242                  TYPEIT  ,MSG125
                                               .DSABL  CRF
 10825 043716                                  TYPDEC  $ERTTL
       043716  013746  002630                  MOV     $ERTTL,-(SP)    ;;SAVE $ERTTL FOR TYPEOUT
       043722  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
                                               .DSABL  CRF
 10826 043724                                  TYPE    MSG079                  ;ERROR(S) DETECTED
       043724  104401  070265                  TYPEIT  ,MSG079
                                               .DSABL  CRF
 10827 043730                                  IF $ERTTL NE #0
       043730  005737  002630                                                         TST $ERTTL
       043734  001445                                                                 BEQ L424
 10828 043736  005037  002334                    CLR   SUCCESS
 10829 043742                                    FOR BANK := #0 TO LASTBANK
       043742  005037  002102                                                         CLR BANK
       043746                                                                B72:;;;;;;;
 10830 043746  013703  002102                      MOV BANK,R3
 10831 043752  070327  000004                      MUL #4,R3
 10832 043756                                      IFB CONFIG+2(R3) NE #0
       043756  105763  002666                                                         TSTB CONFIG+2(R3)
       043762  001424                                                                 BEQ L425
 10833 043764                                        IF SUCCESS IS FALSE
       043764  005737  002334                                                         TST SUCCESS
       043770  001005                                                                 BNE L426
 10834 043772                                          TYPE    MSG076          ;BANK  ERRORS
       043772  104401  070230                  TYPEIT  ,MSG076
                                               .DSABL  CRF
 10835 043776                                          SET SUCCESS
       043776  012737  177777  002334                                                 MOV  #-1,SUCCESS
 10836 044004                                        END ;OF IF SUCCESS
       044004                                                                L426:;;;;;;
 10837 044004                                        TYPOCS    BANK,3
       044004  013746  002102                  MOV     BANK,-(SP)      ;;SAVE BANK FOR TYPEOUT
                                                                        ;;3
       044010  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
       044012     006                          .BYTE   6               ;;TYPE 6 DIGITS
       044013     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
                                               .DSABL  CRF
 10838 044014  116300  002666                        MOVB      CONFIG+2(R3),R0
```

SEQ 0325

```
 10839 044020  042700  177400                    BIC     #^C377,R0
 10840 044024                                    TYPDEC  R0
       044024  010046                  MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
       044026  104405                  TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
                                       .DSABL  CRF
 10841 044030                                    TYPE    $CRLF
       044030  104401  002660          TYPEIT  ,$CRLF
                                       .DSABL  CRF
 10842 044034                                  END ;OF IFB CONFIG(R3)
       044034                                                                  L425:;;;;;;;
 10843 044034                                END ;OF FOR BANK
       044034  005237  002102                                                          INC BANK
       044040  023737  002102  002556                                                  CMP BANK,LASTBANK
       044046  003737                                                                 BLE B72
       044050                                                                  E72:;;;;;;;;
 10844 044050                  END ;OF IF $ERTTL
       044050                                                                  L424:;;;;;;;
 10845 044050  013737  002270  172350          MOV     SAV4,KIPAR4             ;;I.L.C.;;;REV B
 10846 044056                                  POP     BANK,R3,R2,R0
       044056  012637  002102                                                          MOV (SP)+,BANK
       044062  012603                                                                  MOV (SP)+,R3
       044064  012602                                                                  MOV (SP)+,R2
       044066  012600                                                                  MOV (SP)+,R0
 10847 044070  000207                  RETURN
```

```
 10850 044072                          FSCMD9: SUBTST  <<FS    COMMAND 9       REFRESH TEST>>
                                       ;*****************************************************************************
                                       ;*SUBTEST       FS      COMMAND 9       REFRESH TEST
                                       ;*****************************************************************************
 10851 044072                                  PUSH    BANK,PATTERN,TKVEC,TKVEC+2,NOPAR
       044072  013746  002102                                                          MOV BANK,-(SP)
       044076  013746  002112                                                          MOV PATTERN,-(SP)
       044102  013746  000060                                                          MOV TKVEC, (SP)
       044106  013746  000062                                                          MOV TKVEC+2,-(SP)
       044112  013746  002076                                                          MOV NOPAR,-(SP)
 10852 044116  010637  002306                  MOV     SP,FSSTACK              ;SAVE LAST GOOD STACK POINTER
 10853 044122                                  TYPE    MSG073                  ;REFRESH TEST
       044122  104401  070160                  TYPEIT  ,MSG073
                                               .DSABL  CRF
 10854
 10855 044126                                  IF #SW0 SET.IN @SWR
       044126  032777  000001  136502                                                  BIT #SW0,@SWR
       044134  001402                                                                  BEQ L427
 10856 044136  104470                            ECCDIS                        ;DISABLE ERROR CORRECTION
 10857 044140                                  ELSE
       044140  000401                                                                 BR L430
       044142                                                                  L427:;;;;;;;
 10858 044142  104502                            CLRCSR                        ;CLEAR CSRS
 10859 044144                                  END ;OF IF
       044144                                                                  L430:;;;;;;;
 10860 044144                                  TYPE    MSG056                  ;BELL = EACH PASS COMPLETE
       044144  104401  067712                  TYPEIT  ,MSG056
                                               .DSABL  CRF
 10861
 10862 044150                                  TYPE    MSG046                  ;TO ESCAPE TYPE ANY KEY!
       044150  104401  067505                  TYPEIT  ,MSG046
                                               .DSABL  CRF
 10863 044154  012737  044300  000060          MOV     #CMD9C,TKVEC
 10864 044162  012737  000340  000062          MOV     #340,TKVEC+2
 10865 044170  017700  136450                  MOV     @#TKB,R0                ;KILL ANY OLD INTERRUPT
 10866 044174  042737  000200  177776          BIC     #^BIT7,PSW              ;LOWER CPU PRIORITY TO 140
 10867 044202  052777  000100  136432          BIS     #^BIT6,@#TKS            ;ENABLE KEYBOARD INTERRUPTS
 10868
 10869 044210                                  SET     HEADER,MUT
       044210  012737  177777  002612                                                  MOV  #-1,HEADER
       044216  012737  177777  002110                                                  MOV  #-1,MUT
 10870
 10871 044224                          CMD9B:  FOR BANK := #0 TO LASTBANK
       044224  005037  002102                                                          CLR BANK
       044230                                                                  B73:;;;;;;;
 10872 044230  004737  040052                    CALL EXBANK
 10873 044234                                    IF ACFLAG IS TRUE AND RRFLAG IS FALSE
       044234  005737  002116                                                          TST ACFLAG
       044240  001406                                                                  BEQ L431
       044242  005737  002124                                                          TST RRFLAG
       044246  001003                                                                  BNE L431
 10874 044250  104511                              INVALIDATE
 10875 044252  004737  021026                      CALL MT0022
 10876 044256                                    END ;OF IF ACFLAG
       044256                                                                  L431:;;;;;;;
 10877 044256                                  END ;OF FOR BANK
       044256  005237  002102                                                          INC BANK
```

```
CVMJAA0 MSV11-J MEMORY DIAG.    MACRO V05.01b Friday 15 Feb 85 16:10  Page 354 1
FS      COMMAND 9       REFRESH TEST                                            SEQ 0327

        044262  023737  002102  002556                                          CMP BANK,LASTBANK
        044270  003757                                                          BLE B73
        044272                                                          E73:;;;;;;;
 10878  044272                          TYPE    $BELL                   ;RING BELL
        044272  104401  002653          TYPEIT  ,$BELL
                                        .DSABL  CRF
 10879  044276                          GOTO    CMD9B
        044276  000752                                                          BR CMD9B
 10880
 10881  044300  013706  002306  CMD9C:  MOV     FSSTACK,SP              ;RECOVER OLD STACK POINTER
 10882  044304  042777  000100  136330  BIC     #BIT6,@$TKS
 10883  044312  117700  136326          MOVB    @$TKB,R0                ;READ CHAR TO KILL FLAG
 10884  044316                          POP     NOPAR,TKVEC+2,TKVEC,PATTERN,BANK
        044316  012637  002076                                                  MOV (SP)+,NOPAR
        044322  012637  000062                                                  MOV (SP)+,TKVEC+2
        044326  012637  000060                                                  MOV (SP)+,TKVEC
        044332  012637  002112                                                  MOV (SP)+,PATTERN
        044336  012637  002102                                                  MOV (SP)+,BANK
 10885  044342                          MAP     BANK                    ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
        044342  010346                                                          MOV R3,-(SP)
        044344  013703  002102          MOV     BANK,R3
        044350  004737  035716          CALL    MAPPER
                                        .DSABL  CRF
        044354  012603                                                          MOV (SP)+,R3
 10886  044356  004737  040052          CALL    EXBANK
 10887  044362  000207                  RETURN
 10888
```

```
10891 044364                        FCMD10: SUBTST  <<FS    COMMAND 10      SET FILL COUNT>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       FS      COMMAND 10      SET FILL COUNT
                                    ;*****************************************************************************
10892 044364                                PUSH    R0
      044364  010046                                                                    MOV R0,-(SP)
10893 044366                                TYPE    MSG085                  ;FILL COUNT(OCTAL)?
      044366  104401  070311               TYPEIT  ,MSG085
                                          .DSABL  CRF
10894 044372  104413                      RDOCT
10895 044374                              POP     R0
      044374  012600                                                                    MOV (SP)+,R0
10896 044376  042700  177760             BIC     #^C17,R0
10897 044402  110037  002357             MOVB    R0,$FILLS
10898 044406                              POP     R0
      044406  012600                                                                    MOV (SP)+,R0
10899 044410  000207                      RETURN
10900
10901 044412                        FCMD11: SUBTST  <<FS    COMMAND 11      ENTER KAMIKAZE MODE>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       FS      COMMAND 11      ENTER KAMIKAZE MODE
                                    ;*****************************************************************************
10902 044412                                TYPE    MSG101          ;ENTERING KAMIKAZE MODE
      044412  104401  070456                TYPEIT  ,MSG101
                                          .DSABL  CRF
10903 044416                              SET     KAMIKAZE,SKIPKAMI
      044416  012737  177777  002006                                                   MOV  #-1,KAMIKAZE
      044424  012737  177777  002010                                                   MOV  #-1,SKIPKAMI
10904 044432  000207                      RETURN
10905
10906 044434                        FCMD12: SUBTST  <<FS    COMMAND 12      EXIT KAMIKAZE MODE>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       FS      COMMAND 12      EXIT KAMIKAZE MODE
                                    ;*****************************************************************************
10907 044434                                TYPE    MSG102          ;LEAVING KAMIKAZE MODE
      044434  104401  070506                TYPEIT  ,MSG102
                                          .DSABL  CRF
10908 044440  005037  002006              CLR     KAMIKAZE
10909 044444                              SET     SKIPKAMI
      044444  012737  177777  002010                                                   MOV  #-1,SKIPKAMI
10910 044452  000207                      RETURN
10911
10912 044454                        FCMD13: SUBTST  <<FS    COMMAND 13      TURN CACHE OFF>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       FS      COMMAND 13      TURN CACHE OFF
                                    ;*****************************************************************************
10913 044454                                TYPE    MSG106                  ;CACHE IS OFF
      044454  104401  070634                TYPEIT  ,MSG106
                                          .DSABL  CRF
10914 044460  104424                      CACHOFF                         ;TURN CACHE OFF
10915 044462  013737  002544  002546       MOV     CACHKN,CACHKN+2         ;SAVE OLD CACHE ON STATE
10916 044470  005037  002544              CLR     CACHKN                  ;KEEP CACHE OFF
10917 044474  000207                      RETURN
10918
10919 044476                        FCMD14: SUBTST  <<FS    COMMAND 14      TURN CACHE ON>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       FS      COMMAND 14      TURN CACHE ON
```

```
                                ;*****************************************************************************
10920 044476                            TYPE    MSG107                  ;CACHE IS ON (EXCEPT DURING ACTUAL PATTERNS)
      044476  104401  070652              TYPEIT  ,MSG107
                                          .DSABL  CRF
10921 044502  013737  002546  002544      MOV     CACHKN+2,CACHKN         ;RESTORE OLD CACHE ON STATE
10922 044510  104423                      CACHON                          ;TURN CACHE ON
10923 044512  000207                      RETURN
10924
```

```
10937
10938 044514                          FCMD15: SUBTST  <<FS    COMMAND 15      TEST ONLY SELECTED BANKS>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       FS      COMMAND 15      TEST ONLY SELECTED BANKS
                                      ;*****************************************************************************
10939 044514                                  TYPE    MSG105          ;ENTER BANKS IN OCTAL - USE NUMBER OUTSIDE RANGE TO TERMINAT
      044514  104401  070561                  TYPEIT  ,MSG105
                                              .DSABL  CRF
10940 044520  004737  044610                  CALL    CMD16A                  ;ERASE OLD SELECTIONS
10941 044524                                  BEGIN CMD16LOOP
      044524                                                                          B74:;;;;;;;
10942 044524                                    REPEAT
      044524                                                                          B75:;;;;;;;
10943 044524                                      TYPE        MSG030          ;BANK(0-177)?
      044524  104401  067072                  TYPEIT  ,MSG030
                                              .DSABL  CRF
10944 044530  104413                           RDOCT                           ;READ AN OCTAL NUMBER ONTO THE STACK
10945 044532                                    POP R1                          ;PUT IT IN R1
      044532  012601                                                                    MOV (SP)+,R1
10946 044534                                    IF R1 GT #177 OR R1 LT #0
      044534  020127  000177                                                            CMP R1,#177
      044540  003002                                                                    BGT L432
      044542  005701                                                                    TST R1
      044544  002001                                                                    BGE L433
      044546                                                                    L432:;;;;;;;
10947 044546                                      LEAVE CMD16LOOP
      044546  000406                                                                    BR E74
10948 044550                                    END ;OF IF R1
      044550                                                                    L433:;;;;;;;
10949 044550  006301                            ASL  R1
10950 044552  006301                            ASL  R1                         ;R1 <- R1 * 4
10951 044554  052761  040000  002666            BIS #BIT14,CONFIG+2(R1)
10952 044562                                  END ;OF REPEAT
      044562  000760                                                                    BR B75
      044564                                                                    E75:;;;;;;;
10953 044564                                  END CMD16LOOP
      044564                                                                    E74:;;;;;;;
10954 044564                                  TYPE    MSG110                  ;ONLY SELECTED BANKS WILL BE TESTED
      044564  104401  070727                  TYPEIT  ,MSG110
                                              .DSABL  CRF
10955 044570                                  SET     SELONLY
      044570  012737  177777  002002                                                    MOV  #-1,SELONLY
10956 044576  000207                          RETURN
10957
10958 044600                          FCMD16: SUBTST  <<FS    COMMAND 16      RESUME TESTING ALL BANKS>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       FS      COMMAND 16      RESUME TESTING ALL BANKS
                                      ;*****************************************************************************
10959 044600                                  TYPE    MSG111                  ;ALL BANKS WILL BE TESTED
      044600  104401  070773                  TYPEIT  ,MSG111
                                              .DSABL  CRF
10960 044604  005037  002002                  CLR     SELONLY
10961
10962                                         ;ENTRY POINT FROM CMD15
10963 044610  013702  002556          CMD16A: MOV     LASTBANK,R2
10964 044614  006302                          ASL     R2
10965 044616  006302                          ASL     R2
```

```
 10966 044620                                FOR R1 := #0 TO R2 BY #4
       044620  005001                                                    CLR R1
       044622                                                          B76:;;;;;;;
 10967 044622  042761  040000  002666          BIC   #BIT14,CONFIG+2(R1)
 10968 044630                                END ;OF FOR R1
       044630  062701  000004                                                    ADD #4,R1
       044634  020102                                                          CMP R1,R2
       044636  003771                                                          BLE B76
       044640                                                          E76:;;;;;;;;
 10969 044640  000207                        RETURN
```

```
10972 044642                        FCMD17: SUBTST  <<FS    COMMAND 17      ENABLE TRACE>>
                                    ;*****************************************************************************
                                    ;*SUBTEST        FS      COMMAND 17      ENABLE TRACE
                                    ;*****************************************************************************
10973 044642                                TYPE    MSG127
      044642  104401  071331                TYPEIT  ,MSG127
                                          .DSABL  CRF
10974 044646  012737  177777  006216        MOV     #-1,TRACE
10975 044654  000207                        RETURN
```

```
 10978 044656                          FCMD18: SUBTST  <<FS    COMMAND 18      DISABLE TRACE>>
                                       ;*****************************************************************************
                                       ;*SUBTEST       FS      COMMAND 18      DISABLE TRACE
                                       ;*****************************************************************************
 10979 044656                                  TYPE    MSG128
       044656  104401  071350                 TYPEIT  ,MSG128
                                              .DSABL  CRF
 10980 044662  005037  006216                 CLR     TRACE
 10981 044666  000207                         RETURN
```

```
 10984 044670                       WHICHCSR:SUBTST <<SUBR  DETERMINE CORRECT CSR>>
                                    ;*****************************************************************************
                                    ;*SUBTEST       SUBR    DETERMINE CORRECT CSR
                                    ;*****************************************************************************
 10985 044670  013700  002224              MOV     TOTCSR^,R0      ;GET CSR'S FLAG
 10986 044674  022700  100000              CMP     #BIT15,R0       ;CSR 0?
 10987 044700  001003                      BNE     1$              ;NO - SKIP
 10988 044702  005037  002152              CLR     CSRNO           ;YES - SET IT UP
 10989 044706  000207                      RETURN
 10990
 10991 044710                       1$.    TYPE    MSG022          ;WHICH CSR(0-F)
       044710  104401  066725              TYPEIT  ,MSG022
                                          .DSABL  CRF
 10992 044714  104412                      RDLIN                   ;GET CHARACTER
 10993 044716                             POP     R0              ;PUT IN R0
       044716  012600                                                              MOV (SP)+,R0
 10994 044720  011000                      MOV     (R0),R0         ;PUT CHAR IN R0
 10995 044722  020027  000106              CMP     R0,#106         ;CHECK LIMIT
 10996 044726  101370                      BHI     1$              ;IF BAD LOOP TILL HE TYPES IT RIGHT
 10997 044730  022700  000101              CMP     #'A,R0
 10998 044734  103002                      BHIS    2$
 10999 044736  162700  000007              SUB     #7,R0
 11000 044742  162700  000060       2$:    SUB     #60,R0
 11001 044746  006300                      ASL     R0
 11002 044750  010037  002152              MOV     R0,CSRNO
 11003 044754  000207                      RETURN
```

```
11469                                   .SBTTL  ERROR DATA (SUPERVISOR) SETUP STUFF
11470 044756                          $PER25: LET ADDRESS := R1 - #2
      044756  010137  002034                                                  MOV R1,ADDRESS
      044762  162737  000002  002034                                          SUB #2,ADDRESS
11471 044770                                  IF ABORTFLAG IS FALSE
      044770  005737  002144                                                  TST ABORTFLAG
      044774  001007                                                          BNE L434
11472 044776                                    TESTAREA              ;ENTER TEST MODE
      044776  053737  002552  177776          BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                              .DSABL  CRF
11473 045004                                    LET BAD := -2(R1)
      045004  016137  177776  002052                                          MOV -2(R1),BAD
11474 045012  104417                            KERNEL                ;ENTER KERNEL MODE
11475 045014                                  END ;OF IF ABORTFLAG
      045014                                                          L434:;;;;;;;
11476 045014                                  IF 177654 EQ #0
      045014  005737  177654                                                  TST 177654
      045020  001003                                                          BNE L435
11477 045022                                    LET GOOD := R2
      045022  010237  002044                                                  MOV R2,GOOD
11478 045026                                  ELSE
      045026  000402                                                          BR L436
      045030                                                          L435:;;;;;;;
11479 045030                                    LET GOOD := R3
      045030  010337  002044                                                  MOV R3,GOOD
11480 045034                                  END ;OF IF
      045034                                                          L436:;;;;;;;
11481 045034  000137  050212                  JMP     PERRAW
11482
11483 045040                          PERRA3: SUBTST  <<DATA WAS 3 WORDS>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       DATA WAS 3 WORDS
                                      ;*****************************************************************************
11484 045040                                  IF BADPC EQ #0 THEN $CALL BADSTACK
      045040  005737  002022                                                  TST BADPC
      045044  001002                                                          BNE L437
      045046  004737  034152                                                  JSR PC,BADSTACK
      045052                                                          L437:;;;;;;;
11485 045052                                  PUSH    R0                      MOV R0,-(SP)
      045052  010046
11486 045054  005037  002150                  CLR     CSR             ;MAKE SURE CSR BIT HOLDER IS CLEAR
11487 045060  104505                          CHK1DIS                 ;DISABLE ECC & WRITE CHECKBITS FROM 1 SELECTED CSR
11488 045062                                  TESTAREA
      045062  053737  002552  177776          BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
                                              .DSABL  CRF
11489 045070  005711                          TST     (R1)            ;READ LOCATION TO READ CHECKBITS INTO CSR
11490 045072  104417                          KERNEL
11491 045074  104426                          READCSR                 ;GET CSR CONTENTS
11492 045076  013700  002150                  MOV     CSR,R0          ;SAVE CSR CONTENTS IN R0
11493 045102  104503                          CLR1CSR                 ;RETURN CSR TO NORMAL MODE
11494 045104  072027  177773                  ASH     #-5,R0          ;MOVE CHECK BITS TO BOTTOM OF WORD
11495 045110  042700  177600                  BIC     #^C177,R0       ;CLEAR OFF EXTRANEOUS GARBAGE
11496 045114                                  LET ADDRESS := R1        ;SAVE VIRTUAL ADDRESS FOR PRINTOUT
      045114  010137  002034                                                  MOV R1,ADDRESS
11497 045120  005037  002044                  CLR     GOOD            ;FIRST TEST WORD WRITTEN SHOULD ALWAYS BE ZERO
11498 045124                                  TESTAREA                ;ENTER TEST MODE
      045124  053737  002552  177776          BIS     TESTMODE,PSW                    ;GO TO SYSTEM TEST MODE
```

```
                                        .DSABL  CRF
11499 045132  011137  002052           MOV     (R1),BAD        ;GET BAD DATA FROM MUT - FIRST WORD
11500 045136  011437  002054           MOV     (R4),BAD2       ;AND SECOND WORD
11501 045142  104417                   KERNEL                  ;ENTER KERNEL MODE
11502 045144  110037  002056           MOVB    R0,BAD3         ;MOVE BAD CHECKBITS FOR PRINTOUT
11503 045150  105037  002057           CLRB    BAD3+1          ;CLEAR OFF THE OTHER UNUSED BITS
11504 045154  004737  050446           CALL    PERBNK          ;MARK BANK AS BAD IN CONFIG TABLE
11505 045160  104033                   ERROR   +33
11506 045162                           POP     R0              ;RESTORE R0
      045162  012600                                                           MOV (SP)+,R0
11507 045164                           IF #SW0 SET.IN @SWR
      045164  032777  000001  135444                                           BIT #SW0,@SWR
      045172  001402                                                           BEQ L440
11508 045174  104506                     ENASBE                ;TRAP ON SINGLE BIT ERRORS
11509 045176                           ELSE
      045176  000401                                                           BR L441
      045200                                                          L440:;;;;;;;
11510 045200  104472                     ECCINIT               ;TRAP ON UNCORRECTABLE ERRORS
11511 045202                           END; OF IF #SW0
      045202                                                          L441:;;;;;;;
11512 045202  000002                   RTI
```

```
11515 045204                          $PER30: LET GOOD := R1
      045204  010137  002044                                                  MOV R1,GOOD
11516 045210                                  LET ADDRESS := (SP) - 16
      045210  011637  002034                                                  MOV (SP),ADDRESS
      045214  163737  000016  002034                                          SUB 16,ADDRESS
11517 045222                                  IF ABORTFLAG IS FALSE
      045222  005737  002144                                                  TST ABORTFLAG
      045226  001007                                                          BNE L442
11518 045230                                    TESTAREA              ;ENTER TEST MODE
      045230  053737  002552  177776          BIS     TESTMODE,PSW                  ;GO TO SYSTEM TEST MODE
                                              .DSABL  CRF
11519 045236                                    LET BAD := @ADDRESS
      045236  017737  134572  002052                                          MOV @ADDRESS,BAD
11520 045244  104417                            KERNEL                      ;ENTER KERNEL MODE
11521 045246                                  END ;OF IF ABORTFLAG
      045246                                                                L442:;;;;;;
11522 045246  000137  050212                  JMP PERRAW
11523
11524 045252                          GETDATA:SUBTST  <<GET DATA FROM ABORTED AREA IF POSSIBLE>>
                                      ;*************************************************************************
                                      ;*SUBTEST       GET DATA FROM ABORTED AREA IF POSSIBLE
                                      ;*************************************************************************
11525 045252                                  PUSH    R0,4,114
      045252  010046                                                          MOV R0,-(SP)
      045254  013746  000004                                                  MOV 4,-(SP)
      045260  013746  000114                                                  MOV 114, (SP)
11526 045264  010637  045350                  MOV     SP,GETDA1
11527 045270  012737  045330  000004          MOV     #1$,4
11528 045276  012737  045330  000114          MOV     #1$,114
11529 045304  013700  002034                  MOV     ADDRESS,R0
11530 045310                                  TESTAREA
      045310  053737  002552  177776          BIS     TESTMODE,PSW                  ;GO TO SYSTEM TEST MODE
                                              .DSABL  CRF
11531 045316  011037  002052                  MOV     (R0),BAD
11532 045322  104417                          KERNEL
11533 045324  005037  002144                  CLR     ABORTFLAG
11534 045330  013706  045350          1$:     MOV     GETDA1,SP             ;RESTORE KNOWN GOOD STACK POINTER
11535 045334                                  POP     114,4,R0
      045334  012637  000114                                                  MOV (SP)+,114
      045340  012637  000004                                                  MOV (SP)+,4
      045344  012600                                                          MOV (SP)+,R0
11536 045346  000207                          RETURN
11537 045350  000000                  GETDA1: 0
```

```
                                        .SBTTL  POWER FAIL AUTO RESTART
                                        .SBTTL  ROUTINE POWER DOWN AND UP
                                ;***************************************************************************
                                ;POWER DOWN ROUTINE
045352                          $PWRDN:
                                        ;SAVE CACHE STATUS
045352  005737  002544                  TST     CACHKN
045356  001403                          BEQ     5$
045360                                  PUSH    CONTRL
045360  013746  177746                                                          MOV CONTRL,-(SP)
045364  104423                          CACHON                  ;TURN CACHE ON
045366  012737  046300  000024  5$:     MOV     #$ILLUP,PWRVEC ;;SET FOR FAST UP
045374  012737  000340  000026          MOV     #340,PWRVEC+2   ;;PRIO:7
045402                                  PUSH    R0,R1,R2,R3,R4,R5,CSRN0
045402  010046                                                                  MOV R0,-(SP)
045404  010146                                                                  MOV R1,-(SP)
045406  010246                                                                  MOV R2,-(SP)
045410  010346                                                                  MOV R3,-(SP)
045412  010446                                                                  MOV R4,-(SP)
045414  010546                                                                  MOV R5,-(SP)
045416  013746  002152                                                          MOV CSRN0,-(SP)
                                        ;SAVE USER PAR'S & PDR7
045422  012700  177700                  MOV     #177700,R0
045426  012701  000021                  MOV     #17.,R1
045432                          1$:     PUSH    -(R0)
045432  014046                                                                  MOV -(R0),-(SP)
045434  077102                          SOB     R1,1$
                                        ;SAVE SUPERVISOR PAR'S
045436  005737  002456                  TST     NOSUPER
045442  001013                          BNE     PD1
045444  012700  172300                  MOV     #172300,R0
045450  012701  000020                  MOV     #16.,R1
045454                          2$:     PUSH    -(R0)
045454  014046                                                                  MOV -(R0),-(SP)
045456  077102                          SOB     R1,2$
                                        IF RLFLAG IS TRUE THEN $CALL WOOPS
045460  005737  002126                                                          TST RLFLAG
045464  001402                                                                  BEQ L443
045466  004737  046306                                                          JSR PC,WOOPS
045472                                                                  L443:;;;;;;
                                        ;COPY KERNEL MAP TO USER & SUPERVISOR
045472  012700  172300          PD1:    MOV     #KIPDR0,R0
045476  012701  177600                  MOV     #UIPDR0,R1
045502  012702  172200                  MOV     #SIPDR0,R2
045506  012703  000040                  MOV     #32.,R3
045512  011021                  3$:     MOV     (R0),(R1)+
045514  012022                          MOV     (R0)+,(R2)+
045516  077303                          SOB     R3,3$
```

```
11582                                   ;SAVE USER & SUPERVISOR STACK POINTERS
11583 045520                            USER
      045520  052737  140000  177776    BIS     #BIT15!BIT14,PSW                ;GO TO USER MODE
                                        .DSABL  CRF
11584 045526  010600                    MOV     USP,R0
11585 045530  104417                    KERNEL                  ;ENTER KERNEL MODE
11586 045532                            PUSH    R0
      045532  010046                                                                MOV R0, (SP)
11587 045534  005737  002456            TST     NOSUPER
11588 045540  001006                    BNE     7$
11589 045542                            SUPERVISOR              ;ENTER SUPERVISOR MODE
      045542  052737  040000  177776    BIS     #BIT14,PSW                      ;GO TO SUPERVISOR MODE
                                        .DSABL  CRF
11590 045550  010600                    MOV     SSP,R0
11591 045552  104417                    KERNEL                  ;ENTER KERNEL MODE
11592 045554                            PUSH    R0
      045554  010046                                                                MOV R0,-(SP)
11593                                   ;SAVE ECC REGISTERS
11594 045556  013701  002224      7$:   MOV     TOTCSRS,R1      ;GET CSR'S
11595 045562                            BEGIN   LCSRSAVE
      045562                                                                  B77:;;;;;;
11596 045562                              FOR CSRNO := #0 TO #36 BY #2
      045562  005037  002152                                                        CLR CSRNO
      045566                                                                  B100:;;;;;;
11597 045566  006301                        ASL         R1
11598 045570                                ON.ERROR
      045570  103003                                                              BCC L444
11599 045572  104426                          READCSR
11600 045574                                  PUSH      CSR
      045574  013746  002150                                                      MOV CSR,-(SP)
11601 045600                                END ;OF ON.ERROR
      045600                                                                  L444:;;;;;;
11602 045600                              IF R1 EQ #0 THEN LEAVE LCSRSAVE
      045600  005701                                                              TST R1
      045602  001407                                                              BEQ E77
11603 045604                              END ;OF FOR CSRNO
      045604  062737  000002  002152                                            ADD #2,CSRNO
      045612  023727  002152  000036                                            CMP CSRNO,#36
      045620  003762                                                            BLE B100
      045622                                                                  E100:;;;;;;;
11604 045622                            END LCSRSAVE
      045622                                                                  E77:;;;;;;
11605                                   ;SAVE MMR0,1,2,3
11606 045622                            PUSH    MMR0,MMR1,MMR2
      045622  013746  177572                                                      MOV MMR0,-(SP)
      045626  013746  177574                                                      MOV MMR1,-(SP)
      045632  013746  177576                                                      MOV MMR2,-(SP)
11607 045636  005737  002456            TST     NOSUPER
11608 045642  001002                    BNE     8$
11609 045644                            PUSH    MMR3
      045644  013746  172516                                                      MOV MMR3,-(SP)
11610                                   ;SAVE KERNEL PAR'S
11611 045650  012700  172400      8$:   MOV     #172400,R0
11612 045654  012701  000020            MOV     #16.,R1
11613 045660                      4$:   PUSH    -(R0)
      045660  014046                                                              MOV  (R0), (SP)
11614 045662  077102                    SOB     R1,4$
```

```
11615                                   ;SAVE Q-BUS MAP REGISTERS
11616 045664  022737  000005  004010    CMP     #5,PROTYP               ;IS THIS AN 11/83 ?
11617 045672  001004                    BNE     9$                      ;BRANCH IF NOT
11618 045674                            PUSH    MAPHO,MAPLO
      045674  013746  170202                                                    MOV MAPHO,-(SP)
      045700  013746  170200                                                    MOV MAPLO,-(SP)
11619                                   ;SAVE POSSIBLE SOFTWARE SWITCH REGISTER
11620 045704                    9$:     PUSH    @SWR
      045704  017746  134726                                                    MOV @SWR,-(SP)
11621                                   ;SAVE STACK POINTER
11622 045710  010637  046304            MOV     SP,$SAVR6       ;;SAVE SP
11623                                   ;NOW SET UP REAL VECTOR
11624 045714  012737  045726  000024    MOV     #$PWRUP,PWRVEC  ;;SET UP VECTOR
11625 045722  000000            $DOWN:  HALT
11626 045724  000776                    BR      $DOWN           ;;HANG UP
```

```
11629                                   ;*****************  ***************************************************************
11630                                   ;POWER UP ROUTINE
11631 045726                            $PWRUP:
11635 045726  012737  046300  000024              MOV     #$ILLUP,PWRVEC ;;SET FOR FAST DOWN
11636                                             ;RESTORE STACK POINTER
11637 045734  013706  046304                      MOV     $SAVR6,SP       ;;GET SP
11638 045740  005037  046304                      CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
11639 045744  005237  046304              1$:     INC     $SAVR6          ;;WAIT FOR THE INC
11640 045750  001375                              BNE     1$              ;;OF A WORD
11641                                             ;RESTORE POSSIBLE SOFTWARE SWITCH REGISTER
11642 045752                                      POP     @SWR
      045752  012677  134660                                                              MOV (SP)+,@SWR
11643 045756  012700  172340              10$:    MOV     #172340,R0
11644 045762  012702  172300                      MOV     #KIPDR0,R2
11645 045766  012701  000020                      MOV     #16.,R1
11646 045772                              6$:     POP     (R0)+
      045772  012620                                                                    MOV (SP)+,(R0)+
11647 045774  012722  077406                      MOV     #77406,(R2)+
11648 046000  077104                              SOB     R1,6$
11649                                             ;RESTORE MMR3,2,1,0
11650 046002  005737  002456                      TST     NOSUPER
11651 046006  001002                              BNE     11$
11652 046010                                      POP     MMR3
      046010  012637  172516                                                            MOV (SP)+,MMR3
11653 046014                              11$:    POP     MMR2,MMR1,MMR0
      046014  012637  177576                                                            MOV (SP)+,MMR2
      046020  012637  177574                                                            MOV (SP)+,MMR1
      046024  012637  177572                                                            MOV (SP)+,MMR0
11654
11655 046030  013701  002224                      MOV     TOTCSRS,R1      ;GET CSR'S
11656 046034  042701  177400                      BIC     #177400,R1
11657 046040                                      BEGIN LCSRRESTORE
      046040                                                                  B101:;;;;;;
11658 046040                                        FOR CSRNO := #36 DOWNTO #0 BY #2
      046040  012737  000036  002152                                                    MOV #36,CSRNO
      046046                                                                  B102:;;;;;;
11659 046046  006201                                  ASR         R1
11660 046050                                          ON.ERROR
      046050  103003                                                                   BCC L445
11661 046052                                            POP       CSR
      046052  012637  002150                                                          MOV (SP)+,CSR
11662 046056  104425                                    LOADCSR
11663 046060                                          END ;OF ON.ERROR
      046060                                                                  L445:;;;;;;
11664 046060                                        IF R1 EQ #0 THEN LEAVE LCSRRESTORE
      046060  005701                                                                   TST R1
      046062  001407                                                                   BEQ E101
11665 046064                                        END ;OF FOR CSRNO
      046064  162737  000002  002152                                                  SUB #2,CSRNO
      046072  023727  002152  000000                                                  CMP CSRNO,#0
      046100  002362                                                                   BGE B102
      046102                                                                  E102:;;;;;;;
11666 046102                                    END LCSRRESTORE
      046102                                                                  E101:;;;;;;
11667                                           ;COPY KERNEL MAP TO USER & SUPERVISOR
11668 046102  012700  172300                    MOV     #KIPDR0,R0
11669 046106  012701  177600                    MOV     #UIPDR0,R1
```

```
11670 046112  012702  172200                MOV     #SIPDR0,R2
11671 046116  012703  000040                MOV     #32.,R3
11672 046122  011021                3$:     MOV     (R0),(R1)+
11673 046124  012022                        MOV     (R0)+,(R2)+
11674 046126  077303                        SOB     R3,3$
```

```
11676                                   ;RESTORE SUPERVISOR & USER STACK POINTERS
11677 046130  005737  002456            TST     NOSUPER
11678 046134  001006                    BNE     13$
11679 046136                            POP     R0
      046136  012600                                                    MOV (SP)+,R0
11680 046140                            SUPERVISOR              ;ENTER SUPERVISOR MODE
      046140  052737  040000  177776    BIS     #BIT14,PSW                      ;GO TO SUPERVISOR MODE
                                        .DSABL  CRF
11681 046146  010006                    MOV     R0,SSP
11682 046150  104417                    KERNEL                  ;ENTER KERNEL MODE
11683 046152                    13$:    POP     R0
      046152  012600                                                    MOV (SP)+,R0
11684 046154                            USER
      046154  052737  140000  177776    BIS     #BIT15!BIT14,PSW                ;GO TO USER MODE
                                        .DSABL  CRF
11685 046162  010006                    MOV     R0,USP
11686 046164  104417                    KERNEL                  ;ENTER KERNEL MODE
11687                                   ;RESTORE SUPERVISOR PAR'S
11688 046166  012700  172240            MOV     #172240,R0
11689 046172  012701  000020            MOV     #16.,R1
11690 046176                    7$:     POP     (R0)+
      046176  012620                                                    MOV (SP)+,(R0)+
11691 046200  077102                    SOB     R1,7$
11692                                   ;RESTORE USER PAR'S & PDR7
11693 046202  012700  177636            MOV     #177636,R0
11694 046206  012701  000021            MOV     #17.,R1
11695 046212                    8$:     POP     (R0)+
      046212  012620                                                    MOV (SP)+,(R0)+
11696 046214  077102                    SOB     R1,8$
11697                                   ;RESTORE POSSIBLE SOFTWARE DISPLAY REGISTER
11698 046216  013777  002012  134414    MOV     $PATMAR,@DISPLAY
11699 046224  013737  002012  000174    MOV     $PATMAR,DISPREG
11700 046232                            POP     CSRNO,R5,R4,R3,R2,R1,R0
      046232  012637  002152                                            MOV (SP)+,CSRNO
      046236  012605                                                    MOV (SP)+,R5
      046240  012604                                                    MOV (SP)+,R4
      046242  012603                                                    MOV (SP)+,R3
      046244  012602                                                    MOV (SP)+,R2
      046246  012601                                                    MOV (SP)+,R1
      046250  012600                                                    MOV (SP)+,R0
11701 046252  012737  045352  000024    MOV     #$PWRDN,PWRVEC  ;;SET UP THE POWER DOWN VECTOR
11702 046260                            TYPE    MSG051          ;REPORT THE POWER FAILURE
      046260  104401  067652            TYPEIT  ,MSG051
                                        .DSABL  CRF
11703                                   ;RESTORE CACHE STATUS
11704 046264  005737  002544            TST     CACHKN
11705 046270  001402                    BEQ     9$
11706 046272                            POP     CONTRL
      046272  012637  177746                                            MOV (SP)+,CONTRL
11707 046276  000002            9$:     RTI
11708 046300  000000            $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
11709 046302  000776                    BR      $ILLUP          ;; BEFORE THE POWER DOWN WAS COMPLETE
11710 046304  000000            $SAVR6: 0                       ;;PUT THE SP HERE
11711                                   .EVEN
```

```
11723 046306                          WOOPS:  SUBTST  <<POWER FAIL WHILE RELOCATED>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       POWER FAIL WHILE RELOCATED
                                      ;*****************************************************************************
11724 046306                                  PUSH    BANK
      046306  013746  002102                                                          MOV BANK,-(SP)
11725 046312  005037  002102                  CLR     BANK
11726 046316                                  MAP     BANK                    ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
      046316  010346                                                          MOV R3,-(SP)
      046320  013703  002102                  MOV     BANK,R3
      046324  004737  035716                  CALL    MAPPER
                                              .DSABL  CRF
      046330  012603                                                          MOV (SP)+,R3
11727 046332                                  SUPERVISOR              ;ENTER SUPERVISOR MODE
      046332  052737  040000  177776          BIS     #BIT14,PSW                      ;GO TO SUPERVISOR MODE
                                              .DSABL  CRF
11728 046340  013737  060024  046704          MOV     FIRST+PWRVEC,WOOPSAV
11729 046346  013737  060026  046706          MOV     FIRST+PWRVEC+2,WOOPSAV+2
11730 046354                                  BMOV    FIRST+WOOPUP,WOOPSAV+4,WOOPEND-WOOPUP/2+12.
      046354  004537  041024                      JSR R5,BLOCK3
      046360  000105                              WOOPEND-WOOPUP/2+12.
      046362  046710                              WOOPSAV+4
      046364  126472                              FIRST+WOOPUP
                                                  .DSABL      CRF
11731 046366  012737  046472  060024          MOV     #WOOPUP,FIRST+PWRVEC
11732 046374  012737  000340  060026          MOV     #340,FIRST+PWRVEC+2
11733 046402                                  BMOV    WOOPUP,FIRST+WOOPUP,WOOPEND-WOOPUP/2
      046402  004537  041024                      JSR R5,BLOCK3
      046406  000071                              WOOPEND-WOOPUP/2
      046410  126472                              FIRST+WOOPUP
      046412  046472                              WOOPUP
                                                  .DSABL      CRF
11734 046414  012700  172340                  MOV     #KIPAR0,R0
11735 046420  012701  126654                  MOV     #FIRST+WOOPEND,R1
11736 046424  012702  000010                  MOV     #8.,R2
11737 046430  012021                  1$:     MOV     (R0)+,(R1)+
11738 046432  077202                          SOB     R2,1$
11739 046434  005737  002456                  TST     NOSUPER
11740 046440  001002                          BNE     2$
11741 046442  013721  172516                  MOV     MMR3,(R1)+
11742 046446  013721  177576          2$:     MOV     MMR2,(R1)+
11743 046452  013721  177574                  MOV     MMR1,(R1)+
11744 046456  013721  177572                  MOV     MMR0,(R1)+
11745 046462  104417                          KERNEL                  ;ENTER KERNEL MODE
11746 046464                                  POP     BANK
      046464  012637  002102                                                          MOV (SP)+,BANK
11747 046470  000207                          RETURN
```

```
 11750 046472                       WOOPUP: SUBTST  <<POWER UP FROM BANK 0 TO RELOCATION>>
                                    ;*************************************************** ******************************
                                    ;*SUBTEST        POWER UP FROM BANK 0 TO RELOCATION
                                    ;*****************************************************************************
 11751 046472  012700  046654              MOV     #WOOPEND,R0
 11752 046476  012701  172340              MOV     #KIPAR0,R1
 11753 046502  012703  172300              MOV     #KIPDR0,R3
 11754 046506  012702  000010              MOV     #8.,R2
 11755 046512  012021              1$:     MOV     (R0)+,(R1)+
 11756 046514  012723  077406              MOV     #77406,(R3)+
 11757 046520  077204                      SOB     R2,1$
 11758 046522  005737  002456              TST     NOSUPER
 11759 046526  001002                      BNE     3$
 11760 046530  012037  172516              MOV     (R0)+,MMR3
 11761 046534  012037  177576      3$:     MOV     (R0)+,MMR2
 11762 046540  012037  177574              MOV     (R0)+,MMR1
 11763 046544  012037  177572              MOV     (R0)+,MMR0
 11764 046550  013706  046304              MOV     $SAVR6,SP
 11765 046554                              PUSH    BANK
       046554  013746  002102                                                      MOV BANK,-(SP)
 11766 046560  005037  002102              CLR     BANK
 11767 046564                              MAP     BANK                    ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
       046564  010346                                                              MOV R3, (SP)
       046566  013703  002102              MOV     BANK,R3
       046572  004737  035716              CALL    MAPPER
                                          .DSABL  CRF
       046576  012603                                                              MOV (SP)+,R3
 11768 046600                              SUPERVISOR              ;ENTER SUPERVISOR MODE
       046600  052737  040000  177776      BIS     #BIT14,PSW                      ;GO TO SUPERVISOR MODE
                                          .DSABL  CRF
 11769 046606  013737  046704  060024      MOV     WOOPSAV,FIRST+PWRVEC
 11770 046614  013737  046706  060026      MOV     WOOPSAV+2,FIRST+PWRVEC+2
 11771                                    ;SIMULATE THE FOLLOWING BLOCK MOV BUT WITH NO STACK ACCESSES
 11772                                    ;BMOV   WOOPSAV+4,FIRST+WOOPUP,WOOPEND-WOOPUP/2+12.
 11773 046622  012700  046710              MOV     #WOOPSAV+4,R0
 11774 046626  012701  000105              MOV     #WOOPEND-WOOPUP/2+12.,R1
 11775 046632  012702  126472              MOV     #FIRST+WOOPUP,R2
 11776 046636  012022              2$:     MOV     (R0)+,(R2)+
 11777 046640  077102                      SOB     R1,2$
 11778
 11779 046642  104417                      KERNEL                  ;ENTER KERNEL MODE
 11780 046644                              POP     BANK
       046644  012637  002102                                                      MOV (SP)+,BANK
 11781 046650  000137  045726              JMP     $PWRUP
 11782 046654  000014        WOOPEND:.REPT   12.
 11785 046704  000107        WOOPSAV:.REPT   WOOPEND WOOPUP/2+12.+2
```

```
                                        .SBTTL  IO SUBROUTINES
                                        .SBTTL  ROUTINE TYPE

                                ;*************************************************************************
                                ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
                                ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
                                ;*NOTE1:         $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
                                ;*NOTE2:         $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
                                ;*NOTE3:         $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
                                ;*
                                ;*CALL:
                                ;*1) USING A TRAP INSTRUCTION
                                ;*      TYPE    MESADR          ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
                                ;*OR
                                ;*      TYPE
                                ;*      MESADR
                                ;*

047122  105737  002360          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
047126  100407                          BMI     6$              ;BR IF NO
047130  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
047132  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
047136  112046                  4$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
047140  001005                          BNE     7$              ;;BR IF IT ISN'T THE TERMINATOR
047142  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
047144  012600                  5$:     MOV     (SP)+,R0        ;;RESTORE R0
047146  062716  000002          6$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
047152  000002                          RTI                     ;;RETURN
047154  122716  000011          7$:     CMPB    #HT,(SP)        ;BRANCH IF NOT <HT>
047160  001002                          BNE     11$
047162  112716  000040                  MOVB    #' ,(SP)        ;REPLACE TAB WITH SPACE
047166  122716  000200          11$:    CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
047172  001006                          BNE     8$
047174  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
047176                                  TYPE                    ;;TYPE A CR AND LF
        047176  104401                  TYPEIT
                                        .DSABL  CRF
047200  002660                          $CRLF
047202  105037  047434                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
047206  000753                          BR      4$              ;;GET NEXT CHARACTER
047210  004737  047250          8$:     CALL    $TYPEC          ;;GO TYPE THIS CHARACTER
047214  123726  002652          9$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
047220  001346                          BNE     4$              ;;IF NO GO GET NEXT CHAR.
047222  013746  002356                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                                ;;AND THE NULL CHAR.
047226  105366  000001          10$:    DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
047232  002770                          BLT     9$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
047234  004737  047250                  CALL    $TYPEC          ;;GO TYPE A NULL
047240  105337  047434                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
047244  000770                          BR      10$             ;;LOOP
047246  000000          XOCHAR: .WORD 0
047250                  $TYPEC: PUSH    R1                                              MOV R1,-(SP)
        047250  010146
047252  116601  000004                  MOVB    4(SP),R1
047256  005737  002544                  TST     CACHKN
047262  001402                          BEQ     2$
```

```
11844 047264                                    PUSH    CONTRL
      047264  013746  177746                                                 MOV CONTRL,-(SP)
11845 047270                            2$:     PUSH    R0
      047270  010046                                                         MOV R0,-(SP)
11846 047272  104424                            CACHOFF                 ;TURN CACHE OFF
11871 047274  105777  133346              3$:     TSTB  @$TPS             ;;WAIT UNTIL PRINTER IS READY
11872 047300  100375                              BPL   3$
11873 047302  005037  047246                    CLR     XOCHAR
11874 047306  105777  133330                    TSTB    @$TKS             ;;CHECK FOR XOFF
11875 047312  100032                            BPL     NC                ;;SKIP IF NO CHARACTER
11876 047314  117737  133324  047246          MOVB    @$TKB,XOCHAR      ;;SAVE THE CHARACTER
11877 047322  042737  177600  047246          BIC     #^C177,XOCHAR     ;;STRIP OFF ASCII
11878 047330  023727  047246  000023          CMP     XOCHAR,#023       ;;WAS IT A CONTROL S?
11879 047336  001020                          BNE     NC                ;;BRANCH IF NOT
11880 047340  105777  133276        CONTS3:   TSTB    @$TKS             ;;WAIT FOR CHARACTER
11881 047344  100375                          BPL     CONTS3
11882 047346  117737  133272  047246          MOVB    @$TKB,XOCHAR      ;;GET CHARACTER
11883 047354  042737  177600  047246          BIC     #^C177,XOCHAR     ;;STRIP OFF ASCII
11884 047362                                  IF XOCHAR EQ #21          ;; IF IT IS A ^Q
      047362  023727  047246  000021                                                 CMP XOCHAR,#21
      047370  001002                                                                 BNE L446
11885 047372  000402                            BR      NC
11886 047374                                  ELSE
      047374  000401                                                                 BR L447
      047376                                                                L446:;;;;;;
11887 047376  000760                            BR      CONTS3
11888 047400                                  END ;OF IF XOCHAR
      047400                                                                L447:;;;;;;
11889 047400  110177  133244        NC:       MOVB    R1,@$TPB          ;;LOAD CHAR TO BE TYPED INTO DATA REG.
11893 047404  122766  000015  000002          CMPB    #CR,2(SP)         ;;IS CHARACTER A CARRIAGE RETURN?
11894 047412  001003                          BNE     1$                ;;BRANCH IF NO
11895 047414  105037  047434                  CLRB    $CHARCNT          ;;YES--CLEAR CHARACTER COUNT
11896 047420  000406                          BR      $TYPEX            ;;EXIT
11897 047422  122766  000012  000002  1$:     CMPB    #LF,2(SP)         ;;IS CHARACTER A LINE FEED?
11898 047430  001402                          BEQ     $TYPEX            ;;BRANCH IF YES
11899 047432  105227                          INCB    (PC)+             ;;COUNT THE CHARACTER
11900 047434  000000        $CHARCNT:.WORD    0                         ;;CHARACTER COUNT STORAGE
11901 047436                $TYPEX: POP       R0
      047436  012600                                                         MOV (SP)+,R0
11902 047440  005737  002544                    TST     CACHKN            ;IS THERE A CACHE?
11903 047444  001402                          BEQ     2$                ;BRANCH IF NOT
11904 047446                                  POP     CONTRL            ;POP CACHE STATUS
      047446  012637  177746                                                 MOV (SP)+,CONTRL
11905 047452                            2$:     POP     R1
      047452  012601                                                         MOV (SP)+,R1
11906 047454  000207                            RETURN
11907 047456                SUPLIMIT:;!!!!!!!!!!!!THIS IS THE LIMIT ON SUPERVISOR MAPPED TO MUT SPACE
```

```
12585                                   .SBTTL  ERROR DATA SETUP
12586
12587                           ;       USE THIS        IF THIS CONDITION DISCRIBES THE ERROR
12588                           ;
12589                           ;       PERR01          TRAP
12590                           ;                       BAD DATA IN R0 UNLESS ABORTED
12591                           ;                               THEN BAD DATA IS POINTED TO BY -(R4)
12592                           ;                       GOOD DATA IN R5
12593                           ;
12594                           ;       PERR02          TRAP
12595                           ;                       BAD DATA IN R1 UNLESS ABORTED
12596                           ;                               THEN BAD DATA IS POINTED TO BY -(R4)
12597                           ;                       GOOD DATA IN R2
12598                           ;
12599                           ;       PERR03          TRAP
12600                           ;                       BAD DATA IS POINTED TO BY -(R1)
12601                           ;                       GOOD DATA IN R4
12602                           ;
12603                           ;       PERR04          TRAP
12604                           ;                       BAD DATA IN R4 UNLESS ABORTED
12605                           ;                               THEN BAD DATA IS POINTED TO BY  2(R0)
12606                           ;                       GOOD DATA IN R2
12607                           ;
12608                           ;       PERR05          JSR     PC
12609                           ;                       BAD DATA IS POINTED TO BY -(R0)
12610                           ;                       GOOD DATA IN R2
12611                           ;                       RETURN AFTER SETTING UP GOOD,BAD,ADDRESS
12612                           ;
12613                           ;       PERR06          JSR     PC
12614                           ;                       BAD DATA IS POINTED TO BY -(R0)
12615                           ;                       GOOD DATA IS ZERO
12616                           ;                       RETURN AFTER SETTING UP GOOD,BAD,ADDRESS
12617                           ;
12618                           ;       PERR07          TRAP
12619                           ;                       BAD DATA IN R2 UNLESS ABORTED
12620                           ;                               THEN BAD DATA IS POINTED TO BY (R1)
12621                           ;                       GOOD DATA IN DATBUF
12622                           ;
12623                           ;       PERR10          TRAP
12624                           ;                       BAD DATA IN R2 UNLESS ABORTED
12625                           ;                               THEN BAD DATA IS POINTED TO BY 2(R1)
12626                           ;                       GOOD DATA IN DATBUF+2
12627                           ;
12628                           ;       PERR11          TRAP
12629                           ;                       BYTE TEST
12630                           ;                       BAD DATA IN RIGHT BYTE OF R0 UNLESS ABORTED
12631                           ;                               THEN BAD DATA IS POINTED TO BY (R1)
12632                           ;                       GOOD DATA IS A ZERO BYTE
12633                           ;
12634                           ;       PERR12          TRAP
12635                           ;                       BYTE TEST
12636                           ;                       BAD DATA IN RIGHT BYTE OF R0 UNLESS ABORTED
12637                           ;                               THEN BAD DATA IS POINTED TO BY (R1)
12638                           ;                       GOOD DATA IS A BYTE OF ONES
12639                           ;
12640                           ;       PERR13          TRAP
12641                           ;                       BAD DATA IN R0 UNLESS ABORTED
```

```
12642                   ;                       THEN BAD DATA IS POINTED TO BY (R1)
12643                   ;               GOOD DATA IS ZERO
12644                   ;
12645                   ; PERR14        TRAP
12646                   ;               BAD DATA IN R0 UNLESS ABORTED
12647                   ;                       THEN BAD DATA IS POINTED TO BY (R1)
12648                   ;               GOOD DATA IS ONES
12649                   ;
12650                   ; PERR15        TRAP
12651                   ;               BAD DATA IN R0 UNLESS ABORTED
12652                   ;                       THEN BAD DATA IS POINTED TO BY (R1)
12653                   ;               GOOD DATA IN TSTDAT
12654                   ;
12655                   ; PERR16        TRAP
12656                   ;               BAD DATA IN R0 UNLESS ABORTED
12657                   ;                       THEN BAD DATA IS POINTED TO BY (R1)
12658                   ;               GOOD DATA IN TSTDAT+2
12659                   ;
12660                   ; PERR17        TRAP
12661                   ;               BAD DATA IN R0 UNLESS ABORTED
12662                   ;                       THEN BAD DATA IS POINTED TO BY (R1)
12663                   ;               GOOD DATA IN R2
12664                   ;
12665                   ; PERR20        TRAP
12666                   ;               BAD DATA IN R0 UNLESS ABORTED
12667                   ;                       THEN BAD DATA IS POINTED TO BY (R1)
12668                   ;               GOOD DATA IN R3
12669                   ;
12670                   ; PERR21        TRAP
12671                   ;               7 BIT BYTE TEST
12672                   ;               BAD DATA IN RIGHT BYTE OF R0 UNLESS ABORTED
12673                   ;                       THEN BAD DATA IS POINTED TO BY (R1)
12674                   ;               GOOD DATA IS A 7 BIT BYTE ON ONES
12675                   ;
12676                   ; PERR22        TRAP
12677                   ;               BAD DATA IN R2 UNLESS ABORTED
12678                   ;                       THEN BAD DATA IS POINTED TO BY (R1)
12679                   ;               GOOD DATA IN R0
12680                   ;
12681                   ; PERR23        TRAP
12682                   ;               BAD DATA IN R0 UNLESS ABORTED
12683                   ;                       THEN BAD DATA IS POINTED TO BY (R1)
12684                   ;               GOOD DATA IN R4
12685                   ;
12686                   ; PERR24        TRAP
12687                   ;               BAD DATA IN R0 UNLESS ABORTED
12688                   ;                       THEN BAD DATA IS POINTED TO BY (R2)
12689                   ;               GOOD DATA IN R3
12690                   ;
12691                   ; PERR25        TRAP
12692                   ;               BAD DATA POINTED TO BY -(R1)
12693                   ;               GOOD DATA IN R2 UNLESS LOC V177654 IS SET
12694                   ;                       THEN GOOD DATA IS IN R3
12695                   ;
12696                   ; PERR26        TRAP
12697                   ;               BAD DATA IS DOUBLE WORD POINTED TO BY R1 AND IN LOW 7 BITS OF R0
12698                   ;               GOOD DATA IS 000000,,100000,,100
```

```
12699                                   ;
12700                                   ;  PERR27       TRAP
12701                                   ;                BAD DATA IS DOUBLE WORD POINTED TO BY R1 AND IN LOW 7 BITS OF R0
12702                                   ;                GOOD DATA IS 000000,,000000,,077
12703                                   ;
12704                                   ;  PERR30       TRAP
12705                                   ;                BAD DATA IS POINTED TO BY -16(SP)
12706                                   ;                GOOD DATA IS IN R1
12707                                   ;
12708                                   ;  PERR31       TRAP
12709                                   ;                SPECIAL ECC FAILURE HANDLER
12710                                   ;
12711                                   ;  PERR32       TRAP
12712                                   ;                SPECIAL ECC FAILURE HANDLER
12713                                   ;
12714                                   ;  PERR33       TRAP
12715                                   ;                SPECIAL ECC FAILURE HANDLER
12716                                   ;
12717                                   ;  PERR34       TRAP
12718                                   ;                SPECIAL ECC FAILURE HANDLER
12719                                   ;
12720                                   ;  PERR35       TRAP
12721                                   ;                SPECIAL BRANCH GOBBLE FAILURE HANDLER
12722                                   ;
12723                                   ;       CALLING SEQUENCE FOR TRAP TYPES
12724                                   ;       BEQ     2$              ;NO - ERROR,BRANCH FOR CARD
12725                                   ;       PERRXX                  ;TRAP TO ERROR ROUTINE
12726                                   ;2$:    NEXT    INSTRUCTION     ;CONTINUE TESTING
```

```
12729 047456  010437  002034          $PER01: MOV     R4,ADDRESS
12730 047462  162737  000002  002034          SUB     #2,ADDRESS
12731 047470  010037  002052                  MOV     R0,BAD
12732 047474  010537  002044                  MOV     R5,GOOD
12733 047500  000137  050212                  JMP PERRAW
12734
12735 047504  010437  002034          $PER02: MOV     R4,ADDRESS
12736 047510  162737  000002  002034          SUB     #2,ADDRESS
12737 047516  010137  002052                  MOV     R1,BAD
12738 047522  010237  002044                  MOV     R2,GOOD
12739 047526  000137  050212                  JMP PERRAW
12740
12741 047532  010137  002034          $PER03: MOV     R1,ADDRESS
12742 047536  162737  000002  002034          SUB     #2,ADDRESS
12743 047544  010437  002044                  MOV     R4,GOOD
12744 047550  016137  177776  002052          MOV     -2(R1),BAD
12745 047556  000137  050212                  JMP PERRAW
12746
12747 047562  010037  002034          $PER04: MOV     R0,ADDRESS
12748 047566  162737  000002  002034          SUB     #2,ADDRESS
12749 047574  010437  002052                  MOV     R4,BAD
12750 047600  010237  002044                  MOV     R2,GOOD
12751 047604  000137  050212                  JMP     PERRAW
12752
12753 047610  010237  002044          PERR05: MOV     R2,GOOD
12754 047614  014037  002052          PERA05: MOV     -(R0),BAD
12755 047620  010037  002034                  MOV     R0,ADDRESS
12756 047624  062700  000002                  ADD     #2,R0           ;RESTORE R0
12757 047630  004737  034152                  CALL    BADSTACK
12758 047634  000207                          RETURN
12759
12760 047636  005037  002044          PERR06: CLR     GOOD
12761 047642  000764                          BR      PERA05
12762
12763 047644  010137  002034          $PER07: MOV     R1,ADDRESS
12764 047650  010237  002052                  MOV     R2,BAD
12765 047654  013737  002242  002044          MOV     DATBUF,GOOD
12766 047662  000137  050212                  JMP     PERRAW
12767
12768 047666                          $PER10: LET ADDRESS := R1 + #2
      047666  010137  002034                                                  MOV R1,ADDRESS
      047672  062737  000002  002034                                          ADD #2,ADDRESS
12769 047700                                  LET BAD := R2
      047700  010237  002052                                                  MOV R2,BAD
12770 047704                                  LET GOOD := DATBUF+2
      047704  013737  002244  002044                                          MOV DATBUF+2,GOOD
12771 047712  000137  050212                  JMP     PERRAW
12772
12773 047716                          $PER11: LET ADDRESS := R1
      047716  010137  002034                                                  MOV R1,ADDRESS
12774 047722                                  LET BAD := R0
      047722  010037  002052                                                  MOV R0,BAD
12775 047726                                  LET GOOD := #0
      047726  005037  002044                                                  CLR GOOD
12776 047732  000137  050264                  JMP     PERRAB
12777
12778 047736                          $PER12: LET ADDRESS :  R1
```

```
        047736  010137  002034
12779   047742                          LET BAD := R0                   MOV R1,ADDRESS
        047742  010037  002052
12780   047746                          LET GOOD := #377                MOV R0,BAD
        047746  012737  000377  002044
12781   047754  000137  050264          JMP     PERRAB                  MOV #377,GOOD
```

```
12784 047760                          $PER13: LET ADDRESS := R1
      047760  010137  002034                  MOV R1,ADDRESS
12785 047764                                  LET BAD := R0
      047764  010037  002052                  MOV R0,BAD
12786 047770                                  LET GOOD := #0
      047770  005037  002044                  CLR GOOD
12787 047774  000137  050212                  JMP     PERRAW
12788
12789 050000                          $PER14: LET ADDRESS := R1
      050000  010137  002034                  MOV R1,ADDRESS
12790 050004                                  LET BAD := R0
      050004  010037  002052                  MOV R0,BAD
12791 050010                                  LET GOOD := ONES
      050010  013737  002614  002044          MOV ONES,GOOD
12792 050016  000137  050212                  JMP     PERRAW
12793
12794 050022                          $PER15: LET ADDRESS := R1
      050022  010137  002034                  MOV R1,ADDRESS
12795 050026                                  LET BAD := R0
      050026  010037  002052                  MOV R0,BAD
12796 050032                                  LET GOOD := TSTDAT
      050032  013737  002246  002044          MOV TSTDAT,GOOD
12797 050040  000137  050212                  JMP     PERRAW
12798
12799 050044                          $PER16: LET ADDRESS := R1
      050044  010137  002034                  MOV R1,ADDRESS
12800 050050                                  LET BAD := R0
      050050  010037  002052                  MOV R0,BAD
12801 050054                                  LET GOOD := TSTDAT+2
      050054  013737  002250  002044          MOV TSTDAT+2,GOOD
12802 050062  000453                          BR      PERRAW
12803
12804 050064                          $PER17: LET ADDRESS := R1
      050064  010137  002034                  MOV R1,ADDRESS
12805 050070                                  LET BAD := R0
      050070  010037  002052                  MOV R0,BAD
12806 050074                                  LET GOOD := R2
      050074  010237  002044                  MOV R2,GOOD
12807 050100  000444                          BR      PERRAW
12808
12809 050102                          $PER20: LET ADDRESS := R1
      050102  010137  002034                  MOV R1,ADDRESS
12810 050106                                  LET BAD := R0
      050106  010037  002052                  MOV R0,BAD
12811 050112                                  LET GOOD := R3
      050112  010337  002044                  MOV R3,GOOD
12812 050116  000435                          BR      PERRAW
12813
12814 050120                          $PER21: LET ADDRESS := R1
      050120  010137  002034                  MOV R1,ADDRESS
12815 050124                                  LET BAD := R0
      050124  010037  002052                  MOV R0,BAD
12816 050130                                  LET GOOD := #177
      050130  012737  000177  002044          MOV #177,GOOD
12817 050136  000477                          BR      PERRA7
12818
12819 050140                          $PER22: LET ADDRESS := R1
```

```
        050140  010137  002034
12820   050144                          LET BAD := R2                   MOV R1,ADDRESS
        050144  010237  002052
12821   050150                          LET GOOD := R0                  MOV R2,BAD
        050150  010037  002044
12822   050154  000416                  BR      PERRAW                  MOV R0,GOOD
12823
12824   050156                  $PER23: LET ADDRESS :- R1
        050156  010137  002034                                          MOV R1,ADDRESS
12825   050162                          LET BAD := R0                   MOV R0,BAD
        050162  010037  002052
12826   050166                          LET GOOD := R4                  MOV R4,GOOD
        050166  010437  002044
12827   050172  000407                  BR      PERRAW
12828
12829   050174                  $PER24: LET ADDRESS := R2
        050174  010237  002034                                          MOV R2,ADDRESS
12830   050200                          LET BAD := R0                   MOV R0,BAD
        050200  010037  002052
12831   050204                          LET GOOD := R3                  MOV R3,GOOD
        050204  010337  002044
12832   050210  000400                  BR      PERRAW
```

```
12834 050212                            PERRAW: SUBTST  <<DATA WAS A WORD>>
                                        ;*************************************************************************
                                        ;*SUBTEST       DATA WAS A WORD
                                        ;*************************************************************************
12835 050212  004737  050446                    CALL    PERBNK
12836 050216                                    IF ABORTFLAG IS TRUE THEN $CALL GETDATA
      050216  005737  002144                                                    TST ABORTFLAG
      050222  001402                                                            BEQ L450
      050224  004737  045252                                                    JSR PC,GETDATA
      050230                                                            L450:;;;;;;;
12837 050230                                    IF BADPC EQ #0 THEN $CALL BADSTACK
      050230  005737  002022                                                    TST BADPC
      050234  001002                                                            BNE L451
      050236  004737  034152                                                    JSR PC,BADSTACK
      050242                                                            L451:;;;;;;;
12838 050242  004737  050422                    CALL    PERXOR
12839 050246                                    IF ABORTFLAG IS FALSE
      050246  005737  002144                                                    TST ABORTFLAG
      050252  001002                                                            BNE L452
12840 050254  104011                            ERROR +11
12841 050256                                    ELSE
      050256  000401                                                            BR L453
      050260                                                            L452:;;;;;;;
12842 050260  104012                            ERROR +12
12843 050262                                    END ;OF IF ABORTFLAG
      050262                                                            L453:;;;;;;;
12844 050262  000002                            RTI
12845
12846 050264                            PERRAB: SUBTST  <<DATA WAS A BYTE>>
                                        ;*************************************************************************
                                        ;*SUBTEST       DATA WAS A BYTE
                                        ;*************************************************************************
12847 050264  004737  050446                    CALL    PERBNK
12848 050270                                    IF ABORTFLAG IS TRUE THEN $CALL GETDATA
      050270  005737  002144                                                    TST ABORTFLAG
      050274  001402                                                            BEQ L454
      050276  004737  045252                                                    JSR PC,GETDATA
      050302                                                            L454:;;;;;;;
12849 050302                                    IF BADPC EQ #0 THEN $CALL BADSTACK
      050302  005737  002022                                                    TST BADPC
      050306  001002                                                            BNE L455
      050310  004737  034152                                                    JSR PC,BADSTACK
      050314                                                            L455:;;;;;;;
12850 050314  004737  050422                    CALL    PERXOR
12851 050320                                    IF ABORTFLAG IS FALSE
      050320  005737  002144                                                    TST ABORTFLAG
      050324  001002                                                            BNE L456
12852 050326  104014                            ERROR +14
12853 050330                                    ELSE
      050330  000401                                                            BR L457
      050332                                                            L456:;;;;;;;
12854 050332  104015                            ERROR +15
12855 050334                                    END ;OF IF ABORTFLAG
      050334                                                            L457:;;;;;;;
12856 050334  000002                            RTI
```

```
12859 050336                            PERRA7: SUBTST  <<DATA WAS A 7 BIT BYTE>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       DATA WAS A 7 BIT BYTE
                                        ;*****************************************************************************
12860 050336                                    IF BADPC EQ #0 THEN $CALL BADSTACK
      050336  005737  002022                                                        TST BADPC
      050342  001002                                                                BNE L460
      050344  004737  034152                                                        JSR PC,BADSTACK
      050350                                                                L460:;;;;;;
12861 050350  004737  050422                    CALL    PERXOR
12862 050354  004737  050446                    CALL    PERBNK
12863 050360  104022                            ERROR   +22
12864 050362  000002                            RTI
12865
12866 050364                            $PER26: LET GOOD2 := #100000
      050364  012737  100000  002046                                                MOV #100000,GOOD2
12867 050372                                    LET GOOD3 := #100
      050372  012737  000100  002050                                                MOV #100,GOOD3
12868 050400  000137  045040                    JMP PERRA3
12869
12870 050404  005037  002046            $PER27: CLR     GOOD2
12871 050410                                    LET GOOD3 := #077
      050410  012737  000077  002050                                                MOV #077,GOOD3
12872 050416  000137  045040                    JMP PERRA3
12873
12874 050422                            PERXOR: SUBTST  <<DETERMINE XOR OF GOOD & BAD>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       DETERMINE XOR OF GOOD & BAD
                                        ;*****************************************************************************
12875 050422                                    PUSH    R0
      050422  010046                                                                MOV R0, (SP)
12876 050424  013700  002044                    MOV     GOOD,R0
12877 050430  013737  002052  002060            MOV     BAD,BADXOR
12878 050436  074037  002060                    XOR     R0,BADXOR
12879 050442                                    POP     R0
      050442  012600                                                                MOV (SP)+,R0
12880 050444  000207                            RETURN
```

```
12883 050446                          PERBNK: SUBTST<<LOG ERROR ON BAD BANK>>
                                      ;*****************************************************************************
                                      ;*SUBTEST       LOG ERROR ON BAD BANK
                                      ;*****************************************************************************
12884                                         ;WHILE WE'RE HERE LET'S MARK THE BAD BANK IN THE CONFIGURATION TABLE
12885 050446                                  PUSH    R0,R1                                          MOV R0,-(SP)
      050446  010046                                                                                 MOV R1,-(SP)
      050450  010146
12886 050452  013701  002102                  MOV     BANK,R1
12887 050456  006301                          ASL     R1
12888 050460  006301                          ASL     R1
12889 050462  052761  000001  002664          BIS     #BIT0,CONFIG(R1)
12890 050470  105261  002666                  INCB    CONFIG+2(R1)            ;BUMP BANK COUNTER
12891 050474  001002                          BNE     12$                     ;NO OVERFLOW - SKIP
12892 050476  105361  002666                  DECB    CONFIG+2(R1)            ;SET BACK TO 255.
12893 050502  126137  002666  002554  12$:    CMPB    CONFIG+2(R1),ERRMAX     ;IS IT PAST MAX?
12894 050510  101403                          BLOS    11$                     ;NO   SKIP
12895 050512                                  SET     TOOMANY                 ;YES
      050512  012737  177777  002406                                         MOV  #-1,TOOMANY
12896 050520                          11$:    POP     R1,R0
      050520  012601                                                         MOV (SP)+,R1
      050522  012600                                                         MOV (SP)+,R0
12897 050524  000207                          RETURN
12898
12899 050526  010037  002052          PERECC: MOV     R0,BAD
12900 050532                                  IF ADDRESS EQ TESTADD
      050532  023737  002034  002412                                         CMP ADDRESS,TESTADD
      050540  001004                                                         BNE L461
12901 050542  013737  002246  002044            MOV TSTDAT,GOOD
12902 050550                                  ELSE
      050550  000403                                                         BR L462
      050552                                                          L461:;;;;;;
12903 050552  013737  002250  002044            MOV   TSTDAT+2,GOOD
12904 050560                                  END ;OF IF (R1)
      050560                                                          L462:;;;;;;
12905 050560  004737  050422                  CALL    PERXOR
12906 050564                                  SET     HEADER
      050564  012737  177777  002612                                         MOV  #-1,HEADER
12907 050572  000207                          RETURN
12908
12909 050574                          $PER31: IF REALPAT EQ #41
      050574  023727  002300  000041                                         CMP REALPAT,#41
      050602  001001                                                         BNE L463
12910 050604  104023                            ERROR +23
12911 050606                                  END
      050606                                                          L463:;;;;;;
12912 050606                                  IF BADPC EQ #0 THEN $CALL BADSTACK
      050606  005737  002022                                                 TST BADPC
      050612  001002                                                         BNE L464
      050614  004737  034152                                                 JSR PC,BADSTACK
      050620                                                          L464:;;;;;;
12913 050620  004737  050526                  CALL    PERECC
12914 050624                                  IF REALPAT EQ #11
      050624  023727  002300  000011                                         CMP REALPAT,#11
      050632  001001                                                         BNE L465
12915 050634  104037                            ERROR +37
12916 050636                                  END ;OF IF REALPAT
```

```
        050636
12917   050636                                  IF REALPAT EQ #15
        050636  023727  002300  000015
        050644  001001
12918   050646  104043                            ERROR +43
12919   050650                                  END ;OF IF REALPAT
        050650
12920   050650                                  IF REALPAT EQ #16
        050650  023727  002300  000016
        050656  001001
12921   050660  104044                            ERROR +44
12922   050662                                  END ;OF IF REALPAT
        050662
12923   050662                                  SET HEADER
        050662  012737  177777  002612
12924   050670  000002                          RTI
```

```
L465:;;;;;;;

        CMP REALPAT,#15
        BNE L466


L466:;;;;;;;

        CMP REALPAT,#16
        BNE L467


L467:;;;;;;;

        MOV  #-1,HEADER
```

```
 12927 050672                       $PER32: IF BADPC EQ #0 THEN $CALL BADSTACK
       050672  005737  002022                                                    TST BADPC
       050676  001002                                                            BNE L470
       050700  004737  034152                                                    JSR PC,BADSTACK
       050704                                                                 L470:;;;;;;
 12928 050704  010137  002034                 MOV     R1,ADDRESS
 12929 050710  010037  002052                 MOV     R0,BAD
 12930 050714  010237  002044                 MOV     R2,GOOD
 12931 050720                                 SET     HEADER
       050720  012737  177777  002612                                            MOV  #-1,HEADER
 12932 050726  104040                         ERROR   +40
 12933 050730                                 SET     HEADER
       050730  012737  177777  002612                                            MOV  #-1,HEADER
 12934 050736  000002                         RTI
 12935
 12936 050740                       $PER33: IF BADPC EQ #0 THEN $CALL BADSTACK
       050740  005737  002022                                                    TST BADPC
       050744  001002                                                            BNE L471
       050746  004737  034152                                                    JSR PC,BADSTACK
       050752                                                                 L471:;;;;;;
 12937 050752  010137  002034                 MOV     R1,ADDRESS
 12938 050756  010037  002052                 MOV     R0,BAD
 12939 050762  105037  002053                 CLRB    BAD+1
 12940 050766  012737  000377  002044         MOV     #377,GOOD
 12941 050774  004737  050422                 CALL    PERXOR
 12942 051000                                 SET     HEADER
       051000  012737  177777  002612                                            MOV  #-1,HEADER
 12943 051006  104041                         ERROR   +41
 12944 051010                                 SET     HEADER
       051010  012737  177777  002612                                            MOV  #-1,HEADER
 12945 051016  000002                         RTI
 12946
 12947 051020                       $PER34:IF BADPC EQ #0 THEN $CALL BADSTACK
       051020  005737  002022                                                    TST BADPC
       051024  001002                                                            BNE L472
       051026  004737  034152                                                    JSR PC,BADSTACK
       051032                                                                 L472:;;;;;;
 12948 051032                               IF #BIT15!BIT4 OFF.IN CSR
       051032  032737  100020  002150                                            BIT #BIT15!BIT4,CSR
       051040  001002                                                            BNE L473
 12949 051042  104016                         ERROR +16                 ;NO SBE OR DBE
 12950 051044                               ELSE
       051044  000401                                                            BR L474
       051046                                                                 L473:;;;;;;
 12951 051046  104001                         ERROR +1                  ;EXPECTED SBE SO DBE MUST HAVE GOTTEN SET
 12952 051050                               END ;OF IF #BIT15!BIT4
       051050                                                                 L474:;;;;;;
 12953 051050  000002                         RTI
 12954
 12955                                      ;DURING BRANCH GOBBLE THE CONDITION CODES WERE WRONG
 12956 051052  004737  050446       $PER35: CALL    PERBNK
 12957 051056  004737  034152               CALL    BADSTACK
 12958 051062  013737  002032  002052       MOV     BADPSW,BAD
 12959 051070  012737  000012  002044       MOV     #12,GOOD
 12960 051076  104047                       ERROR   +47
 12961 051100  062706  000004               ADD     #4,SP             ;FIX STACK FROM TRAP
 12962 051104  000207                       RETURN                    ;ABORTING TEST
```

```
12963
12964 051106  010037  002044          $PER36: MOV     R0,GOOD
12965 051112  010137  002052                  MOV     R1,BAD
12966 051116                                  SET     HEADER
      051116  012737  177777  002612                                          MOV   #-1,HEADER
12967 051124  104023                          ERROR   #23
12968 051126                                  SET     HEADER
      051126  012737  177777  002612                                          MOV   #-1,HEADER
12969 051134  000002                          RTI
12970
12971 051136  104053                  $PER37: ERROR   #53                     ;ILC;;REV B
12972 051140  000002                          RTI                             ;ILC;;REV B
12973
12974 051142  104054                  $PER40: ERROR   #54                     ;ILC;;REV B
12975 051144  000002                          RTI                             ;ILC;;REV B
```

```
                        .SBTTL  ROUTINE SCOPE HANDLER
                        ;*************************************************************************
                        ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
                        ;*AND LOAD THE DISPLAY DATA INTO THE DISPLAY REGISTER
                        ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                        ;*SW14=1        LOOP ON TEST
                        ;*SW9=1 LOOP ON ERROR
                        ;*CALL
                        ;*      SCOPE           ;;SCOPE=IOT
051146  005237  056656  $SCOPE: INC     $DEVCT          ;TELL AP, WE ARE ALIVE
051152                          IF RESULT IS LT
051152  002004                                                          BGE L475
051154  005037  056656            CLR   $DEVCT
051160  105237  056660            INCB  $UNIT
                                END ;OF IF RESULT
051164                                                          L475:;;;;;;;
051164  104410                  CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
051166  005737  006216          TST     TRACE
051172  001402                  BEQ     NOTRCE
051174  004737  055152          CALL    CONTT           ;TRACE
051200                  NOTRCE:
051200  005737  052314          TST     CPERRF          ;IS THERE A CPU ERROR REGISTER?         ;R-C
051204  001410                  BEQ     SKJ             ;BRANCH IF NOT                          ;R-C
051206  013737  177766  052312  MOV     @#177766,CPSAVE ;GET CONTENTS OF ERROR REGISTER         ;R-C
051214  032737  000001  052312  BIT     #BIT0,CPSAVE    ;IS THE POWER FAIL MONITOR BIT SET?     ;R-C
051222  001401                  BEQ     SKJ             ;BRANCH IF NOT                          ;R-C
051224  104177                  ERROR   +177            ;REPORT IF SO                           ;R-C
051226                  SKJ:    IF STOPOK IS TRUE AND #SW8 SET.IN @SWR                          ;R-C
051226  005737  002420                                                          TST STOPOK
051232  001410                                                                  BEQ L476
051234  032777  000400  131374                                                  BIT #SW8,@SWR
051242  001404                                                                  BEQ L476
051244  005037  002420            CLR   STOPOK
051250  000137  040604            JMP   EXIT
                                END ;OF IF STOPOK
051254                                                          L476:;;;;;;;
051254                          IF NOSCOPE IS TRUE
051254  005737  002440                                                          TST NOSCOPE
051260  001401                                                                  BEQ L477
051262  000002            RTI
                                END ;OF IF NOSCOPE
051264                                                          L477:;;;;;;;
051264                  1$:     IF #SW14 SET.IN @SWR THEN GOTO $OVER
051264  032777  040000  131344                                                  BIT #SW14,@SWR
051272  001051                                                                  BNE $OVER
                        ;#####START OF CODE FOR THE XOR TESTER#####
051274  000425          $XTSTR: BR      2$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
                                                        ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
051276  013746  000004          MOV     ERRVEC,-(SP)    ;;SAVE THE CONTENTS OF THE ERROR VECTOR
051302  012737  051322  000004  MOV     #1$,ERRVEC      ;;SET FOR TIMEOUT
051310  005737  177060          TST     177060  ;;TIME OUT ON XOR?
051314  012637  000004          MOV     (SP)+,ERRVEC    ;;RESTORE THE ERROR VECTOR
051320  000430                  BR      $SVLAD          ;;GO TO THE NEXT TEST
051322  062706  000004  1$:     ADD     #4,SP           ;FIX STACK FROM TRAP
051326  022737  000005  004010  CMP     #5,PROTYP       ;IS THIS AN 11/83 ?
051334  001002                  BNE     6$              ;BRANCH IF NOT
051336  005037  177766          CLR     CPUERR          ;RESET CPU ERROR REGISTER
```

```
13031 051342  012637  000004          6$:     MOV     (SP)+,ERRVEC    ;;RESTORE THE ERROR VECTOR
13032 051346  000407                          BR      4$              ;;LOOP ON THE PRESENT TEST
13033 051350                          2$:;#####END OF CODE FOR THE XOR TESTER#####
13034 051350  105737  002014          3$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
13035 051354  001412                          BEQ     $SVLAD          ;;BR IF NO
13036 051356  032777  001000  131252          BIT     #SW9,@SWR       ;;LOOP ON ERROR?
13037 051364  001404                          BEQ     5$              ;;BR IF NO
13038 051366  013737  002624  002622  4$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
13039 051374  000410                          BR      $OVER
13040 051376  105037  002014          5$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
13041 051402  011637  002622          $SVLAD: MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
13042 051406  011637  002624                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
13043 051412  005037  002362                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
13044 051416  004737  051430          $OVER:  CALL    GETDIS
13045 051422  013716  002622                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
13046 051426  000002                          RTI                     ;;FIXES PS
```

```
13048 051430                          GETDIS: SUBTST  <<SUBR  DISPLAY>>
                                      ;*****************************************************************************
                                      ;*SUBTEST        SUBR    DISPLAY
                                      ;*****************************************************************************
13049 051430  113737  002102  002013          MOVB    BANK,$BANK
13050 051436  113737  002300  002012          MOVB    REALPAT,$PATMAR
13051 051444                                  PUSH    R0
      051444  010046                                                                  MOV R0,-(SP)
13052 051446  005737  002126                  TST     RLFLAG                  ;ARE WE RELOCATED?
13053 051452  001403                          BEQ     1$                      ;NO - SKIP
13054 051454  052737  100000  002012          BIS     #BIT15,$PATMAR          ;YES - SET MSB
13055 051462                          1$:
13059 051462  013777  002012  131150          MOV     $PATMAR,@DISPLAY
13060 051470  013737  002012  000174          MOV     $PATMAR,DISPREG         ;SOFTWARE DISPLAY REGISTER
13061 051476                                  POP     R0
      051476  012600                                                                  MOV (SP)+,R0
13062 051500  000207                          RETURN
```

```
                                        .SBTTL  ROUTINE ERROR HANDLER
                                ;**********************************************************************
                                ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
                                ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
                                ;*AND GO TO $ERRTYP ON ERROR
                                ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                ;*SW15=1         HALT ON ERROR
                                ;*SW13=1         INHIBIT ERROR TYPEOUTS
                                ;*SW10=1         BELL ON ERROR
                                ;*SW9=1 LOOP ON ERROR
                                ;*CALL
                                ;*      ERROR   N       ;;ERROR-EMT AND N=ERROR ITEM NUMBER

                                        .ENABL  LSB
051502  105737  056666          $ERROR: TSTB    $ENV            ;ARE WE RUNNING IN APT MODE ?
051506  001402                          BEQ     NOAPT           ;YES - DO UFD ABORT
051510  004737  000000                  JSR     PC,ABORT        ;GOTO UFD ABORT
051514  105037  052310          NOAPT:  CLRB    IBSAVE                                          ;R-C
051520                                  IF NOERROR IS FALSE                                     TST NOERROR
051520  005737  002430                                                                          BNE L500
051524  001027
051526  104410                            CKSWR                 ;;TEST FOR CHANGE IN SOFT SWR
051530                          BACK:                                                           ;R C
051530  105237  002014          1$:       INCB  $ERFLG          ;;SET THE ERROR FLAG
051534  001775                            BEQ   1$              ;;DON'T LET THE FLAG GO TO ZERO
051536  004737  051430                    CALL  GETDIS          ;SETUP DISPLAY STUFF
051542  013737  002012  056652            MOV   $PATMAR,$TESTN  ;FOR APT
051550  032777  002000  131060            BIT   #SW10,@SWR      ;;BELL ON ERROR?
051556  001404                            BEQ   2$              ;;NO   SKIP
051560                                    TYPE  $BELL           ;;RING BELL
051560  104401  002653                  TYPEIT  ,$BELL
                                        .DSABL  CRF
051564                                    TYPE  MSG014          ;CONTROL Z
051564  104401  066060                  TYPEIT  ,MSG014
                                        .DSABL  CRF
051570  005237  002630          2$:       INC   $ERTTL          ;;COUNT THE NUMBER OF ERRORS
051574                                    IF RESULT IS MI
051574  100003                                                                                  BPL L501
051576  012737  077777  002630              MOV #77777,$ERTTL
                                        END ;OF IF RESULT
051604                                                                          L501:;;;;;;
051604                                  END ;OF IF NOERROR
051604                                                                          L500:;;;;;;
051604  011637  002020                  MOV     (SP),ERRPC      ;;GET ADDRESS OF ERROR INSTRUCTION
051610  162737  000002  002020          SUB     #2,ERRPC
051616  010637  002024                  MOV     SP,ERRSP
051622  016637  000002  002030          MOV     2(SP),ERRPSW
051630  117737  130164  002015          MOVB    @ERRPC,$ITEMB   ;;STRIP AND SAVE THE ERROR ITEM CODE

051636  122737  000177  002015          CMPB    #177,$ITEMB     ;IS THIS THE POWER FAIL CALL?           ;R-C
051644  001431                          BEQ     1001$           ;BRANCH IF SO                           ;R-C
051646  105737  052310                  TSTB    IBSAVE          ;2ND ERROR CALL?                        ;R C
051652  001024                          BNE     1000$           ;BRANCH IF SO                           ;R-C
051654  005737  052314                  TST     CPERRF          ;IS THERE A CPU ERROR REGISTER?         ;R-C
051660  001423                          BEQ     1001$           ;BRANCH IF NOT                          ;R-C
051662  013737  177766  052312          MOV     177766,CPSAVE   ;SAVE CONTENTS                          ;R-C
051670  032737  000001  052312          BIT     #BIT0,CPSAVE    ;POWER MONITOR BIT SET?                 ;R-C
```

```
 13113 051676  001414                        BEQ     1001$           ;BRANCH IF NOT                          ;R-C
 13114 051700  042737  000001  177766        BIC     #BIT0,177766    ;CLEAR THE BIT                          ;R-C
 13115 051706  112737  002015  052310        MOVB    #$ITEMB,IBSAVE  ;MAKE IBSAVE NON-ZERO FOR DUAL CALL     ;R-C
 13116 051714  112737  000177  002015        MOVB    #177,$ITEMB     ;SET $ITEMB TO POWER FAIL POINTER       ;R-C
 13117 051722  000402                        BR      1001$                                                   ;R-C
 13118 051724  105037  052310          1000$:CLRB    IBSAVE                                                  ;R-C
 13119 051730                          1001$:                                                                ;R-C
 13120 051730                        IF NOERROR IS FALSE
       051730  005737  002430                                                          TST NOERROR
       051734  001043                                                                BNE L502
 13121 051736                          IF BADPC NE #0
       051736  005737  002022                                                        TST BADPC
       051742  001416                                                                BEQ L503
 13122 051744  013737  002022  002020          MOV BADPC,ERRPC
 13123 051752  162737  000002  002020          SUB #2,ERRPC
 13124 051760  013737  002026  002024          MOV BADSP,ERRSP
 13125 051766  013737  002032  002030          MOV BADPSW,ERRPSW
 13126 051774  005037  002022                  CLR BADPC
 13127 052000                          END ;IF
       052000                                                           L503:;;;;;;
 13128 052000  013737  002020  056650          MOV   ERRPC,$FATAL      ;FOR APT
 13129 052006  004737  050446                  CALL PERBNK             ;;LOG ERROR ON BANK
 13130 052012                          IF #SW13 SET.IN @SWR
       052012  032777  020000  130616                                                BIT #SW13,@SWR
       052020  001401                                                                BEQ L504
 13131 052022  000420                    BR  3$
 13132 052024                          END ;OF IF #SW13
       052024                                                           L504:;;;;;;
 13133 052024                          IF #SW5 SET.IN @SWR AND TOOMANY IS TRUE
       052024  032777  000040  130604                                                BIT #SW5,@SWR
       052032  001404                                                                BEQ L505
       052034  005737  002406                                                        TST TOOMANY
       052040  001401                                                                BEQ L505
 13134 052042                            GOTO 3$
       052042  000410                                                                BR 3$
 13135 052044                          END ;OF IF #SW5
       052044                                                           L505:;;;;;;
 13136 052044                        END ;OF IF NOERROR
       052044                                                           L502:;;;;;;
 13137 052044  004737  052316                  CALL    $ERRTYP         ;;GO TO USER ERROR ROUTINE
 13138 052050                          IF MONFLG IS TRUE               ;;SHOULD WE RETURN TO XXDP MONITOR???
       052050  005737  002276                                                        TST MONFLG
       052054  001403                                                                BEQ L506
 13139 052056  013706  002274                     MOV  SAVMON,SP       ;;GET MONITOR ADDRESS
 13140 052062  000207                             RTS  PC              ;;GO TO MONITOR
 13141 052064                        END                              ;;
       052064                                                           L506:;;;;;;
```

```
13143 052064                       3$:     IF NOERROR IS FALSE
      052064  005737  002430                                                    TST NOERROR
      052070  001072                                                            BNE L507
13144 052072  005777  130540                 TST   @SWR            ;;HALT ON ERROR
13145 052076  100002                         BPL   7$              ;;SKIP IF CONTINUE
13146 052100  000000                 $HALT:  HALT                  ;;HALT ON ERROR!
13147 052102  104410                         CKSWR                 ;;TEST FOR CHANGE IN SOFT SWR
13148 052104                       7$:       IF NOSCOPE IS FALSE AND #SW9 SET.IN @SWR
      052104  005737  002440                                                    TST NOSCOPE
      052110  001006                                                            BNE L510
      052112  032777  001000  130516                                           BIT #SW9,@SWR
      052120  001402                                                            BEQ L510
13149 052122  013716  002624                   MOV $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
13150 052126                               END ;OF IF NOSCOPE
      052126                                                          L510:;;;;;;;
13151 052126  005737  002362                 TST   $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
13152 052132  001402                         BEQ   9$              ;;BR IF NONE
13153 052134  013716  002362                 MOV   $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
13154 052140                       9$:       IF DETFLAG IS FALSE
      052140  005737  002220                                                    TST DETFLAG
      052144  001043                                                            BNE L511
13155 052146  022737  000005  004010             CMP #5,PROTYP               ;IS THIS AN 11/83 ?
13156 052154  001002                           BNE 11$
13157 052156  005037  177766                   CLR CPUERR
13158 052162                             11$: IF ACTFLAG IS TRUE OR APTFLAG IS TRUE OR FATAL$ IS TRUE
      052162  005737  002350                                                    TST ACTFLAG
      052166  001006                                                            BNE L512
      052170  005737  002352                                                    TST APTFLAG
      052174  001003                                                            BNE L512
      052176  005737  002064                                                    TST FATAL$
      052202  001405                                                            BEQ L513
      052204                                                          L512:;;;;;;;
13159 052204  012737  000001  056646             MOV       #1,$MSGTY       ;FOR APT
13160 052212  000137  040604                     JMP       EXIT
13161 052216                               END ;OF IF ACTFLAG
      052216                                                          L513:;;;;;;;
13162 052216                               IF XXDPCHAIN IS TRUE AND $ERTTL HI #20
      052216  005737  002354                                                    TST XXDPCHAIN
      052222  001414                                                            BEQ L514
      052224  023727  002630  000020                                           CMP $ERTTL,#20
      052232  101410                                                            BLOS L514
13163 052234                                   TYPE      MSG066          ;ERROR COUNT EXCEEDED 20 - ABORTING FOR XXDP CHAIN
      052234  104401  070051                 TYPEIT  ,MSG066
                                             .DSABL  CRF
13164 052240  013700  000042                       MOV       42,R0
13165 052244  005037  000042                       CLR       42
13166 052250  000137  014022                       JMP       $ZAP42
13167 052254                                 END ;OF IF XXDPCHAIN
      052254                                                          L514:;;;;;;;
13168 052254                               END ;OF IF DETFLAG
      052254                                                          L511:;;;;;;;
13169 052254                               ELSE
      052254  000403                                                            BR L515
      052256                                                          L507:;;;;;;;
13170 052256                               SET   HEADER
      052256  012737  177777  002612                                           MOV  #-1,HEADER
13171 052264                               END ;OF IF NOERROR
```

```
        052264                                                              L515:::::::
  13172 052264                  10$:    CLEAR   TOOMANY,NOERROR
        052264  005037  002406                                                       CLR  TOOMANY
        052270  005037  002430                                                       CLR  NOERROR
  13173 052274  105737  052310          TSTB    IBSAVE                  ;POWER FAIL ERROR CALL? ;R C
  13174 052300  001402                  BEQ     213$                                            ;R-C
  13175 052302  000137  051530          JMP     BACK                    ;JUMP IF SO             ;R-C
  13176 052306  000002          213$:   RTI                     ;;RETURN
  13177 052310  000000          IBSAVE: .WORD 0                                                 ;R-C
  13178 052312  000000          CPSAVE: .WORD 0                                                 ;R C
  13179 052314  000000          CPERRF: .WORD 0                                                 ;R-C
  13180                                 .DSABL  LSB
```

```
                                        .SBTTL  ROUTINE ERROR MESSAGE TYPEOUT

                                ;**************************************************************************
                                ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
                                ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE 'ERROR TABLE" ($ERRTB),
                                ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.

052316  104415                  $ERRTYP:SAVREG
052320                                  TYPE    $CRLF           ;;"CARRIAGE RETURN" & "LINE FEED"
052320  104401  002660                  TYPEIT  ,$CRLF
                                        .DSABL  CRF
052324  005000                          CLR     R0              ;;PICKUP THE ITEM INDEX
052326  153700  002015                  BISB    $ITEMB,R0
052332  001004                          BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
                                                                ;;TYPE THE PC OF THE ERROR
052334                                  TYPOCT  ERRPC,<ERROR ADDRESS>
052334  013746  002020                  MOV     ERRPC,-(SP)     ;;SAVE ERRPC FOR TYPEOUT
                                                                ;;ERROR ADDRESS
052340  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                        .DSABL  CRF
052342  000511                          BR      11$             ;;GET OUT
052344  122700  000177          1$:     CMPB    #177,R0         ;POWER MONITOR CALL?                    ;R-C
052350  001003                          BNE     100$            ;BRANCH IF NOT                          ;R-C
052352  012700  052626                  MOV     #PFECWS,R0      ;MOV ADDRESS OF PFE BIT ERROR TO R0     ;R-C
052356  000406                          BR      110$                                                    ;R-C
052360  005300                  100$:   DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL      ;R-C
052362  006300                          ASL     R0              ;;      WORK FOR THE ERROR TABLE
052364  006300                          ASL     R0
052366  006300                          ASL     R0
052370  062700  057274                  ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
052374  012037  052432          110$:   MOV     (R0)+,3$        ;;PICKUP "ERROR MESSAGE" POINTER        ;R-C
052400  001417                          BEQ     4$              ;;SKIP TYPEOUT IF NO POINTER
052402  005737  002430                  TST     NOERROR         ;IS THIS REALLY AN ERROR?
052406  001003                          BNE     12$             ;YES - SKIP
052410  005737  002612                  TST     HEADER          ;TYPE HEADER?
052414  100011                          BPL     4$              ;NO - SKIP
052416  005737  002064          12$:    TST     FATAL$          ;WAS IT A FATAL ERROR?
052422  001402                          BEQ     2$              ;NO   SKIP
052424                                  TYPE    MSG067          ;FATAL
052424  104401  070120                  TYPEIT  ,MSG067
                                        .DSABL  CRF
052430                          2$:     TYPE                    ;;TYPE THE "ERROR MESSAGE"
052430  104401                          TYPEIT
                                        .DSABL  CRF
052432  000000                  3$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
052434                                  TYPE    $CRLF           ;;"CARRIAGE RETURN" & "LINE FEED"
052434  104401  002660                  TYPEIT  ,$CRLF
                                        .DSABL  CRF
052440  012037  052464          4$:     MOV     (R0)+,5$        ;;PICKUP "DATA HEADER" POINTER
052444  001412                          BEQ     6$              ;;SKIP TYPEOUT IF 0
052446  005737  002430                  TST     NOERROR         ;IS THIS REALLY AN ERROR?
052452  001003                          BNE     13$             ;YES - SKIP
052454  005737  002612                  TST     HEADER          ;TYPE HEADER?
052460  100004                          BPL     6$              ;NO - SKIP
052462                          13$:    TYPE                    ;;TYPE THE "DATA HEADER"
052462  104401                          TYPEIT
                                        .DSABL  CRF
```

```
13226 052464  000000              5$:   .WORD   0              ;;"DATA HEADER" POINTER GOES HERE
13227 052466                            TYPE    $CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
      052466  104401  002,60            TYPEIT  ,$CRLF
                                        .DSABL  CRF
13228 052472  012001              6$:   MOV     (R0)+,R1       ;;PICKUP "DATA TABLE" POINTER
13229 052474  001427                    BEQ     10$            ;;BR IF NO DATA TO BE TYPED
13230 052476  012002                    MOV     (R0)+,R2       ;;PICKUP "DATA FORMAT" POINTER
```

```
 13233 052500  112203                  7$:     MOVB    (R2)+,R3
 13234 052502  006303                          ASL     R3              ;MAKE IT A WORD ADDRESS
 13235 052504  004773  052512                    CALL    @8$(R3)
 13236 052510  000412                          BR      9$
 13237 052512  052736                  8$:     TAG70$
 13238 052514  052746                          TAG71$
 13239 052516  052756                          TAG72$
 13240 052520  053026                          TAG73$
 13241 052522  053066                          TAG74$
 13242 052524  053100                          TAG75$
 13243 052526  053112                          TAG76$
 13244 052530  053156                          TAG77$
 13245 052532  053164                          TAG78$
 13246 052534  053244                          TAG79$
 13251 052536  062701  000002            9$:     ADD     #2,R1           ;UPDATE DATA TABLE POINTER
 13252 052542  005711                          TST     (R1)            ;;IS THERE ANOTHER NUMBER?
 13253 052544  001403                          BEQ     10$             ;;BR IF NO
 13254 052546                                  TYPE    MSG018          ;TYPE 2 SPACES
       052546  104401  066107                  TYPEIT  .MSG018
                                               .DSABL  CRF
 13255 052552  000752                          BR      7$              ;;LOOP
 13256
 13257 052554  005737  002110            10$:    TST     MUT             ;IS THERE A MEMORY UNDER TEST
 13258 052560  001402                          BEQ     11$             ;NO - SKIP
 13259 052562  005237  002612                  INC     HEADER          ;YES   BUMP HFADER FLAG
 13260 052566  104416                  11$:    RESREG
 13261 052570                                  IF #SW7 SET.IN @SWR AND DETFLAG IS FALSE AND NOERROR IS FALSE
       052570  032777  000200  130040                                                          BIT #SW7,@SWR
       052576  001410                                                                        BEQ L516
       052600  005737  002220                                                                TST DETFLAG
       052604  001005                                                                        BNE L516
       052606  005737  002430                                                                TST NOERROR
       052612  001002                                                                        BNE L516
 13262 052614  004737  053266                    CALL  DETAIL
 13263 052620                                  END ;OF IF #SW7
       052620                                                                  L516:;;;;;;
 13264 052620                                  TYPE    MSG104          ;CONTROL Z
       052620  104401  070557                  TYPEIT  ,MSG104
                                               .DSABL  CRF
 13265 052624  000207                          RETURN
 13266                                         .EVEN                           ;R-C
 13267 052626  052636  052672  052722  PFECWS: .WORD   PFECEM,PFECDH,PFECDT,PFECDF      ;R C
       052634  052732
 13268 052636     120     117     127  PFECEM: .ASCIZ  "POWER MONITOR BIT FOUND SET"    ;R-C
       052641     105     122     040
       052644     115     117     116
       052647     111     124     117
       052652     122     040     102
       052655     111     124     040
       052660     106     117     125
       052663     116     104     040
       052666     123     105     124
       052671     000
 13269 052672     124     105     123  PFECDH: .ASCIZ  "TESTNO  ERR PC  CPUERR"        ;R C
       052675     124     116     117
       052700     040     040     105
       052703     122     122     040
```

```
        052706     120     103     040
        052711     040     103     120
        052714     125     105     122
        052717     122     000
 13270                                  .EVEN                                  ;R-C
 13271  052722  056652  002020  052312  PFECDT: .WORD   $TESTN,ERRPC,CPSAVE,0   ;R-C
        052730  000000
 13272  052732     000     000     000  PFECDF: .BYTE   0,0,0,0                 ;R-C
        052735     000
 13273
```

```
                                ;*****************************************************************************
                                ;*** OCTAL ***
                                ;*****************************************************************************
052736                          TAG70$: TYPOCT  @(R1)           ;;TYPE AN OCTAL NUMBER
052736  017146  000000                MOV     @(R1),-(SP)     ;;SAVE @(R1) FOR TYPEOUT
052742  104402                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                      .DSABL  CRF
052744  000207                      RETURN

                                ;*****************************************************************************
                                ;*** DECIMAL ***
                                ;*****************************************************************************
052746                          TAG71$: TYPDEC  @(R1)           ;;TYPE A DECIMAL NUMBER
052746  017146  000000                MOV     @(R1),-(SP)     ;;SAVE @(R1) FOR TYPEOUT
052752  104405                        TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
                                      .DSABL  CRF
052754  000207                      RETURN

                                ;*****************************************************************************
                                ;*** INTERLEAVE ***
                                ;*****************************************************************************
052756                          TAG72$: PUSH    R1,R5                                   MOV R1,-(SP)
052760  010546                                                                          MOV R5,-(SP)
052762  013701  002102                MOV     BANK,R1
052766  070127  000004                MUL     #4,R1
052772                                SET     NOTAB                   ;INDICATE NO TABLE TO BE PRINTED - NOW
052772  012737  177777  002372                                                        MOV  # 1,NOTAB
053000                                TYPE    MSG014
053000  104401  066060                TYPEIT  ,MSG014
                                      .DSABL  CRF
053004  004737  033404                CALL    TCFIG1
053010  005037  002372                CLR     NOTAB
053014                                POP     R5,R1
053014  012605                                                                        MOV (SP)+,R5
053016  012601                                                                        MOV (SP)+,R1
053020                                TYPE    MSG014                  ;1 SPACE
053020  104401  066060                TYPEIT  ,MSG014
                                      .DSABL  CRF
053024  000207                      RETURN

                                ;*****************************************************************************
                                ;*** CSR ***
                                ;*****************************************************************************
053026                          TAG73$: PUSH    R1,R5                                   MOV R1,-(SP)
053030  010546                                                                          MOV R5,-(SP)
053032  013701  002102                MOV     BANK,R1
053036  070127  000004                MUL     #4,R1
053042                                SET     NOTAB
053042  012737  177777  002372                                                        MOV  #-1,NOTAB
053050  004737  033600                CALL    TCFIG3
053054  005037  002372                CLR     NOTAB
053060                                POP     R5,R1
053060  012605                                                                        MOV (SP)+,R5
053062  012601                                                                        MOV (SP)+,R1
053064  000207                      RETURN
```

```
13313
13314                           ;*****************************************************************************
13315                           ;*** PATTERN ***
13316                           ;*****************************************************************************
13317 053066                    TAG74$: TYPOCS  REALPAT,<TYPE (0-77)>,2,Z
       053066  013746  002300           MOV     REALPAT,-(SP)   ;;SAVE REALPAT FOR TYPEOUT
                                                                  ;;TYPE (0-77)
       053072  104403                   TYPOS                   ;;GO TYPE--OCTAL ASCII
       053074     002                   .BYTE   2               ;;TYPE 2 DIGIT(S)
       053075     001                   .BYTE   1               ;;TYPE LEADING ZEROS
                                        .DSABL  CRF
13318  053076  000207                   RETURN
13319
13320                           ;*****************************************************************************
13321                           ;*** BANK ***
13322                           ;*****************************************************************************
13323 053100                    TAG75$: TYPOCS  BANK,<TYPE (0-176)>,3
       053100  013746  002102           MOV     BANK,-(SP)      ;;SAVE BANK FOR TYPEOUT
                                                                  ;;TYPE (0-176)
       053104  104403                   TYPOS                   ;;GO TYPE--OCTAL ASCII
       053106     003                   .BYTE   3               ;;TYPE 3 DIGIT(S)
       053107     000                   .BYTE   0               ;;SUPPRESS LEADING ZEROS
                                        .DSABL  CRF
13324  053110  000207                   RETURN
```

```
13326                                   ;*****************************************************************************
13327                                   ;*** MTYPE ***
13328                                   ;*****************************************************************************
13329 053112                            TAG76$: PUSH    R1,R5
      053112  010146                                                                    MOV R1,-(SP)
      053114  010546                                                                    MOV R5,-(SP)
13330 053116  013701  002102                      MOV     BANK,R1
13331 053122  070127  000004                      MUL     #4,R1
13332 053126                                      SET     NOTAB
      053126  012737  177777  002372                                                   MOV  #-1,NOTAB
13333 053134                                      TYPE    MSG019
      053134  104401  066112                     TYPEIT  ,MSG019
                                                .DSABL  CRF
13334 053140  004737  033444                      CALL    TCFIG2
13335 053144  005037  002372                      CLR     NOTAB
13336 053150                                      POP     R5,R1
      053150  012605                                                                   MOV (SP)+,R5
      053152  012601                                                                   MOV (SP)+,R1
13337 053154  000207                            RETURN
13338
13339                                   ;*****************************************************************************
13340                                   ;*** UNKNOWN DATA ***
13341                                   ;*****************************************************************************
13342 053156                            TAG77$: TYPE    MSG061
      053156  104401  067767                     TYPEIT  ,MSG061
                                                .DSABL  CRF
13343 053162  000207                            RETURN
13344
13345                                   ;*****************************************************************************
13346                                   ;*** PHYSICAL ADDRESS ***
13347                                   ;*****************************************************************************
13348 053164  013737  002034  002040  TAG78$: MOV     ADDRESS,PHYADD
13349 053172  162737  060000  002040          SUB     #FIRST,PHYADD
13350 053200  013737  002102  002042          MOV     BANK,PHYADD+2
13351 053206  006237  002042                  ASR     PHYADD+2
13352 053212  103003                          BCC     1$
13353 053214  052737  100000  002040          BIS     #BIT15,PHYADD
13354 053222  012746  002040          1$:     MOV     #PHYADD,-(SP)           ;POINTER TO DOUBLE WORD ON STACK
13355 053226  004737  056526                  CALL    $DB20                   ;CALL DOUBLE PRECISION CONVERSION ROUTINE
13356 053232  062706  000002                  ADD     #2,SP                   ;FIX STACK
13357 053236                                  TYPE    $OCT8
      053236  104401  056634                 TYPEIT  ,$OCT8
                                            .DSABL  CRF
13358 053242  000207                        RETURN
13359
13360                                   ;*****************************************************************************
13361                                   ;*** OCTAL BYTE ***
13362                                   ;*****************************************************************************
13363 053244                            TAG79$: TYPE    MSG018          ;2 SPACES
      053244  104401  066107                   TYPEIT  ,MSG018
                                            .DSABL  CRF
13364 053250                                  TYPOCS  @(R1),<TYPE BYTE>,3,Z
      053250  017146  000000                  MOV     @(R1),-(SP)     ;;SAVE @(R1) FOR TYPEOUT
                                                                      ;;TYPE BYTE
      053254  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
      053256     003                          .BYTE   3               ;;TYPE 3 DIGIT(S)
      053257     001                          .BYTE   1               ;;TYPE LEADING ZEROS
```

```
                                        .DSABL  CRF
13365 053260                            TYPE    MSG014          ;SPACE
      053260  104401  066060             TYPEIT  .MSG014
                                        .DSABL  CRF
13366 053264  000207                    RETURN
```

```
13410 053266                            DETAIL: SUBTST  <<SUBR  DETAILED ERROR REPORT>>
                                        ;*****************************************************************************
                                        ;*SUBTEST        SUBR    DETAILED ERROR REPORT
                                        ;*****************************************************************************
13411 053266  005237  002220                      INC     DETFLAG
13412 053272  022737  000003  002220            CMP     #3,DETFLAG
13413 053300  101473                            BLOS    4$
13414 053302  022737  000002  002220            CMP     #2,DETFLAG
13415 053310  001435                            BEQ     2$
13416 053312                                    PUSH    HEADER,MUT
      053312  013746  002612                                                    MOV HEADER,-(SP)
      053316  013746  002110                                                    MOV MUT,-(SP)
13417 053322                                    SET     HEADER
      053322  012737  177777  002612                                            MOV  #-1,HEADER
13418 053330  005037  002110                    CLR     MUT
13419 053334  010037  002200                    MOV     R0,DETR0
13420 053340  012700  002202                    MOV     #DETR1,R0
13421 053344  010120                            MOV     R1,(R0)+
13422 053346  010220                            MOV     R2,(R0)+
13423 053350  010320                            MOV     R3,(R0)+
13424 053352  010420                            MOV     R4,(R0)+
13425 053354  010520                            MOV     R5,(R0)+
13426 053356  013720  002024                    MOV     ERRSP,(R0)+
13427 053362  013720  002030                    MOV     ERRPSW,(R0)+
13428 053366  013700  002200                    MOV     DETR0,R0
13429 053372                                    SET     NOERROR
      053372  012737  177777  002430                                            MOV  #-1,NOERROR
13430 053400  104013                            ERROR   +13
13431 053402  000423                            BR      1$
13432 053404                            2$:     PUSH    HEADER,MUT
      053404  013746  002612                                                    MOV HEADER,-(SP)
      053410  013746  002110                                                    MOV MUT,-(SP)
13433 053414                                    SET     HEADER
      053414  012737  177777  002612                                            MOV  #-1,HEADER
13434 053422  005037  002110                    CLR     MUT
13435 053426                                    SET     NOERROR
      053426  012737  177777  002430                                            MOV  #-1,NOERROR
13436 053434  104031                            ERROR   +31
13437 053436  022737  000005  004010            CMP     #5,PROTYP               ;IS THIS AN 11/83 ?
13438 053444  001002                            BNE     1$
13439 053446  005037  177766                    CLR     CPUERR
13440 053452                            1$:     POP     MUT,HEADER
      053452  012637  002110                                                    MOV (SP)+,MUT
      053456  012637  002612                                                    MOV (SP)+,HEADER
13441                                           ;WARNING RECURSIVE
13442 053462  004737  053266                    CALL    DETAIL
13443 053466  000207                            RETURN
```

```
 13446                                  ;SIMULATE CONTROL "T"
 13447 053470  004737  055152    4$:    CALL    CONTT                   ;DISPLAY "DISPLAY" INFO
 13448
 13449                                  ;TYPE CONTENTS OF ALL CSR'S
 13450 053474                           PUSH    CSR,CSRNO,R1                            MOV CSR,-(SP)
       053474  013746  002150                                                           MOV CSRNO,-(SP)
       053500  013746  002152                                                           MOV R1,-(SP)
       053504  010146
 13451 053506                           TYPE    MSG058
       053506  104401  067745          TYPEIT  ,MSG058
                                      .DSABL  CRF
 13452 053512                           TYPE    $CRLF
       053512  104401  002660          TYPEIT  ,$CRLF
                                      .DSABL  CRF
 13453 053516  013701  002224          MOV     TOTCSRS,R1
 13454 053522                           BEGIN DUMPCSRLOOP
       053522                                                                  B103:;;;;;;;
 13455 053522                             FOR CSRNO := #0 TO #36 BY #2
       053522  005037  002152                                                           CLR CSRNO
       053526                                                                  B104:;;;;;;;
 13456 053526  006301                       ASL         R1
 13457 053530                               ON.ERROR
       053530  103006                                                           BCC L517
 13458 053532  104426                         READCSR
 13459 053534                               TYPOCT    CSR
       053534  013746  002150          MOV     CSR,-(SP)       ;;SAVE CSR FOR TYPEOUT
       053540  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                      .DSABL  CRF
 13460 053542                               TYPE      MSG018          ;2 SPACES
       053542  104401  066107          TYPEIT  ,MSG018
                                      .DSABL  CRF
 13461 053546                               END ;OF ON.ERROR
       053546                                                                  L517:;;;;;;;
 13462 053546                               IF R1 EQ #0 THEN LEAVE DUMPCSRLOOP
       053546  005701                                                           TST R1
       053550  001407                                                           BEQ E103
 13463 053552                             END ;OF FOR CSRNO
       053552  062737  000002  002152                                           ADD #2,CSRNO
       053560  023727  002152  000036                                           CMP CSRNO,#36
       053566  003757                                                           BLE B104
       053570                                                                  E104:;;;;;;;
 13464 053570                           END DUMPCSRLOOP
       053570                                                                  E103:;;;;;;;
 13465 053570                           POP     R1,CSRNO,CSR
       053570  012601                                                           MOV (SP)+,R1
       053572  012637  002152                                                   MOV (SP)+,CSRNO
       053576  012637  002150                                                   MOV (SP)+,CSR
 13466
 13467                                  ;TYPE STACKS
 13468 053602                           PUSH    R0,R1                           MOV R0,-(SP)
       053602  010046                                                           MOV R1,-(SP)
       053604  010146
 13469 053606                           TYPE    MSG088          ;KERNEL STACK
       053606  104401  070336          TYPEIT  ,MSG088
                                      .DSABL  CRF
 13470 053612  013701  002574          MOV     KSTACK,R1
 13471 053616  162701  000002          SUB     #2,R1
```

```
13472 053622                                    FOR     R0 :- SP TO R1 BY #2
      053622  010600                                                          MOV SP,R0
      053624                                                              B105:;;;;;;;
13473 053624                                      TYPE  $CRLF
      053624  104401  002660                    TYPEIT  ,$CRLF
                                                .DSABL  CRF
13474 053630                                      TYPOCT        R0
      053630  010046                            MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
      053632  104402                            TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                                .DSABL  CRF
13475 053634                                      TYPE          MSG018          ;2 SPACES
      053634  104401  066107                    TYPEIT  ,MSG018
                                                .DSABL  CRF
13476 053640                                      TYPOCT        (R0)
      053640  011046                            MOV     (R0),-(SP)      ;;SAVE (R0) FOR TYPEOUT
      053642  104402                            TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                                .DSABL  CRF
13477 053644                                    END ;OF FOR R0
      053644  062700  000002                                                      ADD #2,R0
      053650  020001                                                             CMP R0,R1
      053652  003764                                                             BLE B105
      053654                                                              E105:;;;;;;;;
13478                                           ;SET PREVIOUS MODE TO SUPERVISOR
13479 053654  005737  002456                    TST     NOSUPER
13480 053660  001036                            BNE     DET1
13481 053662  042737  030000  177776            BIC     #BIT13!BIT12,PSW
13482 053670  052737  010000  177776            BIS     #BIT12,PSW
13483 053676  006506                            MFPI    SSP
13484 053700                                    POP     R1,R0
      053700  012601                                                          MOV (SP)+,R1
      053702  012600                                                          MOV (SP)+,R0
13485 053704                                    TYPE    MSG089          ;SUPERVISOR STACK
      053704  104401  070354                    TYPEIT  ,MSG089
                                                .DSABL  CRF
13486 053710                                    IF R0 LT #SUPSTK
      053710  020027  000740                                                      CMP R0,#SUPSTK
      053714  002016                                                              BGE L520
13487 053716                                      FOR R0 := R0 TO #SUPSTK-2 BY #2
      053716                                                              B106:;;;;;;;
13488 053716                                        TYPE        $CRLF
      053716  104401  002660                    TYPEIT  ,$CRLF
                                                .DSABL  CRF
13489 053722                                        TYPOCT      R0
      053722  010046                            MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
      053724  104402                            TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                                .DSABL  CRF
13490 053726                                        TYPE        MSG018          ;2 SPACES
      053726  104401  066107                    TYPEIT  ,MSG018
                                                .DSABL  CRF
13491 053732                                        TYPOCT      (R0)
      053732  011046                            MOV     (R0),-(SP)      ;;SAVE (R0) FOR TYPEOUT
      053734  104402                            TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                                .DSABL  CRF
13492 053736                                      END ;OF FOR R0
      053736  062700  000002                                                      ADD #2,R0
      053742  020027  000736                                                      CMP R0,#SUPSTK-2
      053746  003763                                                             BLE B106
```

```
      053750                                                              E106:;;;;;;;
13493 053750                              ELSE
      053750  000402                                                          BR L521
      053752                                                              L520:;;;;;;
13494 053752                                TYPE  MSG091        ;IS EMPTY
      053752  104401  070412              TYPEIT  ,MSG091
                                          .DSABL  CRF
13495 053756                              END ;OF IF R0
      053756                                                              L521:;;;;;;
13496                                     ;SET PREVIOUS MODE TO USER
13497 053756  052737  030000  177776 DET1: BIS    #BIT13!BIT12,PSW
13498 053764  006506                      MFPI    USP
13499 053766                              POP     R0
      053766  012600                                                          MOV (SP)+,R0
13500 053770                              TYPE    MSG090        ;USER STACK
      053770  104401  070376              TYPEIT  ,MSG090
                                          .DSABL  CRF
13501 053774                              IF R0 LT #USESTK
      053774  020027  000700                                                  CMP R0,#USESTK
      054000  002016                                                          BGE L522
13502 054002                                FOR R0 := R0 TO #USESTK-2 BY #2
      054002                                                              B107:;;;;;;
13503 054002                                  TYPE        $CRLF
      054002  104401  002660              TYPEIT  ,$CRLF
                                          .DSABL  CRF
13504 054006                                  TYPOCT      R0
      054006  010046                      MOV     R0,-(SP)      ;;SAVE R0 FOR TYPEOUT
      054010  104402                      TYPOC                 ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                          .DSABL  CRF
13505 054012                                  TYPE        MSG018          ;2 SPACES
      054012  104401  066107              TYPEIT  ,MSG018
                                          .DSABL  CRF
13506 054016                                  TYPOCT      (R0)
      054016  011046                      MOV     (R0),-(SP)    ;;SAVE (R0) FOR TYPEOUT
      054020  104402                      TYPOC                 ;;GO TYPE- OCTAL ASCII(ALL DIGITS)
                                          .DSABL  CRF
13507 054022                                END ;OF FOR R0
      054022  062700  000002                                                  ADD #2,R0
      054026  020027  000676                                                  CMP R0,#USESTK-2
      054032  003763                                                          BLE B107
      054034                                                              E107:;;;;;;;
13508 054034                              ELSE
      054034  000402                                                          BR L523
      054036                                                              L522:;;;;;;
13509 054036                                TYPE  MSG091        ;IS EMPTY
      054036  104401  070412              TYPEIT  ,MSG091
                                          .DSABL  CRF
13510 054042                              END ;OF IF R0
      054042                                                              L523:;;;;;;
13511 054042                              TYPE    $CRLF
      054042  104401  002660              TYPEIT  ,$CRLF
                                          .DSABL  CRF
13512 054046  005037  002220              CLR     DETFLAG
13513 054052                              POP     R0
      054052  012600                                                          MOV (SP)+,R0
13514 054054  000207                      RETURN
```

```
                                        .SBTTL  ROUTINE BINARY TO OCTAL (ASCII) AND TYPE

                                ;*******************************************************************************
                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
                                ;*OCTAL (ASCII) NUMBER AND TYPE IT.
                                ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
                                ;*CALL:
                                ;*      MOV     NUM, (SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPOS                   ;;CALL FOR TYPEOUT
                                ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
                                ;*      .BYTE   M               ;;M=1 OR 0
                                ;*                                      ;;1=TYPE LEADING ZEROS
                                ;*                                      ;;0=SUPPRESS LEADING ZEROS
                                ;*
                                ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
                                ;*$TYPOS OR $TYPOC
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPON                   ;;CALL FOR TYPEOUT
                                ;*
                                ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPOC                   ;;CALL FOR TYPEOUT

054056  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
054062  116637  000001  054301          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
054070  112637  054303                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
054074  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
054100  000406                          BR      $TYPON
054102  112737  000001  054301  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
054110  112737  000006  054303          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
054116  112737  000005  054300  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
054124  010346                          MOV     R3,-(SP)        ;;SAVE R3
054126  010446                          MOV     R4,-(SP)        ;;SAVE R4
054130  010546                          MOV     R5,-(SP)        ;;SAVE R5
054132  113704  054303                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
054136  005404                          NEG     R4
054140  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
054144  110437  054302                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
054150  113704  054301                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
054154  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
054160  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
054162  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
054164  000404                          BR      3$              ;;GO DO MSB
054166  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
054170  006105                          ROL     R5
054172  006105                          ROL     R5
054174  010503                          MOV     R5,R3
054176  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
054200  105337  054302                  DECB    $OMODE          ;;TYPE THIS DIGIT?
054204  100016                          BPL     6$              ;;BR IF NO
054206  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
054212  001002                          BNE     4$              ;;TEST FOR 0
054214  005704                          TST     R4              ;;SUPPRESS THIS 0?
054216  001403                          BEQ     5$              ;;BR IF YES
054220  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
```

```
 13609 054222  052703  000060            5$:   BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
 13610 054226  052703  000040                  BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
 13611 054232  110337  054276                  MOVB    R3,8$           ;;SAVE FOR TYPING
 13612 054236                                  TYPE    8$              ;;GO TYPE THIS DIGIT
       054236  104401  054276                  TYPEIT  ,8$
                                               .DSABL  CRF
 13613 054242  105337  054300            6$:   DECB    $OCNT           ;;COUNT BY 1
 13614 054246  003347                          BGT     2$              ;;BR IF MORE TO DO
 13615 054250  002402                          BLT     7$              ;;BR IF DONE
 13616 054252  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
 13617 054254  000744                          BR      2$              ;;GO DO THE LAST DIGIT
 13618 054256  012605                  7$:     MOV     (SP)+,R5        ;;RESTORE R5
 13619 054260  012604                          MOV     (SP)+,R4        ;;RESTORE R4
 13620 054262  012603                          MOV     (SP)+,R3        ;;RESTORE R3
 13621 054264  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
 13622 054272  012616                          MOV     (SP)+,(SP)
 13623 054274  000002                          RTI                     ;;RETURN
 13624 054276     000                  8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
 13625 054277     000                          .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
 13626 054300     000                  $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
 13627 054301     000                  $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
 13628 054302  000000                  $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
```

```
                                .SBTTL  ROUTINE CONVERT BINARY TO DECIMAL AND TYPE
                        ;*******************************************************************************
                        ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
                        ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
                        ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
                        ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
                        ;*REPLACED WITH SPACES.
                        ;*CALL:
                        ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
                        ;*      TYPDS                   ;;GO TO THE ROUTINE
054304                  $TYPDS: PUSH    R0,R1,R2,R3,R5
054304  010046                                                          MOV R0,-(SP)
054306  010146                                                          MOV R1,-(SP)
054310  010246                                                          MOV R2,-(SP)
054312  010346                                                          MOV R3,-(SP)
054314  010546                                                          MOV R5,-(SP)
054316  012746  020200                  MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
054322  016605  000020                  MOV     20(SP),R5       ;;GET THE INPUT NUMBER
054326  100004                          BPL     1$              ;;BR IF INPUT IS POS.
054330  005405                          NEG     R5              ;;MAKE THE BINARY NUMBER POS.
054332  112766  000055  000001          MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
054340  005000                  1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
054342  012703  054520                  MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
054346  112723  000040                  MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
054352  005002                  2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
054354  016001  054510                  MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
054360  160105                  3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
054362  002402                          BLT     4$              ;;BR IF DONE
054364  005202                          INC     R2              ;;INCREASE THE BCD DIGIT BY 1
054366  000774                          BR      3$
054370  060105                  4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
054372  005702                          TST     R2              ;;CHECK IF BCD DIGIT=0
054374  001002                          BNE     5$              ;;FALL THROUGH IF 0
054376  105716                          TSTB    (SP)            ;;STILL DOING LEADING 0'S?
054400  100407                          BMI     7$              ;;BR IF YES
054402  106316                  5$:     ASLB    (SP)            ;;MSD?
054404  103003                          BCC     6$              ;;BR IF NO
054406  116663  000001  177777          MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
054414  052702  000060          6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
054420  052702  000040          7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
054424  110223                          MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
054426  005720                          TST     (R0)+           ;;JUST INCREMENTING
054430  020027  000010                  CMP     R0,#10          ;;CHECK THE TABLE INDEX
054434  002746                          BLT     2$              ;;GO DO THE NEXT DIGIT
054436  003002                          BGT     8$              ;;GO TO EXIT
054440  010502                          MOV     R5,R2           ;;GET THE LSD
054442  000764                          BR      6$              ;;GO CHANGE TO ASCII
054444  105726                  8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
054446  100003                          BPL     9$              ;;BR IF NO
054450  116663  177777  177776          MOVB    -1(SP),-2(R3)   ;;YES- SET THE SIGN FOR TYPING
054456  105013                  9$:     CLRB    (R3)            ;;SET THE TERMINATOR
054460                          POP     R5,R3,R2,R1,R0
054460  012605                                                          MOV (SP)+,R5
054462  012603                                                          MOV (SP)+,R3
054464  012602                                                          MOV (SP)+,R2
054466  012601                                                          MOV (SP)+,R1
054470  012600                                                          MOV (SP)+,R0
```

```
13677 054472                                    TYPE    $DBLK           ;;NOW TYPE THE NUMBER
      054472  104401  054520                    TYPEIT  ,$DBLK
                                                .DSABL  CRF
13678 054476  016666  000002  000004            MOV     2(SP),4(SP)     ;;ADJUST THE STACK
13679 054504  012616                            MOV     (SP)+,(SP)
13680 054506  000002                            RTI                     ;;RETURN TO USER
13681 054510  023420                  $DTBL:    10000.
13682 054512  001750                            1000.
13683 054514  000144                            100.
13684 054516  000012                            10.
13685 054520  000000  000000  000000  $DBLK:    .WORD   0,0,0,0
      054526  000000
```

```
                                .SBTTL  ROUTINE TTY INPUT
                        ;*******************************************************************************
                        ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
                        ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
                        ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
                        ;*WHEN OPERATING IN TTY FLAG MODE.
                                .ENABLE LSB
054530                  $CKSWR:
054530  005737  047246              TST     XOCHAR          ;;SOMETHING THERE?
054534  001406                      BEQ     NOCH            ;; GO ON IF NOT
054536  013746  047246              MOV     XOCHAR,-(SP)    ;; USE IT
054542  005037  047246              CLR     XOCHAR
054546  000137  054570              JMP     CONTS1
054552  105777  126064      NOCH:   TSTB    @$TKS           ;;CHAR THERE?
054556  100136                      BPL     SWREND          ;;IF NO, DON'T WAIT AROUND
054560  117746  126060              MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
054564  042716  177600              BIC     #^C177,(SP)     ;;STRIP-OFF THE ASCII
054570  022716  000006      CONTS1: CMP     #6,(SP)         ;IS IT CONTROL F?
054574  001002                      BNE     1$              ;NO SKIP
054576  004737  041054              CALL    FIELDSERVICE
054602  022716  000024      1$:     CMP     #24,(SP)        ;IS IT CONTROL T?
054606  001002                      BNE     16$             ;NO - SKIP
054610  004737  055152              CALL    CONTT           ;YES - CALL CONTROL T ROUTINE
054614  022716  000003      16$:    CMP     #3,(SP)         ;IS IT CONTROL C?
054620  001454                      BEQ     5$              ;YES EXIT *****NOTE***** STACK IS SCREWED UP!
054622  022716  000023      2$:     CMP     #23,(SP)        ;IS IT CONTROL S?
054626  001002                      BNE     17$             ;NO - SKIP
054630  004737  055226              CALL    CONTS           ;YES - CALL CONTROL S ROUTINE
054634  022716  000013      17$:    CMP     #13,(SP)        ;IS IT CONTROL K?
054640  001005                      BNE     6$              ;NO - SKIP
054642                              TYPE    $CNTLK          ;TYPE A ^K
        054642  104401  055144      TYPEIT  ,$CNTLK
                                    .DSABL  CRF
054646  013706  002146              MOV     CTLKVEC,SP      ;RESET KSP TO AFTER PATTERN EXEC ROUTINE
054652  000207                      RETURN                  ;RETURN TO PATTERN EXEC ROUTINE
054654  022737  000176  002636 6$:  CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED?
054662  001075                      BNE     CKEND           ;;BRANCH IF NO
054664  022716  000007              CMP     #7,(SP)         ;;IS IT A CONTROL G?
054670  001072                      BNE     CKEND           ;;NO, RETURN TO USER
054672  005737  002062              TST     $AUTO           ;ARE WE RUNNING IN AUTO-MODE?
054676  001067                      BNE     CKEND           ;BRANCH IF YES
054700                              TYPE    $CNTLG          ;;ECHO THE CONTROL-G (^G)
        054700  104401  055750      TYPEIT  ,$CNTLG
                                    .DSABL  CRF
054704                  $GTSWR: TYPE    $MSWR           ;;TYPE CURRENT CONTENTS
        054704  104401  055755      TYPEIT  ,$MSWR
                                    .DSABL  CRF
054710                              TYPOCT  @SWR            ;;OF THE SWR
        054710  017746  125722      MOV     @SWR, (SP)      ;;SAVE @SWR FOR TYPEOUT
        054714  104402              TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                    .DSABL  CRF
054716                              TYPE    $MNEW           ;;PROMPT FOR NEW SWR
        054716  104401  055766      TYPEIT  ,$MNEW
                                    .DSABL  CRF
054722  005046                  3$:     CLR     -(SP)           ;;CLEAR COUNTER
054724  005046                          CLR     -(SP)           ;;THE NEW SWR
054726  105777  125710          4$:     TSTB    @$TKS           ;;CHAR THERE?
```

```
13733 054732  100375                        BPL     4$              ;;IF NOT TRY AGAIN
13734 054734  117746  125704                MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
13735 054740  042716  177600                BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
13736 054744  021627  000003                CMP     (SP),#3         ;;IS IT A CONTROL-C?
13737 054750  001006                        BNE     7$              ;;BRANCH IF NOT
13738 054752                        5$:     TYPE    $CNTLC          ;;YES, ECHO CONTROL-C (^C)
      054752  104401  055736                TYPEIT  ,$CNTLC
                                            .DSABL  CRF
13739 054756  062706  000006                ADD     #6,SP           ;;CLEAN UP STACK
13740 054762  000137  040534                JMP     QUIT            ;;CONTROL-C HALT
13741 054766  021627  000025        7$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
13742 054772  001005                        BNE     9$              ;;BRANCH IF NOT
13743 054774                                TYPE    $CNTLU          ;;YES, ECHO CONTROL-U (^U)
      054774  104401  055743                TYPEIT  ,$CNTLU
                                            .DSABL  CRF
13744 055000  062706  000006        8$:     ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
13745 055004  000746                        BR      3$              ;;LET'S TRY IT AGAIN
13746 055006  021627  000015        9$:     CMP     (SP),#15        ;;IS IT A <CR>?
13747 055012  001024                        BNE     13$             ;;BRANCH IF NO
13748 055014  005766  000004                TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
13749 055020  001403                        BEQ     10$             ;;BRANCH IF YES
13750 055022  016677  000002  125606        MOV     2(SP),@SWR      ;;SAVE NEW SWR
13751 055030                        10$:    IF SWRFLG IS TRUE
      055030  005737  002566                                                        TST SWRFLG
      055034  001403                                                              BEQ L524
13752 055036  062706  000006                   ADD  #6,SP           ;;CLEAR UP STACK
13753 055042                                ELSE
      055042  000402                                                              BR L525
      055044                                                                L524:;;;;;;
13754 055044  062706  000010                   ADD  #10,SP          ;;CLEAR UP STACK
13755 055050                                END
      055050                                                                L525:;;;;;;
13756 055050                                TYPE    $CRLF           ;;ECHO <CR> AND <LF>
      055050  104401  002660                TYPEIT  ,$CRLF
                                            .DSABL  CRF
13757 055054  000002                SWREND: RTI                     ;;RETURN
```

```
 13758 055056  062706  000002          CKEND:  ADD     #2,SP           ;FIX STACK
 13759 055062  000002                          RTI                     ;RETURN
 13760 055064  004737  047250          13$:    CALL    $TYPEC          ;;ECHO CHAR
 13761 055070  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
 13762 055074  002420                          BLT     15$             ;;BRANCH IF YES
 13763 055076  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
 13764 055102  003015                          BGT     15$             ;;BRANCH IF YES
 13765 055104  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
 13766 055110  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
 13767 055114  001403                          BEQ     14$             ;;BRANCH IF YES
 13768 055116  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
 13769 055120  006316                          ASL     (SP)            ;;    CHAR OVER TO MAKE
 13770 055122  006316                          ASL     (SP)            ;;    ROOM FOR NEW ONE.
 13771 055124  005266  000002          14$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
 13772 055130  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
 13773 055134  000674                          BR      4$              ;;GET THE NEXT ONE
 13774 055136                          15$:    TYPE    $QUES           ;;TYPE ?<CR><LF>
       055136  104401  002657                  TYPEIT  ,$QUES
                                               .DSABL  CRF
 13775 055142  000716                          BR      8$              ;;SIMULATE CONTROL-U
 13776 055144     136     113     015  $CNTLK: .ASCIZ   /^K/<15><12>    ;CONTROL K ASCII STRING
       055147     012     000
 13777                                         .EVEN
 13778                                         .DSABL  LSB
```

```
 13781 055152                           CONTT:  SUBTST  <<CONTROL T>>
                                        ;*****************************************************************************
                                        ;*SUBTEST       CONTROL T
                                        ;*****************************************************************************
 13782 055152                                   PUSH    R0
       055152  010046                                                                   MOV R0,-(SP)
 13783 055154                                   TYPE    $CRLF
       055154  104401  002660                  TYPEIT  ,$CRLF
                                               .DSABL  CRF
 13793 055160                                    IF RLFLAG IS TRUE
       055160  005737  002126                                                          TST RLFLAG
       055164  001402                                                                  BEQ L526
 13794 055166                                      TYPE        MSG092          ;RELOCATED
       055166  104401  070424                  TYPEIT  ,MSG092
                                               .DSABL  CRF
 13795 055172                                    END ;OF IF RLFLAG
       055172                                                                  L526:;;;;;;
 13796 055172                                    TYPE  MSG093                   ;BANK=
       055172  104401  070440                  TYPEIT  ,MSG093
                                               .DSABL  CRF
 13797 055176                                    TYPOCS        BANK,,3          ;TYPE 3 DIGITS
       055176  013746  002102                  MOV     BANK,-(SP)       ;;SAVE BANK FOR TYPEOUT
       055202  104403                          TYPOS                    ;;GO TYPE--OCTAL ASCII
       055204     003                          .BYTE   3                ;;TYPE 3 DIGIT(S)
       055205     000                          .BYTE   0                ;;SUPPRESS LEADING ZEROS
                                               .DSABL  CRF
 13798 055206                                    TYPE  MSG095                   ;PAT=
       055206  104401  070446                  TYPEIT  ,MSG095
                                               .DSABL  CRF
 13799 055212                                    TYPOCS        REALPAT,,2       ;TYPE 2 DIGITS
       055212  013746  002300                  MOV     REALPAT,-(SP)    ;;SAVE REALPAT FOR TYPEOUT
       055216  104403                          TYPOS                    ;;GO TYPE--OCTAL ASCII
       055220     002                          .BYTE   2                ;;TYPE 2 DIGIT(S)
       055221     000                          .BYTE   0                ;;SUPPRESS LEADING ZEROS
                                               .DSABL  CRF
 13803 055222                                  POP     R0
       055222  012600                                                                   MOV (SP)+,R0
 13804 055224  000207                          RETURN
 13805
```

```
 13806 055226                       CONTS:  SUBTST  <<CONTROL S & CONTROL Q>>
                                    ;*******************************************************************
                                    ;*SUBTEST        CONTROL S & CONTROL Q
                                    ;*******************************************************************
 13807 055226                               POF     R0                  ;GET RID OF RETURN ADDRESS FROM STACK
       055226  012600                                                                               MOV (SP)+,R0
 13808 055230  105777  125406       CONTS2: TSTB    @$TKS               ;WAIT FOR CHARACTER
 13809 055234  100375                       BPL     CONTS2
 13810 055236  117716  125402               MOVB    @$TKB,(SP)          ;REPLACE OVER OLD CHARACTER ON STACK
 13811 055242  042716  177600               BIC     #^C177,(SP)         ;STRIP ALL BUT ASCII
 13812 055246                               IF (SP) EQ #21              ;IF IT IS A CONTROL Q
       055246  021627  000021                                                                       CMP (SP),#21
       055252  001003                                                                               BNE L527
 13813 055254  000137  054570                 JMP   CONTS1
 13814 055260                               ELSE
       055260  000401                                                                               BR L530
       055262                                                                               L527:;;;;;;
 13815 055262  000762                         BR    CONTS2
 13816 055264                               END ;OF IF (SP)
       055264                                                                               L530:;;;;;;
```

```
13818                                   ;*******************************************************************************
13819                                   ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
13820                                   ;*CALL:
13821                                   ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
13822                                   ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
13823                                   ;*                              ;;WITH PARITY BIT STRIPPED OFF
13824                                   ;
13825
13826 055264  011646                   $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
13827 055266  016666  000004  000002           MOV     4(SP),2(SP)     ;;SAVE THE PS
13828 055274  105777  125342           1$:     TSTB    @$TKS           ;;WAIT FOR
13829 055300  100375                           BPL     1$              ;;A CHARACTER
13830 055302  117766  125336  000004           MOVB    @$TKB,4(SP)     ;;READ THE TTY
13831 055310  042766  177600  000004           BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
13832 055316  026627  000004  000023           CMP     4(SP),#23       ;;IS IT A CONTROL-S?
13833 055324  001013                           BNE     3$              ;;BRANCH IF NO
13834 055326  105777  125310           2$:     TSTB    @$TKS           ;;WAIT FOR A CHARACTER
13835 055332  100375                           BPL     2$              ;;LOOP UNTIL ITS THERE
13836 055334  117746  125304                   MOVB    @$TKB,-(SP)     ;;GET CHARACTER
13837 055340  042716  177600                   BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
13838 055344  022627  000021                   CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
13839 055350  001366                           BNE     2$              ;;IF NOT DISCARD IT
13840 055352  000750                           BR      1$              ;;YES, RESUME
13841 055354  026627  000004  000021   3$:     CMP     4(SP),#21       ;;IS IT A RANDOM CONTROL-Q?     ;R-C
13842 055362  001744                           BEQ     1$              ;;BRANCH BACK IF SO             ;R-C
13843 055364  026627  000004  000140           CMP     4(SP),#140      ;;IS IT UPPER CASE?
13844 055372  002407                           BLT     4$              ;;BRANCH IF YES
13845 055374  026627  000004  000175           CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
13846 055402  003003                           BGT     4$              ;;BRANCH IF YES
13847 055404  042766  000040  000004           BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
13848 055412  000002                   4$:     RTI                     ;;GO BACK TO USER
13849                                   ;*******************************************************************************
13850                                   ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
13851                                   ;*CALL:
13852                                   ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
13853                                   ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
13854                                   ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
13855 055414  010346                   $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
13856 055416  005046                           CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
13857 055420  012703  055712           1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
13858 055424  022703  055736           2$:     CMP     #$TTYIN+20.,R3  ;;BUFFER FULL?
13859 055430  101477                           BLOS    8$              ;;BR IF YES
13860 055432  104411                           RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
13861 055434  112613                           MOVB    (SP)+,(R3)      ;;GET CHARACTER
13862 055436  122713  000003                   CMPB    #3,(R3)         ;;IS IT A CONTROL-C?
13863 055442  001016                           BNE     3$              ;;BRANCH IF NO
13864 055444                                   TYPE    $CNTLC          ;;TYPE A CONTROL-C (^C)
      055444  104401  055736                   TYPEIT  ,$CNTLC
                                               .DSABL  CRF
13865 055450  005726                           TST     (SP)+           ;;CLEAN RUBOUT KEY OFF OF THE STACK
13866 055452  012603                           MOV     (SP)+,R3        ;;RESTORE R3
13867 055454  032777  000400  125154           BIT     #BIT8,@SWR      ;;IS THERE A HALT FLAG SET IN THE SWR?
13868 055462  001404                           BEQ     11$             ;;BRANCH IF NOT TO HALT ROUTINE
13869 055464  005037  002420                   CLR     STOPOK          ;;GET READY TO HALT PROGRAM
13870 055470  000137  040604                   JMP     EXIT            ;;GO HALT PROGRAM
13871 055474  000137  040534           11$:    JMP     QUIT            ;;GOTO CONTROL-C HALT
13872 055500  122713  000177           3$:     CMPB    #177,(R3)       ;;IS IT A RUBOUT
```

```
13873 055504  001022                        BNE     5$              ;;BR IF NO
13874 055506  005716                        TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
13875 055510  001007                        BNE     4$              ;;BR IF NO
13876 055512  112737  000134  053710        MOVB    #'\,10$         ;;TYPE A BACK SLASH
13877 055520                                TYPE    10$
      055520  104401  055710                TYPEIT  ,10$
                                            .DSABL  CRF
13878 055524  012716  177777                MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
13879 055530  005303                4$:     DEC     R3              ;;BACKUP BY ONE
13880 055532  020327  055712                CMP     R3,#$TTYIN      ;;STACK EMPTY?
13881 055536  103434                        BLO     8$              ;;BR IF YES
13882 055540  111337  055710                MOVB    (R3),10$                ;;SETUP TO TYPEOUT THE DELETED CHAR.
13883 055544                                TYPE    10$             ;;GO TYPE
      055544  104401  055710                TYPEIT  ,10$
                                            .DSABL  CRF
13884 055550  000725                        BR      2$              ;;GO READ ANOTHER CHAR.
13885 055552  005716                5$:     TST     (SP)            ;;RUBOUT KEY SET?
13886 055554  001406                        BEQ     6$              ;;BR IF NO
13887 055556  112737  000134  055710        MOVB    #'\,10$         ;;TYPE A BACK SLASH
13888 055564                                TYPE    10$
      055564  104401  055710                TYPEIT  ,10$
                                            .DSABL  CRF
13889 055570  005016                        CLR     (SP)            ;;CLEAR THE RUBOUT KEY
13890 055572  122713  000025          6$:   CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
13891 055576  001003                        BNE     7$              ;;BR IF NO
13892 055600                                TYPE    $CNTLU          ;;TYPE A CONTROL "U
      055600  104401  055743                TYPEIT  ,$CNTLU
                                            .DSABL  CRF
13893 055604  000705                        BR      1$              ;;GO START OVER
13894 055606  122713  000022          7$:   CMPB    #22,(R3)        ;;IS CHARACTER A "↑R"?
13895 055612  001011                        BNE     9$              ;;BRANCH IF NO
13896 055614  105013                        CLRB    (R3)            ;;CLEAR THE CHARACTER
13897 055616                                TYPE    $CRLF           ;;TYPE A "CR" & "LF"
      055616  104401  002660                TYPEIT  ,$CRLF
                                            .DSABL  CRF
13898 055622                                TYPE    $TTYIN          ;;TYPE THE INPUT STRING
      055622  104401  055712                TYPEIT  ,$TTYIN
                                            .DSABL  CRF
13899 055626  000676                        BR      2$              ;;GO PICKUP ANOTHER CHACTER
13900 055630                          8$:   TYPE    $QUES           ;;TYPE A '?'
      055630  104401  002657                TYPEIT  ,$QUES
                                            .DSABL  CRF
13901 055634  000671                        BR      1$              ;;CLEAR THE BUFFER AND LOOP
13902 055636  111337  055710          9$:   MOVB    (R3),10$                ;;ECHO THE CHARACTER
13903 055642                                TYPE    10$
      055642  104401  055710                TYPEIT  ,10$
                                            .DSABL  CRF
13904 055646  122723  000015                CMPB    #15,(R3)+       ;;CHECK FOR RETURN
13905 055652  001264                        BNE     2$              ;;LOOP IF NOT RETURN
13906 055654  105063  177777                CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
13907 055660                                TYPE    $LF             ;;TYPE A LINE FEED
      055660  104401  002661                TYPEIT  ,$LF
                                            .DSABL  CRF
13908 055664  005726                        TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
13909 055666  012603                        MOV     (SP)+,R3        ;;RESTORE R3
13910 055670  011646                        MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
13911 055672  016666  000004  000002        MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
```

```
13912 055700  012766  055712  000004          MOV     #$TTYIN,4(SP)
13913 055706  000002                          RTI                     ;;RETURN
13914 055710     000                  10$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
13915 055711     000                          .BYTE   0               ;;TERMINATOR
13916 055712  000024                $TTYIN:  .REPT   20.             ;;RESERVE SIZE BYTES FOR TTY INPUT
13919 055736     136     103     015 $CNTLC:  .ASCIZ  /^C/<15><12>    ;;CONTROL "C"
      055741     012     000
13920 055743     136     125     015 $CNTLU:  .ASCIZ  /^U/<15><12>    ;;CONTROL "U"
      055746     012     000
13921 055750     136     107     015 $CNTLG:  .ASCIZ  /^G/<15><12>    ;;CONTROL "G"
      055753     012     000
13922 055755     015     012     123 $MSWR:   .ASCIZ  <15><12>/SWR = /
      055760     127     122     040
      055763     075     040     000
13923 055766     040     040     116 $MNEW:   .ASCIZ  /  NEW = /
      055771     105     127     040
      055774     075     040     000
13924                                        .EVEN
```

```
                                        .SBTTL  ROUTINE READ AN OCTAL NUMBER FROM THE TTY
                                ;*******************************************************************************
                                ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
                                ;*CHANGE IT TO BINARY.
                                ;*THE INPUT CHARACTERS WILL BE CHECKED TO INSURED THEY ARE LEGAL
                                ;*OCTAL DIGITS. IF AN ILLEGAL CHARACTER IS READ A "?" WILL BE TYPED
                                ;*FOLLOWED BY A CARRIAGE RETURN-LINE FEED. THE COMPLETE NUMBER MUST
                                ;*THEN BE RETYPED. THE INPUT IS TERMINATED BY TYPING A CARRIAGE RETURN.
                                ;*CALL:
                                ;*      RDOCT                   ;;READ AN OCTAL NUMBER
                                ;*      RETURN HERE             ;;LOW ORDER BITS ARE ON TOP OF THE STACK
                                ;*                              ;;HIGH ORDER BITS ARE IN $HIOCT
056000  011646                  $RDOCT: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR THE
056002  016666  000004  000002          MOV     4(SP),2(SP)     ;;INPUT NUMBER
056010                                  PUSH    R0,R1,R2
056010  010046                                                                  MOV R0,-(SP)
056012  010146                                                                  MOV R1,-(SP)
056014  010246                                                                  MOV R2,-(SP)
056016  104412                  1$:     RDLIN                   ;;READ AN ASCIZ LINE
056020  012600                          MOV     (SP)+,R0        ;;GET ADDRESS OF 1ST CHARACTER
056022  010037  056126                  MOV     R0,5$           ;;AND SAVE IT
056026  005001                          CLR     R1              ;;CLEAR DATA WORD
056030  005002                          CLR     R2
056032  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PICKUP THIS CHARACTER
056034  001420                          BEQ     3$              ;;IF ZERO GET OUT
056036  122716  000060                  CMPB    #'0,(SP)        ;;MAKE SURE THIS CHARACTER
056042  003026                          BGT     4$              ;;IS AN OCTAL DIGIT
056044  122716  000067                  CMPB    #'7,(SP)
056050  002423                          BLT     4$
056052  006301                          ASL     R1              ;;*2
056054  006102                          ROL     R2
056056  006301                          ASL     R1              ;;*4
056060  006102                          ROL     R2
056062  006301                          ASL     R1              ;;*8
056064  006102                          ROL     R2
056066  042716  177770                  BIC     #^C7,(SP)       ;;STRIP THE ASCII JUNK
056072  062601                          ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
056074  000756                          BR      2$              ;;LOOP
056076  005726                  3$:     TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
056100  010166  000012                  MOV     R1,12(SP)       ;;SAVE THE RESULT
056104  010237  056146                  MOV     R2,$HIOCT
056110                                  POP     R2,R1,R0
056110  012602                                                                  MOV (SP)+,R2
056112  012601                                                                  MOV (SP)+,R1
056114  012600                                                                  MOV (SP)+,R0
056116  000002                          RTI                     ;;RETURN
056120  005726                  4$:     TST     (SP)+           ;;CLEAN PARTIAL FROM STACK
056122  105010                          CLRB    (R0)            ;;SET A TERMINATOR
056124                                  TYPE                    ;;TYPE UP THRU THE BAD CHAR.
056124  104401                          TYPEIT
                                        .DSABL  CRF
056126  000000                  5$:     .WORD   0
056130                                  TYPE    MSG062          ;INPUT MUST BE A
056130  104401  067776                  TYPEIT  ,MSG062
                                        .DSABL  CRF
056134                                  TYPE    MSG063          ;N OCTAL
056134  104401  070016                  TYPEIT  ,MSG063
```

```
                                        .DSABL  CRF
13972 056140                            TYPE    MSG064          ;NUMBER
      056140  104401  070027            TYPEIT  ,MSG064
                                        .DSABL  CRF
13973 056144  000724                    BR      1$              ;;TRY AGAIN
13974 056146  000000            $HIOCT: .WORD   0               ;;HIGH ORDER BITS GO HERE
13975                                   .SBTTL  ROUTINE READ A DECIMAL NUMBER FROM THE TTY
13976
13977                           ;*************************************************************************
13978                           ;*THIS ROUTINE WILL READ A DECIMAL (ASCII) NUMBER FROM THE TTY AND
13979                           ;*CHANGE IT TO BINARY. IF TOO MANY CHARACTERS OR ANY ILLEGAL CHARACTERS
13980                           ;*ARE READ A "?" FOLLOWED BY A CARRIAGE RETURN-LINE FEED WILL BE TYPED.
13981                           ;*THE COMPLETE NUMBER MUST BE RETYPED. THE INPUT IS TERMINATED BY THE
13982                           ;*USER TYPING A CARRIAGE RETURN. THE RANGE OF THE INPUT NUMBER IS
13983                           ;*POSITIVE 32767 TO NEGATIVE 32768.
13984                           ;*CALL:
13985                           ;*      RDDEC                   ;;READ A DECIMAL NUMBER
13986                           ;*      RETURN HERE             ;;NUMBER IS ON TOP OF THE STAC(
13987                           ;
13988
13989 056150  011646            $RDDEC: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR
13990 056152  016666  000004  000002    MOV     4(SP),2(SP)     ;;THE INPUT NUMBER
13991 056160                            PUSH    R0,R1,R2
      056160  010046                                                            MOV R0,-(SP)
      056162  010146                                                            MOV R1,-(SP)
      056164  010246                                                            MOV R2,-(SP)
13992 056166  104412            1$:     RDLIN                   ;;READ AN ASCIZ LINE
13993 056170  012600                    MOV     (SP)+,R0        ;;ADDRESS OF 1ST CHAR.
13994 056172  010037  056316            MOV     R0,6$           ;;SAVE INCASE OF BAD INPUT
13995 056176  005046                    CLR     -(SP)           ;;CLEAR DATA WORD
13996 056200  005002                    CLR     R2              ;;SIGN SET POSITIVE
13997 056202  122710  000055            CMPB    #'-,(R0)        ;;SEE IF A MINUS SIGN WAS TYPED
13998 056206  001001                    BNE     2$              ;;BR IF NO MINUS SIGN
13999 056210  112002                    MOVB    (R0)+,R2        ;;SAVE FOR LATER USE
14000 056212  112001            2$:     MOVB    (R0)+,R1        ;;PICKUP THIS CHARACTER
14001 056214  001424                    BEQ     3$              ;;GET OUT IF ZERO
14002 056216  122701  000060            CMPB    #'0,R1          ;;MAKE SURE THIS CHARACTER
14003 056222  003032                    BGT     5$              ;;IS A DIGIT BETWEEN 0 & 9
14004 056224  122701  000071            CMPB    #'9,R1
14005 056230  002427                    BLT     5$
14006 056232  032716  170000            BIT     #^C7777,(SP)    ;;DON'T LET NUMBER GET TO BIG
14007 056236  001024                    BNE     5$              ;;BR IF NUMBER WOULD OVERFLOW
14008 056240  006316                    ASL     (SP)            ;;*2
14009 056242  011646                    MOV     (SP),-(SP)      ;;SAVE FOR LATER
14010 056244  006316                    ASL     (SP)            ;;*4
14011 056246  006316                    ASL     (SP)            ;;*8.
14012 056250  062616                    ADD     (SP)+,(SP)      ;;*10.
14013 056252  102416                    BVS     5$              ;;OVERFLOW ISN'T ALLOWED
14014 056254  162701  000060            SUB     #'0,R1          ;;STRIP AWAY THE ASCII JUNK
14015 056260  060116                    ADD     R1,(SP)         ;;ADD IN THIS DIGIT
14016 056262  102412                    BVS     5$              ;;OVERFLOW ISN'T ALLOWED
14017 056264  000752                    BR      2$              ;;LOOP
14018 056266  005702            3$:     TST     R2              ;;CHECK IF NUMBER IS NEG
14019 056270  001401                    BEQ     4$              ;;BR IF NO
14020 056272  005416                    NEG     (SP)            ;;YES--NEGATE THE NUMBER
14021 056274  012666  000012    4$:     MOV     (SP)+,12(SP)    ;;SAVE THE RESULT
14022 056300                            POP     R2,R1,R0
```

```
        056300  012602                                                  MOV (SP)+,R2
        056302  012601                                                  MOV (SP)+,R1
        056304  012600                                                  MOV (SP)+,R0
 14023  056306  000002                  RTI                    ;;RETURN
 14024
 14025  056310  005726          5$:     TST     (SP)+          ;;CLEAN PARTIAL NUMBER FROM STACK
 14026  056312  105010                  CLRB    (R0)           ;;SET A TERMINATOR
 14027  056314                          TYPE                   ;;TYPE THE INPUT UP TO BAD CHAR.
        056314  104401                  TYPEIT
                                        .DSABL  CRF
 14028  056316  000000          6$:     .WORD   0              ;;POINTER GOES HERE
 14029  056320                          TYPE    MSG062         ;INPUT MUSST BE A
        056320  104401  067776          TYPEIT  ,MSG062
                                        .DSABL  CRF
 14030  056324                          TYPE    MSG065         ;DECIMAL
        056324  104401  070037          TYPEIT  ,MSG065
                                        .DSABL  CRF
 14031  056330                          TYPE    MSG064         ;NUMBER
        056330  104401  070027          TYPEIT  ,MSG064
                                        .DSABL  CRF
 14032  056334  000714                  BR      1$             ;;TRY AGAIN
```

```
14034                                   .SBTTL  ROUTINE SAVE AND RESTORE R0-R5
14035
14036                                ;*************************************************************************
14037                                ;*SAVE R0-R5
14038                                ;*CALL:
14039                                ;*      SAVREG
14040                                ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
14041                                ;*
14042                                ;*TOP---(+16)
14043                                ;* +2---(+18)
14044                                ;* +4---R5
14045                                ;* +6---R4
14046                                ;* +8---R3
14047                                ;*+10---R2
14048                                ;*+12---R1
14049                                ;*+14---R0
14050
14051 056336                        $SAVREG:
14052 056336                                PUSH    R0,R1,R2,R3,R4,R5
       056336  010046                                                           MOV R0,-(SP)
       056340  010146                                                           MOV R1,-(SP)
       056342  010246                                                           MOV R2,-(SP)
       056344  010346                                                           MOV R3,-(SP)
       056346  010446                                                           MOV R4,-(SP)
       056350  010546                                                           MOV R5,-(SP)
14053 056352  016646  000022                MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
14054 056356  016646  000022                MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
14055 056362  016646  000022                MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
14056 056366  016646  000022                MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
14057 056372  000002                        RTI
14058
14059                                ;*RESTORE R0-R5
14060                                ;*CALL:
14061                                ;*      RESREG
14062 056374                        $RESREG:
14063 056374  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
14064 056400  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
14065 056404  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
14066 056410  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
14067 056414                                POP     R5,R4,R3,R2,R1,R0
       056414  012605                                                           MOV (SP)+,R5
       056416  012604                                                           MOV (SP)+,R4
       056420  012603                                                           MOV (SP)+,R3
       056422  012602                                                           MOV (SP)+,R2
       056424  012601                                                           MOV (SP)+,R1
       056426  012600                                                           MOV (SP)+,R0
14068 056430  000002                        RTI
```

```
                                .SBTTL  ROUTINE RANDOM NUMBER GENERATOR

                        ;*****************************************************************************
                        ;*THIS ROUTINE IS A DOUBLE PRECISION PSEUDO RANDOM NUMBER GENERATOR
                        ;*WITH A RANGE OF 0 TO 2**(+33)-1.
                        ;*CALL:
                        ;*      CALL    $RAND           ;;CALL THE ROUTINE
                        ;*      RETURN                  ;;RETURN HERE THE RANDOM
                        ;*                              ;;NUMBER WILL BE IN
                        ;*                              ;;$HINUM,$LONUM

056432                  $RAND:  PUSH    R0,R1,R2
056432  010046                                                          MOV R0,-(SP)
056434  010146                                                          MOV R1,-(SP)
056436  010246                                                          MOV R2,-(SP)
056440  013700  002604                  MOV     SEEDLO,R0       ;SET R0 WITH LOW
056444  013701  002602                  MOV     SEEDHI,R1       ;SET R1 WITH HIGH
056450  012702  000007                  MOV     #7,R2           ;SET SHIFT COUNT
056454  006300                  1$:     ASL     R0              ;;SHIFT R0 LEFT AND
056456  006101                          ROL     R1              ;;ROTATE CARRY INTO R1 AND
056460  077203                          SOB     R2,1$
056462  063700  002604                  ADD     SEEDLO,R0       ;ADD NUMBER TO MAKE X 129
056466  005501                          ADC     R1              ;;PROPOGATE CARRY
056470  063701  002602                  ADD     SEEDHI,R1       ;ADD NUMBER TO MAKE X 129
056474  062700  001057                  ADD     #1057,R0        ;;ADD LOW CONSTANT
056500  005501                          ADC     R1              ;;PROPOGATE CARRY
056502  062701  047401                  ADD     #47401,R1       ;;ADD HIGH CONSTANT
056506  010037  002604                  MOV     R0,SEEDLO       ;SAVE R0
056512  010137  002602                  MOV     R1,SEEDHI       ;SAVE R1
056516                                  POP     R2,R1,R0
056516  012602                                                          MOV (SP)+,R2
056520  012601                                                          MOV (SP)+,R1
056522  012600                                                          MOV (SP)+,R0
056524  000207                  RETURN
```

```
14100                                   .SBTTL  ROUTINE DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT
14101                                   ;*************************************************************************
14102                                   ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
14103                                   ;*UNSIGNED OCTAL ASCIZ NUMBER.
14104                                   ;*CALL
14105                                   ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
14106                                   ;*      CALL    $DB20           ;;CALL THE ROUTINE
14107                                   ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
14108
14109
14110 056526  104415                   $DB20:  SAVREG                  ;;SAVE ALL REGISTERS
14111 056530  016601  000002                    MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
14112 056534  012705  056645                    MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
14113 056540  012704  000014                    MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
14114 056544  012703  177770                    MOV     #^C7,R3         ;;MASK
14115 056550  012100                            MOV     (R1)+,R0        ;;LOWER WORD
14116 056552  012101                            MOV     (R1)+,R1        ;;HIGH WORD
14117 056554  005002                            CLR     R2              ;;TERMINATOR
14118 056556  110245                   1$:      MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
14119 056560  010002                            MOV     R0,R2           ;;GET THIS DIGIT
14120 056562  005304                            DEC     R4              ;;COUNT THIS CHARACTER
14121 056564  003007                            BGT     3$              ;;BR IF NOT THE LAST DIGIT
14122 056566  001405                            BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
14123 056570  005205                            INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
14124 056572  010566  000002                    MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
14125 056576  104416                            RESREG                  ;;RESTORE ALL REGISTERS
14126 056600  000207                            RETURN                  ;;RETURN TO USER
14127 056602  006203                   2$:      ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
14128 056604  006001                   3$:      ROR     R1              ;;POSITION THE BINARY NUMBER FOR
14129 056606  006000                            ROR     R0              ;;      THE NEXT OCTAL DIGIT
14130 056610  006001                            ROR     R1
14131 056612  006000                            ROR     R0
14132 056614  006001                            ROR     R1
14133 056616  006000                            ROR     R0
14134 056620  040302                            BIC     R3,R2           ;;MASK OUT ALL JUNK
14135 056622  062702  000060                    ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
14136 056626  000753                            BR      1$              ;;GO PUT IT IN THE DATA TABLE
14137 056630  000016                   $OCTVL:  .REPT   14.             ;;RESERVE DATA TABLE
14140         056634                   $OCT8=$OCTVL+4                  ;POINTER TO 11 DIGIT NUMBER
```

```
14142                                   .SBTTL  TABLES
14143
14144                                   .SBTTL  APT MAILBOX ETABLE
14145 056646                    $MAIL:
14146 056646  000000              $MSGTY: .WORD   0       ;;MESSAGE TYPE CODE
14147 056650  000000              $FATAL: .WORD   0       ;;FATAL ERROR NUMBER (ERROR PC)
14148 056652  000000              $TESTN: .WORD   0       ;;TEST PATTERN NUMBER
14149 056654  000000              $PASS:  .WORD   0       ;;PASS COUNT
14150 056656  000000              $DEVCT: .WORD   0       ;;DEVICE COUNT
14151 056660  000000              $UNIT:  .WORD   0       ;;I/O UNIT NUMBER
14152 056662  000000              $MSGAD: .WORD   0       ;;MESSAGE ADDRESS
14153 056664  000000              $MSGLG: .WORD   0       ;;MESSAGE LENGTH
14154 056666                    $ETABLE:                ;;APT ENVIRONMENT TABLE
14155 056666      000           $ENV:   .BYTE   0       ;;ENVIRONMENT BYTE      ;SET TO A 1 FOR APT AUTO MODE
14156                           ;NOTE:  IF BIT #7 IS SET IN $ENVM THE TABLE BELOW (BEGINNING AT $MAMS1 AND
14157                           ;       ENDING AT $MADR4) MUST BE FILLED IN TO INDICATE THE PROPER AMOUNT OF
14158                           ;       EACH TYPE OF MEMORY.
14159 056667      000           $ENVM:  .BYTE   0       ;ENVIRONMENT MODE
14160                                                   ;BIT7(200)=USE APT SIZE INFO ;BIT5(40)=NO CONSOLE
14161 056670  000101              $SWREG: .WORD   101     ;;APT SWITCH REGISTER
14162 056672  000000              $USWR:  .WORD   0       ;USED TO LIMIT THE NUMBER OF PASSES
14163 056674  000000              $CPUOP: .WORD   0       ;;CPU TYPE,OPTIONS
14164                                                   BITS 15-11=CPU TYPE
14165                                                           11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
14166                                                           11/70=06,PDQ=07,Q=10
14167                                                   BIT 10=REAL TIME CLOCK
14168                                                   BIT  9=FLOATING POINT PROCESSOR
14169                                                   BIT  8=MEMORY MANAGEMENT
14170 056676      001           $MAMS1: .BYTE   1       ;;HIGH ADDRESS,M.S. BYTE ;DEFAULT = 64K
14171 056677      004           $MTYP1: .BYTE   4       ;;MEM. TYPE,BLK#1
14172                                                   MEM.TYPE BYTE   --  (HIGH BYTE)
14173                                                           900 NSEC CORE=001
14174                                                           300 NSEC BIPOLAR=002
14175                                                           PARITY MOS=003
14176                                                           ERROR CORRECTING MOS=004
14177 056700  177776              $MADR1: .WORD   177776  ;;HIGH ADDRESS,BLK#1
14178                                                     MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPE" ABOVE
14179 056702      000           $MAMS2: .BYTE   0       ;;HIGH ADDRESS,M.S. BYTE
14180 056703      000           $MTYP2: .BYTE   0       ;;MEM.TYPE,BLK#2
14181 056704  000000              $MADR2: .WORD   0       ;;MEM.LAST ADDRESS,BLK#2
14182 056706      000           $MAMS3: .BYTE   0       ;;HIGH ADDRESS,M.S.BYTE
14183 056707      000           $MTYP3: .BYTE   0       ;;MEM.TYPE,BLK#3
14184 056710  000000              $MADR3: .WORD   0       ;;MEM.LAST ADDRESS,BLK#3
14185 056712      000           $MAMS4: .BYTE   0       ;;HIGH ADDRESS,M.S.BYTE
14186 056713      000           $MTYP4: .BYTE   0       ;;MEM.TYPE,BLK#4
14187 056714  000000              $MADR4: .WORD   0       ;;MEM.LAST ADDRESS,BLK#4
14188 056716  000000              $VECT1: .WORD   0       ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
14189 056720  000000              $VECT2: .WORD   0       ;;INTERRUPT VECTOR#2BUS PRIORITY#2
14190 056722  000000              $BASE:  .WORD   0       ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
14191 056724  000000              $DEVM:  .WORD   0       ;;DEVICE MAP
14192
14193 056726  000000              $CDW1:  .WORD   0
14194 056730  000000              $CDW2:  .WORD   0
14195 056732  000000              $DDW7:  .WORD   0       ;UFD MODE FLAG 1-UFD MODE
```

```
                                ;THE FOLLOWING LOCATIONS SPECIFY WHICH PATTERNS
                                ;ARE TO BE RUN FOR PARTICULAR MEMORIES
                                ;
                                ;REFERENCE THE TABLE LISTED BELOW TO RELATE BITS TO PATTERNS.
                                ;BIT0 SET WILL RUN THE FIRST ENTRY IN THE TABLE, BIT0 SET
                                ;IN THE SECOND WORD WILL RUN THE 17TH ENTRY IN THE TABLE ...
                                ;
                                ;NOTE** NULL TESTS DO NOT TAKE ANY TIME
                                ;                                        ;FIELD SERVICE VALUE
056734  177777                  $DDW0:  .WORD   177777  ;ECC CSR TESTS           177777          TABLE = MKCSRT:
056736  177777                  $DDW1:  .WORD   177777  ;ECC CSR TESTS           177777          TABLE = MKCSRT:
056740  177777                  $DDW2:  .WORD   177777  ;ECC PATTERNS            103777          TABLE = MKPAT:
056742  177777                  $DDW3:  .WORD   177777  ;ECC PATTERNS            177777          TABLE = MKPAT:
056744  177777                  $DDW4:  .WORD   177777  ;PARITY PATTERNS         003777          TABLE = MJPAT:
056746  177777                  $DDW5:  .WORD   177777  ;PARITY PATTERNS         177774          TABLE = MJPAT:
056750                          $ETEND:
                                ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
                                ;INTERFACE SPEC.
                                
056750                          $APTHD:
056750  000000                  $HIBTS: .WORD   0               ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
056752  056646                  $MBADR: .WORD   $MAIL           ;;ADDRESS OF APT MAILBOX (BITS 0-15)
056754  000043                  $TSTM:  .WORD   35.             ;;RUN TIM OF LONGEST TEST
056756  001274                  $PASTM: .WORD   700.            ;;RUN TIME IN SECS. OF 1ST PASS ON 128K (QUICK VERIFY)
056760  000000                  $UNITM: .WORD   0.              ;;EXTRA RUN TIME OF A PASS FOR EACH ADDITIONAL 128K (QV)
056762  000041                          .WORD   $ETEND $MAIL/2  ;;LENGTH MAILBOX ETABLE(WORDS)
```

```
                                        .SBTTL  ROUTINE TRAP DECODER

                                ;*******************************************************************************
                                ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
                                ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
                                ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
                                ;*GO TO THAT ROUTINE.

14235 056764  010046          $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
14236 056766  016600  000002          MOV     2(SP),R0        ;;GET TRAP ADDRESS
14237 056772  005740                  TST     -(R0)           ;;BACKUP BY 2
14238 056774  111000                  MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
14239 056776  006300                  ASL     R0              ;;POSITION FOR INDEXING
14240 057000  016000  057026          MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
14241 057004  000200                  RTS     R0              ;;GO TO ROUTINE
14242
14243
14244                           ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
14245
14246 057006  011646          $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
14247 057010  016666  000004  000002  MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
14248 057016  000002                  RTI                     ;;RESTORE THE PSW
14249
14250 057020                  $NOTRAP:TYPE    MSG006          ;UNDEFINED TRAP INSTRUCTION
      057020  104401  065507          TYPEIT  ,MSG006
                                      .DSABL  CRF
14251 057024  000000          $HALT2: HALT
```

```
                                .SBTTL  TRAP TABLE

                        ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                        ;*BY THE "TRAP" INSTRUCTION.

                        ;       ROUTINE
                        ;       -------
057026  057006  $TRPAD: .WORD   $TRAP2
057030  047122          $TYPE   ;CALL=TYPEIT    TRAP+1(104401)  TTY TYPEOUT ROUTINE
057032  054102          $TYPOC  ;CALL=TYPOC     TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
057034  054056          $TYPOS  ;CALL=TYPOS     TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
057036  057020          $NOTRAP;$TYPON  ;CALL=TYPON     TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
057040  054304          $TYPDS  ;CALL=TYPDS     TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
057042  057020          $NOTRAP;$TYPBN  ;CALL=TYPBN     TRAP+6(104406)  TYPE BINARY (ASCII) NUMBER

057044  054704          $GTSWR  ;CALL=GTSWR     TRAP+7(104407)  GET SOFT-SWR SETTING
057046  054530          $CKSWR  ;CALL=CKSWR     TRAP+10(104410) TEST FOR CHANGE IN SOFT-SWR

057050  055264          $RDCHR  ;CALL=RDCHR     TRAP+11(104411) TTY TYPEIN CHARACTER ROUTINE
057052  055414          $RDLIN  ;CALL=RDLIN     TRAP+12(104412) TTY TYPEIN STRING ROUTINE
057054  056000          $RDOCT  ;CALL=RDOCT     TRAP+13(104413) READ AN OCTAL NUMBER FROM TTY
057056  056150          $RDDEC  ;CALL=RDDEC     TRAP+14(104414) READ A DECIMAL NUMBER FROM TTY

057060  056336          $SAVREG ;CALL=SAVREG    TRAP+15(104415) SAVE R0-R5 ROUTINE
057062  056374          $RESREG ;CALL=RESREG    TRAP+16(104406) RESTORE R0-R5 ROUTINE

057064  034202          $KERNEL  ;CALL=KERNEL   TRAP+17(104417) ENTER KERNEL MODE
057066  034212          $ENERGIZE;CALL=ENERGIZETRAP+20(104420) TURN ON MEMORY MANAGEMENT & TRAPS
057070  034222          $DEENERGI;CALL=DEENERGITRAP+21(104421) TURN OFF MEMORY MENAGEMENT & TRAPS

057072  036310          $KMAP    ;CALL=KMAP     TRAP+22(104422) MAP KERNEL 1 TO 1

057074  034232          $CACHN  ;CALL=CACHON    TRAP+23(104423) TURN CACHE ON
057076  034256          $CACHF  ;CALL=CACHOFF   TRAP+24(104424) TURN CACHE OFF

057100  034274          $LOADC  ;CALL=LOADCSR   TRAP+25(104425) LOAD CORRECT CSR
057102  034370          $READC  ;CALL=READCSR   TRAP+26(104426) READ CORRECT CSR

057104  047456          $PER01  ;CALL=PERR01    TRAP+27(104427) PROGRAM DETECTED ERROR
057106  047504          $PER02  ;CALL=PERR02    TRAP+30(104430) PROGRAM DETECTED ERROR
057110  047532          $PER03  ;CALL=PERR03    TRAP+31(104431) PROGRAM DETECTED ERROR
057112  047562          $PER04  ;CALL=PERR04    TRAP+32(104432) PROGRAM DETECTED ERROR
057114  047644          $PER07  ;CALL=PERR07    TRAP+33(104433) PROGRAM DETECTED ERROR
057116  047666          $PER10  ;CALL=PERR10    TRAP+34(104434) PROGRAM DETECTED ERROR
057120  047716          $PER11  ;CALL=PERR11    TRAP+35(104435) PROGRAM DETECTED ERROR
057122  047736          $PER12  ;CALL=PERR12    TRAP+36(104436) PROGRAM DETECTED ERROR
057124  047760          $PER13  ;CALL=PERR13    TRAP+37(104437) PROGRAM DETECTED ERROR
057126  050000          $PER14  ;CALL=PERR14    TRAP+40(104440) PROGRAM DETECTED ERROR
057130  050022          $PER15  ;CALL=PERR15    TRAP+41(104441) PROGRAM DETECTED ERROR
057132  050044          $PER16  ;CALL=PERR16    TRAP+42(104442) PROGRAM DETECTED ERROR
057134  050064          $PER17  ;CALL=PERR17    TRAP+43(104443) PROGRAM DETECTED ERROR
057136  050102          $PER20  ;CALL=PERR20    TRAP+44(104444) PROGRAM DETECTED ERROR
057140  050120          $PER21  ;CALL=PERR21    TRAP+45(104445) PROGRAM DETECTED ERROR
057142  050140          $PER22  ;CALL=PERR22    TRAP+46(104446) PROGRAM DETECTED ERROR
057144  050156          $PER23  ;CALL=PERR23    TRAP+47(104447) PROGRAM DETECTED ERROR
057146  050174          $PER24  ;CALL=PERR24    TRAP+50(104450) PROGRAM DETECTED ERROR
057150  044756          $PER25  ;CALL=PERR25    TRAP+51(104451) PROGRAM DETECTED ERROR
```

```
 14311 057152  050364                    $PER26  ;CALL=PERR26    TRAP=52(104452) PROGRAM DETECTED ERROR
 14312 057154  050404                    $PER27  ;CALL=PERR27    TRAP=53(104453) PROGRAM DETECTED ERROR
 14313 057156  045204                    $PER30  ;CALL=PERR30    TRAP=54(104454) PROGRAM DETECTED ERROR
 14314 057160  050574                    $PER31  ;CALL=PERR31    TRAP=55(104455) PROGRAM DETECTED ERROR
 14315 057162  050672                    $PER32  ;CALL=PERR32    TRAP=56(104456) PROGRAM DETECTED ERROR
 14316 057164  050740                    $PER33  ;CALL=PERR33    TRAP=57(104457) PROGRAM DETECTED ERROR
 14317 057166  051020                    $PER34  ;CALL=PERR34    TRAP=60(104460) PROGRAM DETECTED ERROR
 14318 057170  051052                    $PER35  ;CALL=PERR35    TRAP=61(104461) PROGRAM DETECTED ERROR
 14319 057172  051106                    $PER36  ;CALL=PERR36    TRAP=62(104462) PROGRAM DETECTED ERROR
 14320 057174  051136                    $PER37  ;CALL=PERR37    TRAP=63(104463) PROGRAM DETECTED ERROR    ;;ILC;REV B
 14321 057176  051142                    $PER40  ;CALL=PERR40    TRAP=64(104464) PROGRAM DETECTED ERROR    ;;ILC;REV B
 14322 057200  057020                    $NOTRAP ;CALL=PERR41    TRAP=65(104465) PROGRAM DETECTED ERROR
 14323 057202  057020                    $NOTRAP ;CALL=PERR42    TRAP=66(104466) PROGRAM DETECTED ERROR
 14324 057204  057020                    $NOTRAP ;CALL=PERR43    TRAP=67(104467) PROGRAM DETECTED ERROR
 14325
 14326 057206  034570                    $ECCDIS ;CALL=ECCDIS    TRAP=70(104470) DISABLE ECC ON ALL CSR'S
 14327 057210  034604                    $ECC1DIS;CALL=ECC1DIS   TRAP=71(104471) DISABLE ECC ON 1 SELECTED CSR
 14328 057212  034616                    $ECCINIT;CALL=ECCINIT   TRAP=72(104472) INITIALIZE ALL MK11 CSR'S
 14329 057214  034632                    $ECC1INIT;CALL=ECC1INIT TRAP=73(104473) INITIALIZE 1 SELECTED MK11 CSR
 14330 057216  034672                    $CBCSR  ;CALL=CBCSR     TRAP=74(104474) WRITE GENERATED CHECKBITS IN ALL CSR'S
 14331 057220  034714                    $CB1CSR ;CALL=CB1CSR    TRAP=75(104475) WRITE GENERATED CHECKBITS IN 1 SELECTED CSR
 14332 057222  034734                    $WASSBE ;CALL=WASSBE    TRAP=76(104476) WAS THERE A SBE ON ANY CSR?
 14333 057224  035050                    $WAS1SBE;CALL=WAS1SBE   TRAP=77(104477) WAS THERE A SBE ON 1 SELECTED CSR?
 14334 057226  035100                    $WASDBE ;CALL=WASDBE    TRAP=100(104500)WAS THERE A DBE ON ANY CSR?
 14335 057230  035214                    $WAS1DBE;CALL=WAS1DBE   TRAP=101(104501)WAS THERE A DBE ON 1 SELECTED CSR?
 14336 057232  035244                    $CLRCSR ;CALL=CLRCSR    TRAP=102(104502)CLEAR ALL CSR'S
 14337 057234  035256                    $CLR1CSR;CALL=CLR1CSR   TRAP=103(104503)CLEAR 1 SELECTED CSR
 14338 057236  035266                    $CHKDIS ;CALL=CHKDIS    TRAP=104(104504)DISABLE ECC & WRITE CKBITS FROM ALL CSR S
 14339 057240  035302                    $CHK1DIS;CALL=CHK1DIS   TRAP=105(104505)DISABLE ECC & WRITE CKBITS FROM 1 CSR
 14340 057242  034644                    $ENASBE ;CALL=ENASBE    TRAP=106(104506)ENABLE TRAPS ON SBE'S FROM ALL CSR'S
 14341 057244  034660                    $ENA1SBE;CALL=ENA1SBE   TRAP=107(104507)ENABLE TRAPS ON SBE'S FROM 1 SELECTED CSR
 14342 057246  034410                    $TSTRD  ;CALL=TSTREAD   TRAP=110(104510)TEST LOC (R1) & TST FOR SBE (WITHOUT FETCHES
 14343 057250  035362                    $INVALID;CALL=INVALID   TRAP=111(104511)INVALIDATE BACKGROUND PATTERN ON BANK
 14344 057252  035412                    $ERRGEN ;CALL=ERRGEN    TRAP=112(104512)TEST ERROR ADDRESS
 14345 057254  035662                    $CBREG  ;CALL=CBREG     TRAP=113(104513)ENABLE CHECK BIT REGISTER
 14346 057256  035700                    $SYNREG ;CALL=SYNREG    TRAP=114(104514)ENABLE SYNDROME BIT REGISTER
 14347 057260  057020                    $NOTRAP
 14348 057262  057020                    $NOTRAP
 14349 057264  057020                    $NOTRAP
 14350 057266  057020                    $NOTRAP
 14351 057270  057020                    $NOTRAP
 14352 057272  057020                    $NOTRAP

 14355         177776          ST      =       177776          ;STATUS REGISTER
```

```
14358                                   .SBTTL  TABLE   ERROR POINTER
14359
14360                           ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
14361                           ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
14362                           ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
14363                           ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS (ERRPC).
14364                           ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:
14365
14366                           ;*      EM              ;;POINTS TO THE ERROR MESSAGE
14367                           ;*      DH              ;;POINTS TO THE DATA HEADER
14368                           ;*      DT              ;;POINTS TO THE DATA
14369                           ;*      DF              ;;POINTS TO THE DATA FORMAT
14370
14371
14372 057274                    $ERRTB: ;ERROR  1
14373 057274  061762                    EM24
14374 057276  064172                    DH13
14375 057300  060320                    DT13
14376 057302  060701                    DF11
14377                                   ;ERROR  2
14378 057304  060747                    EM2
14379 057306  063501                    DH1
14380 057310  060144                    DT1
14381 057312  060557                    DF2
14382                                   ;ERROR  3
14383 057314  061005                    EM3
14384 057316  063561                    DH3
14385 057320  060162                    DT3
14386 057322  060674                    DF9
14387                                   ;ERROR  4
14388 057324  061037                    EM4
14389 057326  063561                    DH3
14390 057330  060172                    DT4
14391 057332  060674                    DF9
14392                                   ;ERROR  5
14393 057334  061105                    EM5
14394 057336  063615                    DH5
14395 057340  060202                    DT5
14396 057342  060557                    DF2
14397                                   ;ERROR  6
14398 057344  061162                    EM6
14399 057346  063615                    DH5
14400 057350  060202                    DT5
14401 057352  060557                    DF2
14402                                   ;ERROR  7
14403 057354  061207                    EM7
14404 057356  063615                    DH5
14405 057360  060202                    DT5
14406 057362  060557                    DF2
14407                                   ;ERROR  10
14408 057364  063173                    EM53
14409 057366  064714                    DH25
14410 057370  060476                    DT25
14411 057372  060557                    DF2
```

```
14414                                   ;ERROR  11
14415 057374  061247                    EM11
14416 057376  063741                    DH7
14417 057400  060234                    DT7
14418 057402  060603                    DF3
14419                                   ;ERROR  12
14420 057404  061247                    EM11
14421 057406  063741                    DH7
14422 057410  060234                    DT7
14423 057412  060616                    DF4
14424                                   ;ERROR  13
14425 057414  061271                    EM12
14426 057416  064051                    DH10
14427 057420  060264                    DT10
14428 057422  060557                    DF2
14429                                   ;ERROR  14
14430 057424  061247                    EM11
14431 057426  063741                    DH7
14432 057430  060234                    DT7
14433 057432  060631                    DF5
14434                                   ;ERROR  15
14435 057434  061247                    EM11
14436 057436  063741                    DH7
14437 057440  060234                    DT7
14438 057442  060644                    DF6
14439                                   ;ERROR  16
14440 057444  061315                    EM13
14441 057446  064172                    DH13
14442 057450  060320                    DT13
14443 057452  060701                    DF11
14444                                   ;ERROR  17
14445 057454  061347                    EM14
14446 057456  064172                    DH13
14447 057460  060320                    DT13
14448 057462  060701                    DF11
14449                                   ;ERROR  20
14450 057464  061413                    EM15
14451 057466  064172                    DH13
14452 057470  060320                    DT13
14453 057472  060701                    DF11
14454                                   ;ERROR  21
14455 057474  063222                    EM55
14456 057476  064752                    DH26
14457 057500  060510                    DT26
14458 057502  060557                    DF2
14459                                   ;ERROR  22
14460 057504  061461                    EM17
14461 057506  063741                    DH7
14462 057510  060234                    DT7
14463 057512  060631                    DF5
14464                                   ;ERROR  23
14465 057514  063042                    EM50
14466 057516  064566                    DH23
14467 057520  060434                    DT23
14468 057522  060712                    DF13
```

```
14471                                   ;ERROR  24
14472 057524  061521                    EM19
14473 057526  064172                    DH13
14474 057530  060320                    DT13
14475 057532  060701                    DF11
14476                                   ;ERROR  25
14477 057534  061573                    EM20
14478 057536  064172                    DH13
14479 057540  060320                    DT13
14480 057542  060701                    DF11
14481                                   ;ERROR  26
14482 057544  000000                    0               ;NO MESSAGE
14483 057546  064165                    DH12
14484 057550  060314                    DT12
14485 057552  060557                    DF2
14486                                   ;ERROR  27
14487 057554  061652                    EM21
14488 057556  064147                    DH11
14489 057560  060306                    DT11
14490 057562  060557                    DF2
14491                                   ;ERROR  30
14492 057564  061706                    EM22
14493 057566  064172                    DH13
14494 057570  060320                    DT13
14495 057572  060701                    DF11
14496                                   ;ERROR  31
14497 057574  000000                    0               ;NO MESSAGE
14498 057576  064267                    DH14
14499 057600  060342                    DT14
14500 057602  060557                    DF2
14501                                   ;ERROR  32
14502 057604  061733                    EM23
14503 057606  063615                    DH5
14504 057610  060202                    DT5
14505 057612  060557                    DF2
14506                                   ;ERROR  33
14507 057614  062041                    EM25
14508 057616  064346                    DH15
14509 057620  060360                    DT16
14510 057622  060657                    DF7
14511                                   ;ERROR  34
14512 057624  062066                    EM26
14513 057626  064465                    DH16
14514 057630  060410                    DT17
14515 057632  060603                    DF3
```

```
14518
14519 057634  063146  ;ERROR  35
14520 057636  064714  EM52
14521 057640  060476  DH25
14522 057642  060557  DT25
14523                 DF2
14524 057644  062137  ;ERROR  36
14525 057646  064465  EM27
14526 057650  060410  DH16
14527 057652  060672  DT17
14528                 DF8
14529 057654  062634  ;ERROR  37
14530 057656  063741  EM35
14531 057660  060234  DH7
14532 057662  060603  DT7
14533                 DF3
14534 057664  062227  ;ERROR  40
14535 057666  063741  EM29
14536 057670  060234  DH7
14537 057672  060603  DT7
14538                 DF3
14539 057674  062311  ;ERROR  41
14540 057676  063741  EM30
14541 057700  060234  DH7
14542 057702  060631  DT7
14543                 DF5
14544 057704  063343  ;ERROR  42
14545 057706  064507  EM60
14546 057710  060434  DH20
14547 057712  060712  DT23
14548                 DF13
14549 057714  062421  ;ERROR  43
14550 057716  063741  EM32
14551 057720  060234  DH7
14552 057722  060603  DT7
14553                 DF3
14554 057724  062526  ;ERROR  44
14555 057726  063741  EM33
14556 057730  060234  DH7
14557 057732  060603  DT7
14558                 DF3
14559 057734  063076  ;ERROR  45
14560 057736  064645  EM51
14561 057740  060456  DH24
14562 057742  060722  DT24
14563                 DF14
14564 057744  062721  ;ERROR  46
14565 057746  063674  EM36
14566 057750  060220  DH6
14567 057752  060557  DT6
                      DF2
```

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14570
14571 057754  062770  ;ERROR  47
14572 057756  063536  EM40
14573 057760  060416  DH2
14574 057762  060557  DT20
14575                 DF2
14576 057764  063243  ;ERROR  50
14577 057766  064770  EM56
14578 057770  060516  DH27
14579 057772  060556  DT27
14580                 DF1
14581 057774  063405  ;ERROR  51
14582 057776  064645  EM61
14583 060000  060456  DH24
14584 060002  060722  DT24
14585                 DF14
14586 060004  062227  ;ERROR  52
14587 060006  064172  EM29
14588 060010  060320  DH13
14589 060012  060701  DT13
14590                 DF11
14591 060014  062041  ;ERROR  53
14592 060016  065044  EM25
14593 060020  060536  DH30
14594 060022  060740  DT30
14595                 DF16
14596 060024  063275  ;ERROR  54
14597 060026  065044  EM57
14598 060030  060536  DH30
14599 060032  060740  DT30
14600                 DF16
14601 060034  061573  ;ERROR  55
14602 060036  064645  EM20
14603 060040  060456  DH24
14604 060042  060722  DT24
14605                 DF14
14606 060044  061573  ;ERROR  56
14607 060046  065044  EM20
14608 060050  060536  DH30
14609 060052  060740  DT30
14610                 DF16
14611 060054  061521  ;ERROR  57
14612 060056  064645  EM19
14613 060060  060456  DH24
14614 060062  060722  DT24
14615                 DF14
14616 060064  061315  ;ERROR  60
14617 060066  064507  EM13
14618 060070  060434  DH20
14619 060072  060712  DT23
14620                 DF13
14621 060074  062311  ;ERROR  61
14622 060076  064507  EM30
14623 060100  060434  DH20
14624 060102  060712  DT23
14625                 DF13
14626 060104  061573  ;ERROR  62
                      EM20
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14627 060106  064645                    DH24
14628 060110  060456                    DT24
14629 060112  060722                    DF14
14630                                   ;ERROR  63
14631 060114  061706                    EM22
14632 060116  064645                    DH24
14633 060120  060456                    DT24
14634 060122  060722                    DF14
14635                                   ;ERROR  64
14636 060124  063426                    EM62
14637 060126  063615                    DH5
14638 060130  060202                    DT5
14639 060132  060557                    DF2
14640                                   ;ERROR  65
14641 060134  061706                    EM22
14642 060136  064507                    DH20
14643 060140  060434                    DT23
14644 060142  060712                    DF13
```

```
                                                .SBTTL  ERROR DATA TAGS (DT)
14647 060144 002020 002034 002044 DT1:  .WORD   ERRPC,ADDRESS,GOOD,BAD,0
      060152 002052 000000
14648 060156 002020 000000        DT2:  .WORD   ERRPC,0
14649 060162 002020 002036 002072 DT3:  .WORD   ERRPC,PADDRESS,PARCNT,0
      060170 000000
14650 060172 002020 002034 002070 DT4:  .WORD   ERRPC,ADDRESS,NEMCNT,0
      060200 000000
14651 060202 002020 177572 177574 DT5:  .WORD   ERRPC,MMR0,MMR1,MMR2,MMR3,CPUERR,0
      060210 177576 172516 177766
      060216 000000
14652 060220 002020 002422 002400 DT6:  .WORD   ERRPC,APTPAR,LSIZE,APTECC,MSIZE,0
      060226 002424 002402 000000
14653 060234 002020 002176 002034 DT7:  .WORD   ERRPC,DUMMY,ADDRESS,DUMMY,GOOD,BAD,BADXOR
      060242 002176 002044 002052
      060250 002060
14654 060252 002176 002176 002176       .WORD   DUMMY,DUMMY,DUMMY,DUMMY,0
      060260 002176 000000
14655 060264 002200 002202 002204 DT10: .WORD   DETR0,DETR1,DETR2,DETR3,DETR4,DETR5,DETSP,DETPSW,0
      060272 002206 002210 002212
      060300 002214 002216 000000
14656 060306 002020 002150 000000 DT11: .WORD   ERRPC,CSR,0
14657 060314 002150 000000        DT12: .WORD   CSR,0
14658 060320 002020 002176 002034 DT13: .WORD   ERRPC,DUMMY,ADDRESS,DUMMY,TSTDAT,TSTDAT+2,CHECK,CSR,0
      060326 002176 002246 002250
      060334 002314 002150 000000
14659 060342 177746 177572 177574 DT14: .WORD   CONTRL,MMR0,MMR1,MMR2,MMR3,CPUERR,0
      060350 177576 172516 177766
      060356 000000
14660 060360 002020 002176 002176 DT16: .WORD   ERRPC,DUMMY,DUMMY,GOOD,GOOD2,GOOD3
      060366 002044 002046 002050
14661 060374 002052 002054 002056       .WORD   BAD,BAD2,BAD3,DUMMY,DUMMY,0
      060402 002176 002176 000000
14662 060410 002020 002176 000000 DT17: .WORD   ERRPC,DUMMY,0
14663 060416 002020 002044 002052 DT20: .WORD   ERRPC,GOOD,BAD,0
      060424 000000
14664 060426 002020 002176 000000 DT22: .WORD   ERRPC,DUMMY,0
14665 060434 002020 002176 002044 DT23: .WORD   ERRPC,DUMMY,GOOD,BAD,DUMMY,DUMMY,DUMMY,DUMMY,0
      060442 002052 002176 002176
      060450 002176 002176 000000
14666 060456 002020 002176 002150 DT24: .WORD   ERRPC,DUMMY,CSR,DUMMY,DUMMY,DUMMY,DUMMY,0
      060464 002176 002176 002176
      060472 002176 000000
14667 060476 002020 002044 002150 DT25: .WORD   ERRPC,GOOD,CSR,CSRNO,0
      060504 002152 000000
14668 060510 002020 002052 000000 DT26: .WORD   ERRPC,BAD,0
14669 060516 002020 002176 002034 DT27: .WORD   ERRPC,DUMMY,ADDRESS,DUMMY,DUMMY,DUMMY,DUMMY,0
      060524 002176 002176 002176
      060532 002176 000000
14670 060536 002020 002176 002176 DT30: .WORD   ERRPC,DUMMY,DUMMY,GOOD,BAD,CSR,DUMMY,0
      060544 002044 002052 002150
      060552 002176 000000
```

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14673                                          .SBTTL  ERROR DATA FORMATS (DF)
14674 060556  000                        DF1:  .BYTE   0
14675 060557  000  000  000              DF2:  .BYTE   0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
      060562  000  000  000
      060565  000  000  000
      060570  000  000  000
      060573  000  000  000
      060576  000  000  000
      060601  000  000
14676 060603  000  005  000              DF3:  .BYTE   0,5,0,8.,0,0,0,3,6,2,4
      060606  010  000  000
      060611  000  003  006
      060614  002  004
14677 060616  000  005  000              DF4:  .BYTE   0,5,0,8.,0,8.,8.,3,6,2,4
      060621  010  000  010
      060624  010  003  006
      060627  002  004
14678 060631  000  005  000              DF5:  .BYTE   0,5,0,8.,9.,9.,9.,3,6,2,4
      060634  010  011  011
      060637  011  003  006
      060642  002  004
14679 060644  000  005  000              DF6:  .BYTE   0,5,0,8.,9.,8.,8.,3,6,2,4
      060647  010  011  010
      060652  010  003  006
      060655  002  004
14680 060657  000  005  010              DF7:  .BYTE   0,5,8.,0,0,9.,0,0,9.,2,4
      060662  000  000  011
      060665  000  000  011
      060670  002  004
14681 060672  000  005                   DF8:  .BYTE   0,5
14682 060674  000  001  001              DF9:  .BYTE   0,1,1,1,1
      060677  001  001
14683 060701  000  005  000              DF11: .BYTE   0,5,0,8.,0,0,0,0,0
      060704  010  000  000
      060707  000  000  000
14684 060712  000  005  000              DF13: .BYTE   0,5,0,0,3,6,2,4
      060715  000  003  006
      060720  002  004
14685 060722  000  005  000              DF14: .BYTE   0,5,0,3,6,2,4
      060725  003  006  002
      060730  004
14686 060731  000  005  000              DF15: .BYTE   0,5,0,8.,3,6,4
      060734  010  003  006
      060737  004
14687 060740  000  005  010              DF16: .BYTE   0,5,8.,0,0,3,4
      060743  000  000  003
      060746  004
```

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14690                                           .SBTTL  ERROR MESSAGES (EM)
14696 060747  103  101  116  EM2:    .ASCIZ  /CAN'T SET 22 BIT MODE IN MMR3/
      060752  047  124  040
      060755  123  105  124
      060760  040  062  062
      060763  040  102  111
      060766  124  040  115
      060771  117  104  105
      060774  040  111  116
      060777  040  115  115
      061002  122  063  000
14697 061005  120  101  122  EM3:    .ASCIZ  /PARITY ERROR(S) IN BANK 0/
      061010  111  124  131
      061013  040  105  122
      061016  122  117  122
      061021  050  123  051
      061024  040  111  116
      061027  040  102  101
      061032  116  113  040
      061035  060  000
14698 061037  116  117  116  EM4:    .ASCIZ  /NON-EXISTANT MEMORY (HOLES) IN BANK 0/
      061042  055  105  130
      061045  111  123  124
      061050  101  116  124
      061053  040  115  105
      061056  115  117  122
      061061  131  040  050
      061064  110  117  114
      061067  105  123  051
      061072  040  111  116
      061075  040  102  101
      061100  116  113  040
      061103  060  000
14699 061105  111  114  114  EM5:    .ASCIZ  /ILLEGAL OR RESERVED INSTRUCTION (TRAP TO 10)/
      061110  105  107  101
      061113  114  040  117
      061116  122  040  122
      061121  105  123  105
      061124  122  126  105
      061127  104  040  111
      061132  116  123  124
      061135  122  125  103
      061140  124  111  117
      061143  116  040  050
      061146  124  122  101
      061151  120  040  124
      061154  117  040  061
      061157  060  051  000
14700 061162  125  116  105  EM6:    .ASCIZ  /UNEXPECTED TRAP TO 4/
      061165  130  120  105
      061170  103  124  105
      061173  104  040  124
      061176  122  101  120
      061201  040  124  117
      061204  040  064  000
14701 061207  115  105  115  EM7:    .ASCIZ  /MEMORY MANAGEMENT (TRAP TO 250)/
      061212  117  122  131
```

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                061215  040     115     101
                061220  116     101     107
                061223  105     115     105
                061226  116     124     040
                061231  050     124     122
                061234  101     120     040
                061237  124     117     040
                061242  062     065     060
                061245  051     000
14702           061247  115     105     115     EM11:   .ASCIZ  /MEMORY DATA ERROR/
                061252  117     122     131
                061255  040     104     101
                061260  124     101     040
                061263  105     122     122
                061266  117     122     000
14703           061271  104     105     124     EM12:   .ASCIZ  /DETAILED ERROR DUMP/
                061274  101     111     114
                061277  105     104     040
                061302  105     122     122
                061305  117     122     040
                061310  104     125     115
                061313  120     000
14704           061315  115     111     123     EM13:   .ASCIZ  /MISSING EXPECTED SBE FLAG/
                061320  123     111     116
                061323  107     040     105
                061326  130     120     105
                061331  103     124     105
                061334  104     040     123
                061337  102     105     040
                061342  106     114     101
                061345  107     000
14705           061347  127     122     111     EM14:   .ASCIZ  /WRITE BYTE FAILED TO CLEAR SBE FLAG/
                061352  124     105     040
                061355  102     131     124
                061360  105     040     106
                061363  101     111     114
                061366  105     104     040
                061371  124     117     040
                061374  103     114     105
                061377  101     122     040
                061402  123     102     105
                061405  040     106     114
                061410  101     107     000
14706           061413  106     101     111     EM15:   .ASCIZ  /FAILED TO GET INTERRUPT WITH DBE FLAG/
                061416  114     105     104
                061421  040     124     117
                061424  040     107     105
                061427  124     040     111
                061432  116     124     105
                061435  122     122     125
                061440  120     124     040
                061443  127     111     124
                061446  110     040     104
                061451  102     105     040
                061454  106     114     101
                061457  107     000
14707           061461  115     105     115     EM17:   .ASCIZ  /MEMORY DATA ERROR IN CHECK BITS/
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                061464  117     122     131
                061467  040     104     101
                061472  124     101     040
                061475  105     122     122
                061500  117     122     040
                061503  111     116     040
                061506  103     110     105
                061511  103     113     040
                061514  102     111     124
                061517  123     000
14708           061521  123     102     105     EM19:   .ASCIZ  /SBE-DBE CAUSED PARITY TRAP WHEN INHIBITED/
                061524  055     104     102
                061527  105     040     103
                061532  101     125     123
                061535  105     104     040
                061540  120     101     122
                061543  111     124     131
                061546  040     124     122
                061551  101     120     040
                061554  127     110     105
                061557  116     040     111
                061562  116     110     111
                061565  102     111     124
                061570  105     104     000
14709           061573  123     102     105     EM20:   .ASCIZ  /SBE-DBE DID NOT CAUSE PARITY TRAP WHEN ENABLED/
                061576  055     104     102
                061601  105     040     104
                061604  111     104     040
                061607  116     117     124
                061612  040     103     101
                061615  125     123     105
                061620  040     120     101
                061623  122     111     124
                061626  131     040     124
                061631  122     101     120
                061634  040     127     110
                061637  105     116     040
                061642  105     116     101
                061645  102     114     105
                061650  104     000
14710           061652  123     102     105     EM21:   .ASCIZ  /SBE-DBE ON MASTER TEST WORD/
                061655  055     104     102
                061660  105     040     117
                061663  116     040     115
                061666  101     123     124
                061671  105     122     040
                061674  124     105     123
                061677  124     040     127
                061702  117     122     104
                061705  000
14711           061706  115     111     123     EM22:   .ASCIZ  /MISSING EXPECTED DBE/
                061711  123     111     116
                061714  107     040     105
                061717  130     120     105
                061722  103     124     105
                061725  104     040     104
                061730  102     105     000
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14712 061733  125  116  105  EM23:   .ASCIZ  /UNEXPECTED PARITY TRAP/
      061736  130  120  105
      061741  103  124  105
      061744  104  040  120
      061747  101  122  111
      061752  124  131  040
      061755  124  122  101
      061760  120  000
14713 061762  122  105  103  EM24:   .ASCIZ  /RECEIVED DBE FLAG WHEN EXPECTING ONLY SBE FLAG/
      061765  105  111  126
      061770  105  104  040
      061773  104  102  105
      061776  040  106  114
      062001  101  107  040
      062004  127  110  105
      062007  116  040  105
      062012  130  120  105
      062015  103  124  111
      062020  116  107  040
      062023  117  116  114
      062026  131  040  123
      062031  102  105  040
      062034  106  114  101
      062037  107  000
14714 062041  103  110  105  EM25:   .ASCIZ  /CHECK BIT DATA ERROR/
      062044  103  113  040
      062047  102  111  124
      062052  040  104  101
      062055  124  101  040
      062060  105  122  122
      062063  117  122  000
14715 062066  101  104  104  EM26:   .ASCIZ  /ADDRESS PARITY ERROR DID NOT CAUSE ABORT/
      062071  122  105  123
      062074  123  040  120
      062077  101  122  111
      062102  124  131  040
      062105  105  122  122
      062110  117  122  040
      062113  104  111  104
      062116  040  116  117
      062121  124  040  103
      062124  101  125  123
      062127  105  040  101
      062132  102  117  122
      062135  124  000
14716 062137  105  103  103  EM27:   .ASCIZ  /ECC INHIBIT MODE POINTER FAILURE - DID NOT PROTECT BANK/
      062142  040  111  116
      062145  110  111  102
      062150  111  124  040
      062153  115  117  104
      062156  105  040  120
      062161  117  111  116
      062164  124  105  122
      062167  040  106  101
      062172  111  114  125
      062175  122  105  040
      062200  055  040  104
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                062203  111     104     040
                062206  116     117     124
                062211  040     120     122
                062214  117     124     105
                062217  103     124     040
                062222  102     101     116
                062225  113     000
14717           062227  103     117     122     EM29:   .ASCIZ  /CORRECTION FAILURE WITH ECC ENABLED ON FORCED SBE/
                062232  122     105     103
                062235  124     111     117
                062240  116     040     106
                062243  101     111     114
                062246  125     122     105
                062251  040     127     111
                062254  124     110     040
                062257  105     103     103
                062262  040     105     116
                062265  101     102     114
                062270  105     104     040
                062273  117     116     040
                062276  106     117     122
                062301  103     105     104
                062304  040     123     102
                062307  105     000
14718           062311  127     122     111     EM30:   .ASCII  /WRITE BYTE WITH ECC ENABLED FAILED TO CLEAR DATA AT/<CRLF>
                062314  124     105     040
                062317  102     131     124
                062322  105     040     127
                062325  111     124     110
                062330  040     105     103
                062333  103     040     105
                062336  116     101     102
                062341  114     105     104
                062344  040     106     101
                062347  111     114     105
                062352  104     040     124
                062355  117     040     103
                062360  114     105     101
                062363  122     040     104
                062366  101     124     101
                062371  040     101     124
                062374  200
14719           062375  106     117     122             .ASCIZ  /FORCED SBE LOCATION/
                062400  103     105     104
                062403  040     123     102
                062406  105     040     114
                062411  117     103     101
                062414  124     111     117
                062417  116     000
14720           062421  115     117     126     EM32:   .ASCIZ  /MOVB #360,(R2)+ WITH ECC ENABLED CHANGED DATA AT FORCED DBE LOCATION/
                062424  102     040     043
                062427  063     066     060
                062432  054     050     122
                062435  062     051     053
                062440  040     127     111
                062443  124     110     040
                062446  105     103     103
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                062451  040     105     116
                062454  101     102     114
                062457  105     104     040
                062462  103     110     101
                062465  116     107     105
                062470  104     040     104
                062473  101     124     101
                062476  040     101     124
                062501  040     106     117
                062504  122     103     105
                062507  104     040     104
                062512  102     105     040
                062515  114     117     103
                062520  101     124     111
                062523  117     116     000
14721           062526  115     117     126     EM33:   .ASCIZ  /MOV #177400,(R1) WITH ECC ENABLED CHANGED DATA AT FORCED DBE LOCATION/
                062531  040     043     061
                062534  067     067     064
                062537  060     060     054
                062542  050     122     061
                062545  051     040     127
                062550  111     124     110
                062553  040     105     103
                062556  103     040     105
                062561  116     101     102
                062564  114     105     104
                062567  040     103     110
                062572  101     116     107
                062575  105     104     040
                062600  104     101     124
                062603  101     040     101
                062606  124     040     106
                062611  117     122     103
                062614  105     104     040
                062617  104     102     105
                062622  040     114     117
                062625  103     101     124
                062630  111     117     116
                062633  000
14722           062634  125     116     105     EM35:   .ASCIZ  /UNEXPECTED CORRECTION WITH ECC DISABLE ON FORCED SBE/
                062637  130     120     105
                062642  103     124     105
                062645  104     040     103
                062650  117     122     122
                062653  105     103     124
                062656  111     117     116
                062661  040     127     111
                062664  124     110     040
                062667  105     103     103
                062672  040     104     111
                062675  123     101     102
                062700  114     105     040
                062703  117     116     040
                062706  106     117     122
                062711  103     105     104
                062714  040     123     102
                062717  105     000
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14723 062721   101   120   124  EM36:   .ASCIZ  /APT SIZE DISAGREES WITH PROGRAM SIZING/
      062724   040   123   111
      062727   132   105   040
      062732   104   111   123
      062735   101   107   122
      062740   105   105   123
      062743   040   127   111
      062746   124   110   040
      062751   120   122   117
      062754   107   122   101
      062757   115   040   123
      062762   111   132   111
      062765   116   107   000
14724 062770   102   122   101  EM40:   .ASCIZ  /BRANCH GOBBLE FAILED CONDITION CODES TEST/
      062773   116   103   110
      062776   040   107   117
      063001   102   102   114
      063004   105   040   106
      063007   101   111   114
      063012   105   104   040
      063015   103   117   116
      063020   104   111   124
      063023   111   117   116
      063026   040   103   117
      063031   104   105   123
      063034   040   124   105
      063037   123   124   000
14725 063042   102   101   104  EM50:   .ASCIZ  /BAD ERROR ADDRESS GENERATED/
      063045   040   105   122
      063050   122   117   122
      063053   040   101   104
      063056   104   122   105
      063061   123   123   040
      063064   107   105   116
      063067   105   122   101
      063072   124   105   104
      063075   000
14726 063076   106   114   101  EM51:   .ASCIZ  /FLAGS NOT SET ON FORCED UNCORRECTED SBE/
      063101   107   123   040
      063104   116   117   124
      063107   040   123   105
      063112   124   040   117
      063115   116   040   106
      063120   117   122   103
      063123   105   104   040
      063126   125   116   103
      063131   117   122   122
      063134   105   103   124
      063137   105   104   040
      063142   123   102   105
      063145   000
14727 063146   102   111   124  EM52:   .ASCIZ  /BIT SET ERROR IN CSR/
      063151   040   123   105
      063154   124   040   105
      063157   122   122   117
      063162   122   040   111
      063165   116   040   103
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                063170  123  122  000
14728           063173  102  111  124  EM53:   .ASCIZ  /BIT CLEAR ERROR IN CSR/
                063176  040  103  114
                063201  105  101  122
                063204  040  105  122
                063207  122  117  122
                063212  040  111  116
                063215  040  103  123
                063220  122  000
14729           063222  111  114  114  EM55:   .ASCIZ  /ILLEGAL CSR TYPE/
                063225  105  107  101
                063230  114  040  103
                063233  123  122  040
                063236  124  131  120
                063241  105  000
14730           063243  102  101  104  EM56:   .ASCIZ  /BAD PARITY TRAP GENERATED/
                063246  040  120  101
                063251  122  111  124
                063254  131  040  124
                063257  122  101  120
                063262  040  107  105
                063265  116  105  122
                063270  101  124  105
                063273  104  000
14731           063275  127  122  117  EM57:   .ASCIZ  /WRONG CHECK BIT READ BACK FROM MEMORY/
                063300  116  107  040
                063303  103  110  105
                063306  103  113  040
                063311  102  111  124
                063314  040  122  105
                063317  101  104  040
                063322  102  101  103
                063325  113  040  106
                063330  122  117  115
                063333  040  115  105
                063336  115  117  122
                063341  131  000
14732           063343  127  122  117  EM60:   .ASCIZ  /WRONG SYNDROME BITS READ INTO CSR/
                063346  116  107  040
                063351  123  131  116
                063354  104  122  117
                063357  115  105  040
                063362  102  111  124
                063365  123  040  122
                063370  105  101  104
                063373  040  111  116
                063376  124  117  040
                063401  103  123  122
                063404  000
14733           063405  103  123  122  EM61:   .ASCIZ  /CSR UPDATE ERROR/
                063410  040  125  120
                063413  104  101  124
                063416  105  040  105
                063421  122  122  117
                063424  122  000
14734           063426  120  122  117  EM62:   .ASCIZ  /PROCESSOR NOT SUPPORTED BY THIS DIAGNOSTIC/
                063431  103  105  123
```

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063434  123  117  122
063437  040  116  117
063442  124  040  123
063445  125  120  120
063450  117  122  124
063453  105  104  040
063456  102  131  040
063461  124  110  111
063464  123  040  104
063467  111  101  107
063472  116  117  123
063475  124  111  103
063500  000
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                                                .SBTTL  ERROR DATA HEADERS (DH)
14738 063501  040   040   120  DH1:    .ASCIZ  /  PC   DEV ADD   GOOD    BAD/
      063504  103   040   040
      063507  040   104   105
      063512  126   040   101
      063515  104   104   040
      063520  040   040   107
      063523  117   117   104
      063526  040   040   040
      063531  040   102   101
      063534  104   000
14739 063536  040   040   120  DH2:    .ASCIZ  /  PC   GD CC BD-CC/
      063541  103   040   040
      063544  040   107   104
      063547  055   103   103
      063552  040   102   104
      063555  055   103   103
      063560  000
14740 063561  040   040   120  DH3:    .ASCIZ  /  PC   1ST ADD  # OF ERRORS/
      063564  103   040   040
      063567  040   061   123
      063572  124   040   101
      063575  104   104   040
      063600  040   043   040
      063603  117   106   040
      063606  105   122   122
      063611  117   122   123
      063614  000
14741 063615  040   040   120  DH5:    .ASCIZ  /  PC     MMR0    MMR1    MMR2    MMR3   CPUERR/
      063620  103   040   040
      063623  040   040   040
      063626  115   115   122
      063631  060   040   040
      063634  040   040   115
      063637  115   122   061
      063642  040   040   040
      063645  040   115   115
      063650  122   062   040
      063653  040   040   040
      063656  115   115   122
      063661  063   040   040
      063664  040   103   120
      063667  125   105   122
      063672  122   000
14742 063674  040   040   120  DH6:    .ASCIZ  /  PC   APTPAR   LSIZE  APTECC  MSIZE/
      063677  103   040   040
      063702  040   101   120
      063705  124   120   101
      063710  122   040   040
      063713  040   114   123
      063716  111   132   105
      063721  040   040   101
      063724  120   124   105
      063727  103   103   040
      063732  040   115   123
      063735  111   132   105
      063740  000
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                063741  040     040     120  DH7:    .ASCII  /  PC    BANK  VADD     PADD     GOOD/
                063744  103     040     040
                063747  040     040     102
                063752  101     116     113
                063755  040     040     126
                063760  101     104     104
                063763  040     040     040
                063766  040     040     120
                063771  101     104     104
                063774  040     040     040
                063777  040     040     107
                064002  117     117     104
14744           064005  040     040     040          .ASCIZ  /     BAD     XOR  CSR  MTYP INT PAT/
                064010  040     040     102
                064013  101     104     040
                064016  040     040     040
                064021  040     130     117
                064024  122     040     040
                064027  103     123     122
                064032  040     040     115
                064035  124     131     120
                064040  040     111     116
                064043  124     040     120
                064046  101     124     000
14745           064051  040     040     122  DH10:   .ASCIZ  /  R0      R1      R2      R3      R4      R5      SP      PSW/
                064054  060     040     040
                064057  040     040     040
                064062  040     122     061
                064065  040     040     040
                064070  040     040     040
                064073  122     062     040
                064076  040     040     040
                064101  040     040     122
                064104  063     040     040
                064107  040     040     040
                064112  040     122     064
                064115  040     040     040
                064120  040     040     040
                064123  122     065     040
                064126  040     040     040
                064131  040     040     123
                064134  120     040     040
                064137  040     040     040
                064142  040     120     123
                064145  127     000
14746           064147  040     040     120  DH11:   .ASCIZ  /  PC      CSR/
                064152  103     040     040
                064155  040     040     040
                064160  040     103     123
                064163  122     000
14747           064165  040     103     123  DH12:   .ASCIZ  / CSR/
                064170  122     000
14748           064172  040     040     120  DH13:   .ASCII  /  PC    BANK  VADD     PADD     WROTE1  WROTE2/
                064175  103     040     040
                064200  040     040     102
                064203  101     116     113
                064206  040     040     126
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                064211  101     104     104
                064214  040     040     040
                064217  040     040     120
                064222  101     104     104
                064225  040     040     040
                064230  040     127     122
                064233  117     124     105
                064236  061     040     040
                064241  127     122     117
                064244  124     105     062
14749           064247  040     103     110             .ASCIZ  / CHKBITS    CSR/
                064252  113     102     111
                064255  124     123     040
                064260  040     040     040
                064263  103     123     122
                064266  000
14750           064267  103     117     116     DH14:   .ASCIZ  /CONTRL   MMR0    MMR1    MMR2    MMR3   CPUERR/
                064272  124     122     114
                064275  040     040     040
                064300  115     115     122
                064303  060     040     040
                064306  040     040     115
                064311  115     122     061
                064314  040     040     040
                064317  040     115     115
                064322  122     062     040
                064325  040     040     040
                064330  115     115     122
                064333  063     040     040
                064336  040     103     120
                064341  125     105     122
                064344  122     000
14751           064346  040     040     120     DH15:   .ASCII  /  PC    BANK    PADD   GD-WD1  GD-WD2  GD-CHK/
                064351  103     040     040
                064354  040     040     102
                064357  101     116     113
                064362  040     040     040
                064365  040     120     101
                064370  104     104     040
                064373  040     040     107
                064376  104     055     127
                064401  104     061     040
                064404  040     107     104
                064407  055     127     104
                064412  062     040     040
                064415  107     104     055
                064420  103     110     113
14752           064423  040     102     101             .ASCIZ  / BAD-WD1 BAD-WD2  BAD-CHK INT PAT/
                064426  104     055     127
                064431  104     061     040
                064434  102     101     104
                064437  055     127     104
                064442  062     040     040
                064445  102     101     104
                064450  055     103     110
                064453  113     040     111
                064456  116     124     040
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                064461  120     101     124
                064464  000
14753           064465  040     040     120     DH16:   .ASCIZ  /  PC    BANK/
                064470  103     040     040
                064473  040     040     102
                064476  101     116     113
                064501  000
14754           064502  040     040     120     DH19:   .ASCIZ  /  PC/
                064505  103     000
14755           064507  040     040     120     DH20:   .ASCIZ  /  PC    BANK GD-CSR  (CSR)  CSR  MTYP INT  PAT/
                064512  103     040     040
                064515  040     040     102
                064520  101     116     113
                064523  040     107     104
                064526  055     103     123
                064531  122     040     040
                064534  050     103     123
                064537  122     051     040
                064542  040     103     123
                064545  122     040     040
                064550  115     124     131
                064553  120     040     111
                064556  116     124     040
                064561  040     120     101
                064564  124     000
14756           064566  040     040     120     DH23:   .ASCIZ  /  PC    BANK GD-ERR BAD-ERR CSR  MTYP INT  PAT/
                064571  103     040     040
                064574  040     040     102
                064577  101     116     113
                064602  040     107     104
                064605  055     105     122
                064610  122     040     102
                064613  101     104     055
                064616  105     122     122
                064621  040     103     123
                064624  122     040     040
                064627  115     124     131
                064632  120     040     111
                064635  116     124     040
                064640  040     120     101
                064643  124     000
14757           064645  040     040     120     DH24:   .ASCIZ  /  PC    BANK  (CSR) CSR  MTYP INT  PAT/
                064650  103     040     040
                064653  040     040     102
                064656  101     116     113
                064661  040     040     050
                064664  103     123     122
                064667  051     040     103
                064672  123     122     040
                064675  040     115     124
                064700  131     120     040
                064703  111     116     124
                064706  040     040     120
                064711  101     124     000
14758           064714  040     040     120     DH25:   .ASCIZ  /  PC    GD-DAT  (CSR)   CSRNO/
                064717  103     040     040
                064722  040     040     107
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                064725  104     055     104
                064730  101     124     040
                064733  040     050     103
                064736  123     122     051
                064741  040     040     040
                064744  103     123     122
                064747  116     117     000
14759           064752  040     040     120     DH26:   .ASCIZ  /  PC  BADCODE/
                064755  103     040     040
                064760  102     101     104
                064763  103     117     104
                064766  105     000
14760           064770  040     040     120     DH27:   .ASCIZ  /  PC    BANK  VADD    PADD   CSR  MTYP PAT/
                064773  103     040     040
                064776  040     040     102
                065001  101     116     113
                065004  040     040     126
                065007  101     104     104
                065012  040     040     040
                065015  040     040     120
                065020  101     104     104
                065023  040     040     040
                065026  103     123     122
                065031  040     040     115
                065034  124     131     120
                065037  040     120     101
                065042  124     000
14761           065044  040     040     120     DH30:   .ASCIZ  /  PC    BANK   PADD    WROTE    READ  CSR  PAT/
                065047  103     040     040
                065052  040     040     102
                065055  101     116     113
                065060  040     040     040
                065063  120     101     104
                065066  104     040     040
                065071  040     040     127
                065074  122     117     124
                065077  105     040     040
                065102  040     040     122
                065105  105     101     104
                065110  040     040     103
                065113  123     122     040
                065116  040     120     101
                065121  124     000
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                                                .SBTTL  MESSAGES
14765 065123  200   040   040  MSG001: .ASCIZ  <CRLF>/                    MEMORY CONFIGURATION MAP/
      065126  040   040   040
      065131  040   040   040
      065134  040   040   040
      065137  040   040   040
      065142  040   040   040
      065145  040   040   040
      065150  040   040   040
      065153  040   115   105
      065156  115   117   122
      065161  131   040   103
      065164  117   116   106
      065167  111   107   125
      065172  122   101   124
      065175  111   117   116
      065200  040   115   101
      065203  120   000
14766 065205  200   040   040  MSG002: .ASCIZ  <CRLF>/                          16K WORD BANKS/
      065210  040   040   040
      065213  040   040   040
      065216  040   040   040
      065221  040   040   040
      065224  040   040   040
      065227  040   040   040
      065232  040   040   040
      065235  040   040   040
      065240  040   040   040
      065243  061   066   113
      065246  040   127   117
      065251  122   104   040
      065254  102   101   116
      065257  113   123   000
14767 065262  200   040   040  MSG003: .ASCII <CRLF>/                1       2       3/
      065265  040   040   040
      065270  040   040   040
      065273  040   040   040
      065276  040   040   040
      065301  040   040   061
      065304  040   040   040
      065307  040   040   040
      065312  040   062   040
      065315  040   040   040
      065320  040   040   040
      065323  063
14768 065324  040   040   040          .ASCIZ  /       4       5       6       7  /
      065327  040   040   040
      065332  040   064   040
      065335  040   040   040
      065340  040   040   040
      065343  065   040   040
      065346  040   040   040
      065351  040   040   066
      065354  040   040   040
      065357  040   040   040
      065362  040   067   040
      065365  040   000
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                065367  200     040     040  MSG004: .ASCII <CRLF>/        012345670123456701234567/
                065372  040     040     040
                065375  040     040     040
                065400  060     061     062
                065403  063     064     065
                065406  066     067     060
                065411  061     062     063
                065414  064     065     066
                065417  067     060     061
                065422  062     063     064
                065425  065     066     067
14770           065430  060     061     062          .ASCIZ  /012345670123456701234567012345670123/
                065433  063     064     065
                065436  066     067     060
                065441  061     062     063
                065444  064     065     066
                065447  067     060     061
                065452  062     063     064
                065455  065     066     067
                065460  060     061     062
                065463  063     064     065
                065466  066     067     060
                065471  061     062     063
                065474  000
14771           065475  200     105     122  MSG005: .ASCIZ  <CRLF>/ERRORS  /
                065500  122     117     122
                065503  123     040     040
                065506  000
14772           065507  200     125     116  MSG006: .ASCIZ  <CRLF>/UNDEFINED TRAP INSTRUCTION/<32>
                065512  104     105     106
                065515  111     116     105
                065520  104     040     124
                065523  122     101     120
                065526  040     111     116
                065531  123     124     122
                065534  125     103     124
                065537  111     117     116
                065542  032     000
14773           065544  200     115     105  MSG009. .ASCIZ  <CRLF>/MEMTYPE /                ;MEMORY TYPE
                065547  115     124     131
                065552  120     105     040
                065555  000
14774           065556  200     120     122  MSG010: .ASCIZ  <CRLF>/PROTECT /                ;MEMORY PROTECTED
                065561  117     124     105
                065564  103     124     040
                065567  000
14775           065570  040     040     040  MSG11A: .ASCIZ  /    1       1       1       1       1       1       1/
                065573  040     061     040
                065576  040     040     040
                065601  040     040     040
                065604  061     040     040
                065607  040     040     040
                065612  040     040     061
                065615  040     040     040
                065620  040     040     040
                065623  040     061     040
                065626  040     040     040
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        065631  040     040     040
        065634  061     040     040
        065637  040     040     040
        065642  040     040     061
        065645  040     040     040
        065650  040     040     040
        065653  040     061     000
14776   065656  040     040     040     MSG011: .ASCIZ  /    0       1       2       3       4       5       6/
        065661  040     060     040
        065664  040     040     040
        065667  040     040     040
        065672  061     040     040
        065675  040     040     040
        065700  040     040     062
        065703  040     040     040
        065706  040     040     040
        065711  040     063     040
        065714  040     040     040
        065717  040     040     040
        065722  064     040     040
        065725  040     040     040
        065730  040     040     065
        065733  040     040     040
        065736  040     040     040
        065741  040     066     000
14777   065744  064     065     066     MSG012: .ASCIZ  /456701234567012345670123456701234567012345670123456701234567/
        065747  067     060     061
        065752  062     063     064
        065755  065     066     067
        065760  060     061     062
        065763  063     064     065
        065766  066     067     060
        065771  061     062     063
        065774  064     065     066
        065777  067     060     061
        066002  062     063     064
        066005  065     066     067
        066010  060     061     062
        066013  063     064     065
        066016  066     067     060
        066021  061     062     063
        066024  064     065     066
        066027  067     060     061
        066032  062     063     064
        066035  065     066     067
        066040  000
14778   066041  061     000             MSG11B: .ASCIZ  /1/
14779   066043  067     000             MSG11C: .ASCIZ  /7/
14780   066045  060     061     062     MSG11D: .ASCIZ  /01234567/
        066050  063     064     065
        066053  066     067     000
14781   066056  130     000             MSG013: .ASCIZ  /X/
14782   066060  040     000             MSG014: .ASCIZ  / /             ;SPACE
14783   066062  000     000             MSG015: .BYTE   0,0             ;FOR SINGLE ASCII CHARACTERS & TERMINATOR
14784   066064  200     103     123     MSG016: .ASCIZ  <CRLF>/CSR      /
        066067  122     040     040
        066072  040     040     040
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                066075  000
14785           066076  040     040     040  MSG017: .ASCIZ  /        /              ;8 SPACES
                066101  040     040     040
                066104  040     040     000
14786           066107  040     040     000  MSG018: .ASCIZ  /  /                    ;2 SPACES
14787           066112  040     040     040  MSG019: .ASCIZ  /   /                   ;3 SPACES
                066115  000
14788           066116  200     106     123  MSG020: .ASCIZ  <CRLF>/FS COMMAND MODE/
                066121  040     103     117
                066124  115     115     101
                066127  116     104     040
                066132  115     117     104
                066135  105     000
14789           066137  200     103     117  MSG021: .ASCII  <CRLF>/COMMANDS AVAILABLE:/
                066142  115     115     101
                066145  116     104     123
                066150  040     101     126
                066153  101     111     114
                066156  101     102     114
                066161  105     072
14790           066163  200     060     040          .ASCII  <CRLF>/0 = EXIT/
                066166  075     040     105
                066171  130     111     124
14791           066174  200     061     040          .ASCII  <CRLF>/1 = READ CSR/
                066177  075     040     122
                066202  105     101     104
                066205  040     103     123
                066210  122
14792           066211  200     062     040          .ASCII  <CRLF>/2 = LOAD CSR/
                066214  075     040     114
                066217  117     101     104
                066222  040     103     123
                066225  122
14793           066226  200     063     040          .ASCII  <CRLF>/3 = EXAMINE MEMORY/
                066231  075     040     105
                066234  130     101     115
                066237  111     116     105
                066242  040     115     105
                066245  115     117     122
                066250  131
14794           066251  200     064     040          .ASCII  <CRLF>/4 = MODIFY MEMORY/
                066254  075     040     115
                066257  117     104     111
                066262  106     131     040
                066265  115     105     115
                066270  117     122     131
14795           066273  200     065     040          .ASCII  <CRLF>/5 = SELECT BANK & TEST/
                066276  075     040     123
                066301  105     114     105
                066304  103     124     040
                066307  102     101     116
                066312  113     040     046
                066315  040     124     105
                066320  123     124
14796           066322  200     066     040          .ASCII  <CRLF>/6 = TYPE CONFIG MAP/
                066325  075     040     124
                066330  131     120     105
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                066333  040     103     117
                066336  116     106     111
                066341  107     040     115
                066344  101     120
14797           066346  200     067     040             ASCII   <CRLF>/7 = SOB A-LONG TEST/
                066351  075     040     123
                066354  117     102     055
                066357  101     055     114
                066362  117     116     107
                066365  040     124     105
                066370  123     124
14798           066372  200     070     040             .ASCII  <CRLF>/8 = ERROR SUMMARY/
                066375  075     040     105
                066400  122     122     117
                066403  122     040     123
                066406  125     115     115
                066411  101     122     131
14799           066414  200     071     075             .ASCII  <CRLF>/9=  REFRESH TEST/
                066417  040     040     122
                066422  105     106     122
                066425  105     123     110
                066430  040     124     105
                066433  123     124
14800           066435  200     061     060             .ASCII  <CRLF>/10= SET FILL COUNT/
                066440  075     040     123
                066443  105     124     040
                066446  106     111     114
                066451  114     040     103
                066454  117     125     116
                066457  124
14801           066460  200     061     061             .ASCII  <CRLF>/11= ENTER KAMIKAZE MODE/
                066463  075     040     105
                066466  116     124     105
                066471  122     040     113
                066474  101     115     111
                066477  113     101     132
                066502  105     040     115
                066505  117     104     105
14802           066510  200     061     062             .ASCII  <CRLF>/12= EXIT KAMIKAZE MODE/
                066513  075     040     105
                066516  130     111     124
                066521  040     113     101
                066524  115     111     113
                066527  101     132     105
                066532  040     115     117
                066535  104     105
14803           066537  200     061     063             .ASCII  <CRLF>/13= TURN CACHE OFF/
                066542  075     040     124
                066545  125     122     116
                066550  040     103     101
                066553  103     110     105
                066556  040     117     106
                066561  106
14804           066562  200     061     064             .ASCII  <CRLF>/14= TURN CACHE ON/
                066565  075     040     124
                066570  125     122     116
                066573  040     103     101
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        066576  103     110     105
        066601  040     117     116
 14805  066604  200     061     065             .ASCII  <CRLF>/15= TEST SELECTED BANKS/
        066607  075     040     124
        066612  105     123     124
        066615  040     123     105
        066620  114     105     103
        066623  124     105     104
        066626  040     102     101
        066631  116     113     123
 14806  066634  200     061     066             .ASCII  <CRLF>/16= TEST ALL BANKS/
        066637  075     040     124
        066642  105     123     124
        066645  040     101     114
        066650  114     040     102
        066653  101     116     113
        066656  123
 14807  066657  200     061     067             .ASCII  <CRLF>/17= ENABLE TRACE/
        066662  075     040     105
        066665  116     101     102
        066670  114     105     040
        066673  124     122     101
        066676  103     105
 14808  066700  200     061     070             .ASCII  <CRLF>/18= DISABLE TRACE/
        066703  075     040     104
        066706  111     123     101
        066711  102     114     105
        066714  040     124     122
        066717  101     103     105
 14809  066722  015     012     000             .BYTE   15,12,0
 14810  066725  200     127     110     MSG022: .ASCIZ  <CRLF>/WHICH CSR(0-F)? /
        066730  111     103     110
        066733  040     103     123
        066736  122     050     060
        066741  055     106     051
        066744  077     040     000
 14811  066747  200     103     123     MSG023: .ASCIZ  <CRLF>/CSR WORD? /
        066752  122     040     127
        066755  117     122     104
        066760  077     040     000
 14812  066763  200     103     123     MSG025: .ASCIZ  <CRLF>/CSR DOES NOT EXIST/
        066766  122     040     104
        066771  117     105     123
        066774  040     116     117
        066777  124     040     105
        067002  130     111     123
        067005  124     000
 14813  067007  200     103     117     MSG026: .ASCIZ  <CRLF>/COMMAND:/
        067012  115     115     101
        067015  116     104     072
        067020  000
 14814  067021  200     117     114     MSG027: .ASCIZ  <CRLF>/OLD CSR WAS/
        067024  104     040     103
        067027  123     122     040
        067032  127     101     123
        067035  000
 14815  067036  200     103     123     MSG028: .ASCIZ  <CRLF>/CSR IS NOW/
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        067041  122  040  111
        067044  123  040  116
        067047  117  127  000
14816   067052  200  105  130  MSG029: .ASCIZ  <CRLF>/EXAMINE MEMORY/
        067055  101  115  111
        067060  116  105  040
        067063  115  105  115
        067066  117  122  131
        067071  000
14817   067072  200  102  101  MSG030: .ASCIZ  <CRLF>/BANK(0 177)? /
        067075  116  113  050
        067100  060  055  061
        067103  067  067  051
        067106  077  040  000
14818   067111  200  120  110  MSG031: .ASCIZ  <CRLF>/PHYSICAL ADDRESS(0-17757776)? /
        067114  131  123  111
        067117  103  101  114
        067122  040  101  104
        067125  104  122  105
        067130  123  123  050
        067133  060  055  061
        067136  067  067  065
        067141  067  067  067
        067144  066  051  077
        067147  040  000
14819   067151  200  120  101  MSG032: .ASCIZ  <CRLF>/PARITY ABORT/<32>
        067154  122  111  124
        067157  131  040  101
        067162  102  117  122
        067165  124  032  000
14820   067170  200  124  111  MSG033: .ASCIZ  <CRLF>/TIMEOUT TRAP/<32>
        067173  115  105  117
        067176  125  124  040
        067201  124  122  101
        067204  120  032  000
14821   067207  200  102  131  MSGA34: .ASCIZ  <CRLF>/BYPASSING ECC TESTS ON BANK /
        067212  120  101  123
        067215  123  111  116
        067220  107  040  105
        067223  103  103  040
        067226  124  105  123
        067231  124  123  040
        067234  117  116  040
        067237  102  101  116
        067242  113  040  000
14822   067245  040  104  125  MSGB34: .ASCIZ  / DUE TO SBE LOCATIONS/
        067250  105  040  124
        067253  117  040  123
        067256  102  105  040
        067261  114  117  103
        067264  101  124  111
        067267  117  116  123
        067272  000
14823   067273  121  126  000  MSG035: .ASCIZ  /QV/
14824   067276  200  115  117  MSG036: .ASCIZ  <CRLF>/MODIFY MEMORY/
        067301  104  111  106
        067304  131  040  115
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        067307  105  115  117
        067312  122  131  000
 14825  067315  200  117  114  MSG037: .ASCIZ  <CRLF>/OLD DATA WAS /
        067320  104  040  104
        067323  101  124  101
        067326  040  127  101
        067331  123  040  000
 14826  067334  200  104  101  MSG038: .ASCIZ  <CRLF>/DATA IS NOW /
        067337  124  101  040
        067342  111  123  040
        067345  116  117  127
        067350  040  000
 14827  067352  200  111  116  MSG039: .ASCIZ  <CRLF>/INPUT NEW DATA? /
        067355  120  125  124
        067360  040  116  105
        067363  127  040  104
        067366  101  124  101
        067371  077  040  000
 14828  067374  200  123  105  MSG040: .ASCIZ  <CRLF>/SELECT BANK & TEST/
        067377  114  105  103
        067402  124  040  102
        067405  101  116  113
        067410  040  046  040
        067413  124  105  123
        067416  124  000
 14829  067420  200  102  101  MSG041: .ASCIZ  <CRLF>/BANK NOT ACCESSABLE/
        067423  116  113  040
        067426  116  117  124
        067431  040  101  103
        067434  103  105  123
        067437  123  101  102
        067442  114  105  000
 14830  067445  200  124  105  MSG042: .ASCIZ  <CRLF>/TEST(0-47)? /
        067450  123  124  050
        067453  060  055  064
        067456  067  051  077
        067461  040  000
 14831  067463  200  124  105  MSG043: .ASCIZ  <CRLF>/TEST 0 DATA IS? /
        067466  123  124  040
        067471  060  040  104
        067474  101  124  101
        067477  040  111  123
        067502  077  040  000
 14832  067505  200  124  117  MSG046: .ASCIZ  <CRLF>/TO ESCAPE TYPE ANY KEY/<CRLF><12><12>
        067510  040  105  123
        067513  103  101  120
        067516  105  040  124
        067521  131  120  105
        067524  040  101  116
        067527  131  040  113
        067532  105  131  200
        067535  012  012  000
 14833  067540  200  124  105  MSG047: .ASCIZ  <CRLF>/TEST COMPLETE/
        067543  123  124  040
        067546  103  117  115
        067551  120  114  105
        067554  124  105  000
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 14834 067557     040     116     117  MSG048: .ASCIZ  / NOT AVAILABLE NOW - TRY LATER!/
       067562     124     040     101
       067565     126     101     111
       067570     114     101     102
       067573     114     105     040
       067576     116     117     127
       067601     040     055     040
       067604     124     122     131
       067607     040     114     101
       067612     124     105     122
       067615     041     000
 14835 067617     200     102     101  MSG049: .ASCIZ  <CRLF>/BANK REQUIRES RELOCATION/
       067622     116     113     040
       067625     122     105     121
       067630     125     111     122
       067633     105     123     040
       067636     122     105     114
       067641     117     103     101
       067644     124     111     117
       067647     116     000
 14836                                .EVEN
 14837 067652     120     117     127  MSG051: .ASCIZ  /POWER RECOVERY/
       067655     105     122     040
       067660     122     105     103
       067663     117     126     105
       067666     122     131     000
 14838 067671     200     123     117  MSG055: .ASCIZ  <CRLF>/SOB-A-LONG TEST/
       067674     102     055     101
       067677     055     114     117
       067702     116     107     040
       067705     124     105     123
       067710     124     000
 14839 067712     200     102     105  MSG056: .ASCIZ  <CRLF>/BELL = EACH PASS COMPLETE/
       067715     114     114     040
       067720     075     040     105
       067723     101     103     110
       067726     040     120     101
       067731     123     123     040
       067734     103     117     115
       067737     120     114     105
       067742     124     105     000
 14840 067745     200     040     040  MSG058: .ASCIZ  <CRLF>/  CSR    CSR .../
       067750     103     123     122
       067753     040     040     040
       067756     040     103     123
       067761     122     040     056
       067764     056     056     000
 14841 067767     077     077     077  MSG061: .ASCIZ  /??????/
       067772     077     077     077
       067775     000
 14842 067776     111     116     120  MSG062: .ASCIZ  /INPUT MUST BE A/
       070001     125     124     040
       070004     115     125     123
       070007     124     040     102
       070012     105     040     101
       070015     000
 14843 070016     116     040     117  MSG063: .ASCIZ  /N OCTAL /
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                070021  103     124     101
                070024  114     040     000
 14844          070027  116     125     115     MSG064: .ASCIZ  /NUMBER/<CRLF>
                070032  102     105     122
                070035  200     000
 14845          070037  040     104     105     MSG065: .ASCIZ  / DECIMAL /
                070042  103     111     115
                070045  101     114     040
                070050  000
 14846          070051  200     105     122     MSG066: .ASCIZ  <CRLF>/ERRORS > 20 - ABORTING FOR XXDP CHAIN/
                070054  122     117     122
                070057  123     040     076
                070062  040     062     060
                070065  040     055     040
                070070  101     102     117
                070073  122     124     111
                070076  116     107     040
                070101  106     117     122
                070104  040     130     130
                070107  104     120     040
                070112  103     110     101
                070115  111     116     000
 14847          070120  106     101     124     MSG067: .ASCIZ  /FATAL /
                070123  101     114     040
                070126  000
 14848          070127  113     040     127     MSG070: .ASCIZ  /K WORDS OF MEMORY TOTAL/<CRLF>
                070132  117     122     104
                070135  123     040     117
                070140  106     040     115
                070143  105     115     117
                070146  122     131     040
                070151  124     117     124
                070154  101     114     200
                070157  000
 14849          070160  200     122     105     MSG073: .ASCIZ  <CRLF>/REFRESH TEST/
                070163  106     122     105
                070166  123     110     040
                070171  124     105     123
                070174  124     000
 14850          070176  200     122     105     MSG075: .ASCIZ  <CRLF>/RELOCATION NOT POSSIBLE/<32>
                070201  114     117     103
                070204  101     124     111
                070207  117     116     040
                070212  116     117     124
                070215  040     120     117
                070220  123     123     111
                070223  102     114     105
                070226  032     000
 14851          070230  200     040     040     MSG076: .ASCIZ  <CRLF>/  BANK  ERRORS/<CRLF>
                070233  102     101     116
                070236  113     040     040
                070241  105     122     122
                070244  117     122     123
                070247  200     000
 14852          070251  200     105     116     MSG077: .ASCIZ  <CRLF>/END PASS #/
                070254  104     040     120
                070257  101     123     123
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        070262  040  043  000
14853   070265  040  105  122  MSG079: .ASCIZ  / ERROR(S) DETECTED/<CRLF>
        070270  122  117  122
        070273  050  123  051
        070276  040  104  105
        070301  124  105  103
        070304  124  105  104
        070307  200  000
14854   070311  200  106  111  MSG085: .ASCIZ  <CRLF>/FILL COUNT(OCTAL)? /
        070314  114  114  040
        070317  103  117  125
        070322  116  124  050
        070325  117  103  124
        070330  101  114  051
        070333  077  040  000
14855   070336  200  113  105  MSG088: .ASCIZ  <CRLF>/KERNEL STACK/
        070341  122  116  105
        070344  114  040  123
        070347  124  101  103
        070352  113  000
14856   070354  200  123  125  MSG089: .ASCIZ  <CRLF>/SUPERVISOR STACK/
        070357  120  105  122
        070362  126  111  123
        070365  117  122  040
        070370  123  124  101
        070373  103  113  000
14857   070376  200  125  123  MSG090: .ASCIZ  <CRLF>/USER STACK/
        070401  105  122  040
        070404  123  124  101
        070407  103  113  000
14858   070412  040  111  123  MSG091: .ASCIZ  / IS EMPTY/
        070415  040  105  115
        070420  120  124  131
        070423  000
14859   070424  122  105  114  MSG092: .ASCIZ  /RELOCATED  /
        070427  117  103  101
        070432  124  105  104
        070435  040  040  000
14860   070440  102  101  116  MSG093: .ASCIZ  /BANK=/
        070443  113  075  000
14861   070446  040  040  124  MSG095: .ASCIZ  /  TEST=/
        070451  105  123  124
        070454  075  000
14862   070456  200  105  116  MSG101: .ASCIZ  <CRLF>/ENTERING KAMIKAZE MODE/
        070461  124  105  122
        070464  111  116  107
        070467  040  113  101
        070472  115  111  113
        070475  101  132  105
        070500  040  115  117
        070503  104  105  000
14863   070506  200  114  105  MSG102: .ASCIZ  <CRLF>/LEAVING KAMIKAZE MODE/
        070511  101  126  111
        070514  116  107  040
        070517  113  101  115
        070522  111  113  101
        070525  132  105  040
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        070530  115  117  104
        070533  105  000
 14864  070535  200  114  105  MSG103: .ASCIZ  <CRLF>/LEAVING FS MODE/<CRLF>
        070540  101  126  111
        070543  116  107  040
        070546  106  123  040
        070551  115  117  104
        070554  105  200  000
 14865  070557  032  000       MSG104: .BYTE   32,0                              ;CONTROL Z
 14866  070561  200  105  116  MSG105: .ASCIZ  <CRLF>/ENTER BANKS - USE NUMBER 200 TO TERMINATE/
        070564  124  105  122
        070567  040  102  101
        070572  116  113  123
        070575  040  055  040
        070600  125  123  105
        070603  040  116  125
        070606  115  102  105
        070611  122  040  062
        070614  060  060  040
        070617  124  117  040
        070622  124  105  122
        070625  115  111  116
        070630  101  124  105
        070633  000
 14867  070634  200  103  101  MSG106: .ASCIZ  <CRLF>/CACHE IS OFF/
        070637  103  110  105
        070642  040  111  123
        070645  040  117  106
        070650  106  000
 14868  070652  200  103  101  MSG107: .ASCIZ  <CRLF>/CACHE IS ON (EXCEPT DURING ACTUAL PATTERNS)/
        070655  103  110  105
        070660  040  111  123
        070663  040  117  116
        070666  040  050  105
        070671  130  103  105
        070674  120  124  040
        070677  104  125  122
        070702  111  116  107
        070705  040  101  103
        070710  124  125  101
        070713  114  040  120
        070716  101  124  124
        070721  105  122  116
        070724  123  051  000
 14869  070727  200  117  116  MSG110: .ASCIZ  <CRLF>/ONLY SELECTED BANKS WILL BE TESTED/
        070732  114  131  040
        070735  123  105  114
        070740  105  103  124
        070743  105  104  040
        070746  102  101  116
        070751  113  123  040
        070754  127  111  114
        070757  114  040  102
        070762  105  040  124
        070765  105  123  124
        070770  105  104  000
 14870  070773  200  101  114  MSG111: .ASCIZ  <CRLF>/ALL BANKS WILL BE TESTED/
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                070776  114     040     102
                071001  101     116     113
                071004  123     040     127
                071007  111     114     114
                071012  040     102     105
                071015  040     124     105
                071020  123     124     105
                071023  104     000
14871           071025  113     040     117     MSG112: .ASCIZ  /K OF Q-BUS PARITY MEMORY/<CRLF>
                071030  106     040     121
                071033  055     102     125
                071036  123     040     120
                071041  101     122     111
                071044  124     131     040
                071047  115     105     115
                071052  117     122     131
                071055  200     000
14872           071057  113     040     117     MSG113: .ASCIZ  /K OF ECC MEMORY/<CRLF>
                071062  106     040     105
                071065  103     103     040
                071070  115     105     115
                071073  117     122     131
                071076  200     000
14873           071100  200     040     040     M1184:  .ASCIZ  <CRLF>"   11/84"
                071103  040     061     061
                071106  057     070     064
                071111  000
14874           071112  200     040     040     MSG117: .ASCIZ  <CRLF>"   11/83"
                071115  040     061     061
                071120  057     070     063
                071123  000
14875           071124  200     040     040     MSG119: .ASCIZ  <CRLF>/   NO/
                071127  040     116     117
                071132  000
14876           071133  040     103     101     MSG120: .ASCIZ  / CACHE AVAILABLE/
                071136  103     110     105
                071141  040     101     126
                071144  101     111     114
                071147  101     102     114
                071152  105     000
14877           071154  040     103     101     MSG121: .ASCIZ  / CACHE BYPASSED/
                071157  103     110     105
                071162  040     102     131
                071165  120     101     123
                071170  123     105     104
                071173  000
14878           071174  200     103     123     MSG122: .ASCII  <CRLF>/CSR NUMBER /
                071177  122     040     116
                071202  125     115     102
                071205  105     122     040
14879           071210  000                     MSGA122:.BYTE   0
14880           071211  040     103     117             .ASCIZ  / CONTROLS TOO MANY BANKS/
                071214  116     124     122
                071217  117     114     123
                071222  040     124     117
                071225  117     040     115
                071230  101     116     131
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        071233  040  102  101
        071236  116  113  123
        071241  000
 14881  071242  040  120  101  MSG125: .ASCIZ  / PASSES COMPLETED/
        071245  123  123  105
        071250  123  040  103
        071253  117  115  120
        071256  114  105  124
        071261  105  104  000
 14882  071264  200  120  122  MSG126: .ASCIZ  <CRLF>/PROGRAM CSR COULD NOT BE DETERMINED/
        071267  117  107  122
        071272  101  115  040
        071275  103  123  122
        071300  040  103  117
        071303  125  114  104
        071306  040  116  117
        071311  124  040  102
        071314  105  040  104
        071317  105  124  105
        071322  122  115  111
        071325  116  105  104
        071330  000
 14883  071331  200  124  122  MSG127: .ASCIZ  <CRLF>/TRACE ENABLED/
        071334  101  103  105
        071337  040  105  116
        071342  101  102  114
        071345  105  104  000
 14884  071350  200  124  122  MSG128: .ASCIZ  <CRLF>/TRACE DISABLED/
        071353  101  103  105
        071356  040  104  111
        071361  123  101  102
        071364  114  105  104
        071367  000
 14885  071370  200  200  040  MSG008: .ASCIZ  <CRLF><CRLF>/                CSR MAP/<CRLF>
        071373  040  040  040
        071376  040  040  040
        071401  040  040  040
        071404  040  040  040
        071407  040  040  103
        071412  123  122  040
        071415  115  101  120
        071420  200  000
 14886  071422  200  040  103  MSG000: .ASCIZ  <CRLF>" CVMJA0  ECC/PARITY MEMORY DIAGNOSTIC"
        071425  126  115  112
        071430  101  060  040
        071433  040  105  103
        071436  103  057  120
        071441  101  122  111
        071444  124  131  040
        071447  115  105  115
        071452  117  122  131
        071455  040  104  111
        071460  101  107  116
        071463  117  123  124
        071466  111  103  000
 14887  071471  200  200  000  MSG129: .ASCIZ  <CRLF><CRLF>
 14888  071474  120  122  117  MSG130: .ASCIZ  /PROCESSOR NOT SUPPORTED BY THIS DIAGNOSTIC/
```

```
        071477      103      105      123
        071502      123      117      122
        071505      040      116      117
        071510      124      040      123
        071513      125      120      120
        071516      117      122      124
        071521      105      104      040
        071524      102      131      040
        071527      124      110      111
        071532      123      040      104
        071535      111      101      107
        071540      116      117      123
        071543      124      111      103
        071546      000
 14889  071547      200      125      116  NOUBMT: .ASCIZ  <CRLF>/UNIBUS MEMORY WILL NOT BE TESTED/<CRLF>
        071552      111      102      125
        071555      123      040      115
        071560      105      115      117
        071563      122      131      040
        071566      127      111      114
        071571      114      040      116
        071574      117      124      040
        071577      102      105      040
        071602      124      105      123
        071605      124      105      104
        071610      200      000
 14890                                          .EVEN
 14896  071612                                  $$END
 14897  071612                              END:
 14898  071612  010322                          .PRINT  60000-SUPLIMIT  ;SUPERVISOR ADDRESSES LEFT
 14902          000200                          .END START3
```

ABORT	000000	BSIZE	002374	B61	035112	CPUERR=	177766	DH13	064172
ABORTF	002144	B0	004652	B62	035116	CR =	000015	DH14	064267
ABORT1	000032	B1	005656	B63	035322	CRLF =	000200	DH15	064346
ABORT2	000046	B10	012262	B64	035326	CSR	002150	DH16	064465
ACFLAG	002116	B100	045566	B65	036444	CSRADD=	172100	DH19	064502
ACTFLA	002350	B101	046040	B66	036452	CSRBMP	006024	DH2	063536
ADDRES	002034	B102	046046	B67	036602	CSRCAS	017004	DH20	064507
ANA2	007372	B103	053522	B7	012220	CSRFBA	002232	DH23	064566
APTDOW	040720	B104	053526	B70	036616	CSRFIR	002226	DH24	064645
APTECC	002424	B105	053624	B71	043510	CSRHOL	002526	DH25	064714
APTFLA	002352	B106	053716	B72	043746	CSRINC	002330	DH26	064752
APTHAN	014126	B107	054002	B73	044230	CSRINF	002462	DH27	064770
APTHLT	040766	B11	013010	B74	044524	CSRINT	002236	DH3	063561
APTPAR	002422	B12	013060	B75	044524	CSRLAS	002230	DH30	065044
APTSIZ	002444	B13	013122	B76	044622	CSRLBA	002234	DH5	063615
BACK	051530	B14	013400	B77	045562	CSRLOO	002332	DH6	063674
BACKGN	032630	B15	014172	CACHKF	002550	CSRMAP	006034	DH7	063741
BAD	002052	B16	015610	CACHKN	002544	CSRNO	002152	DIAGFL	002004
BADPC	002022	B17	016060	CACHOF=	104424	CSROUT	035314	DISPLA	002640
BADPSW	002032	B2	006050	CACHON=	104423	CSRSTU=	000021	DISPRE=	000174
BADSP	002026	B20	016066	CACHVE=	000114	CSR1S	002322	DISPTB	013600
BADSTA	034152	B21	016104	CBCSR =	104474	CTEST	006714	DOBACK	014162
BADXOR	002060	B22	016146	CBITS	002316	CTLKVE	002146	DONE	006700
BAD2	002054	B23	016220	CBREG =	104513	DATARG=	177754	DSWR =	177570
BAD3	002056	B24	021642	CB1CSR=	104475	DATBUF	002242	DT1	060144
BAFPAF	014262	B25	021646	CHECK	002314	DBEMSK	002256	DT10	060264
BAFPAR	014370	B26	022026	CHKDIS=	104504	DDISP =	177570	DT11	060306
BAKPAT	002632	B27	022034	CHKTRP	032220	DEENER=	104421	DT12	060314
BANK	002102	B3	006120	CHK1DI=	104505	DETAIL	053266	DT13	060320
BANKIN	002104	B30	022264	CKEND	055056	DETFLA	002220	DT14	060342
BANKMO	037442	B31	025750	CKSWR =	104410	DETPSW	002216	DT16	060360
BANKOK	040456	B32	026140	CLRCSR=	104502	DETR0	002200	DT17	060410
BAWPAF	014476	B33	026176	CLREX	007342	DETR1	002202	DT2	060156
BAWPAR	014626	B34	026620	CLRMEM	007232	DETR2	002204	DT20	060416
BGTEST	027610	B35	026656	CLR1CS=	104503	DETR3	002206	DT22	060426
BITNO	002324	B36	026672	CMD16A	044610	DETR4	002210	DT23	060434
BIT0 =	000001	B37	027012	CMD16L=	000074	DETR5	002212	DT24	060456
BIT1 =	000002	B4	006400	CMD5B	042752	DETSP	002214	DT25	060476
BIT10 =	002000	B40	027172	CMD5C	043246	DET1	053756	DT26	060510
BIT11 =	004000	B41	027214	CMD7B	043504	DF1	060556	DT27	060516
BIT12 =	010000	B42	027742	CMD7C	043560	DF11	060701	DT3	060162
BIT13 =	020000	B43	030102	CMD9B	044224	DF13	060712	DT30	060536
BIT14 =	040000	B44	030140	CMD9C	044300	DF14	060722	DT4	060172
BIT15 =	100000	B45	030432	CONFGE	002450	DF15	060731	DT5	060202
BIT2 =	000004	B46	030646	CONFIE	003670	DF16	060740	DT6	060220
BIT3 =	000010	B47	031050	CONFIG	002664	DF2	060557	DT7	060234
BIT4 =	000020	B5	006434	CONTFL	002222	DF3	060603	DUMMY	002176
BIT5 =	000040	B50	031224	CONTRL=	177746	DF4	060616	DUMPCS=	000103
BIT6 =	000100	B51	031244	CONTS	055226	DF5	060631	ECCDIS=	104470
BIT7 =	000200	B52	031254	CONTS1	054570	DF6	060644	ECCINI=	104472
BIT8 =	000400	B53	031572	CONTS2	055230	DF7	060657	ECC1DI=	104471
BIT9 =	001000	B54	031742	CONTS3	047340	DF8	060672	ECC1IN=	104473
BLOCK1	040770	B55	031756	CONTT	055152	DF9	060674	EMTSAV	003670
BLOCK2	041010	B56	032022	COUNT	002370	DH1	063501	EMTVEC=	000030
BLOCK3	041024	B57	034746	CPERRF	052314	DH10	064051	EM11	061247
BMFLAG	002130	B6	011544	CPSAVE	052312	DH11	064147	EM12	061271
BRG08B	027612	B60	034752	CPUBIT	002106	DH12	064165	EM13	061315

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EM14    061347  E0      004700  E62     035164  GTSWR = 104407  LOADBA  002432
EM15    061413  E1      005776  E63     035356  HEADER  002612  LOADCS= 104425
EM17    061461  E10     012346  E64     035356  HIPAT   040510  LOADER= 000065
EM19    061521  E100    045622  E65     036602  HOLDLO= 000016  LOADHO  002576
EM2     060747  E101    046102  E66     036562  HT    = 000011  LOOP    013552
EM20    061573  E102    046102  E67     037016  I       002452  LSIZE   002400
EM21    061652  E103    053570  E7      012362  IBSAVE  052310  LST$$ = 000000
EM22    061706  E104    053570  E70     036730  IIII  = 177777  LWDBE = 000061
EM23    061733  E105    053654  E71     043552  ILLCSR  012724  LWSBE = 000057
EM24    061762  E106    053750  E72     044050  IMPTES  011750  L0      004662
EM25    062041  E107    054034  E73     044272  INCBNK  040520  L1      004724
EM26    062066  E11     013052  E74     044564  INCPAT  040474  L10     005222
EM27    062137  E12     013120  E75     044564  INCRPT  040474  L100    012334
EM29    062227  E13     013150  E76     044640  INHBAN  002540  L101    012340
EM3     061005  E14     013520  E77     045622  INHECC  002536  L102    013042
EM30    062311  E15     014260  FASTCI= 177640  INTFLA  002136  L103    013036
EM32    062421  E16     015630  FATAL$  002064  INT64K  002140  L104    013042
EM33    062526  E17     016414  FCMD10  044364  INVALI= 104511  L105    013136
EM35    062634  E2      006114  FCMD11  044412  IOTVEC= 000020  L106    013206
EM36    062721  E20     016374  FCMD12  044434  JMPRL1  037076  L107    013352
EM4     061037  E21     016324  FCMD13  044454  KAMIKA  002006  L11     005230
EM40    062770  E22     016324  FCMD14  044476  KAMITE  024234  L110    013552
EM5     061105  E23     016274  FCMD15  044514  KDIAG = 000010  L111    013510
EM50    063042  E24     022004  FCMD16  044600  KDPAR0= 172360  L112    013426
EM51    063076  E25     021770  FCMD17  044642  KDPAR6= 172374  L113    013430
EM52    063146  E26     022172  FCMD18  044656  KDPAR7= 172376  L114    013470
EM53    063173  E27     022156  FIELDS  041054  KERNEL= 104417  L115    013504
EM55    063222  E3      006210  FINDBA= 000067  KERSTK= 002000  L116    013550
EM56    063243  E30     022342  FINT$   007214  KFLAG   002530  L117    013552
EM57    063275  E31     022034  FIRST = 060000  KIPAR0= 172340  L12     005300
EM6     061162  E32     026414  FLIPL0  002616  KIPAR4= 172350  L120    013666
EM60    063343  E33     026402  FLIPWA  032500  KIPAR5= 172352  L121    013776
EM61    063405  E34     027164  FLUSH   013672  KIPAR6= 172354  L122    014006
EM62    063426  E35     027150  FSCMD0  041252  KIPDR0= 172300  L123    014156
EM7     061207  E36     026764  FSCMD1  041354  KMAP  = 104422  L124    014156
ENASBE= 104506  E37     027134  FSCMD2  041464  KPFLAG  002114  L125    014244
ENA1SB= 104507  E4      006622  FSCMD3  041632  KSIZE   002376  L126    014356
END     071612  E40     027210  FSCMD4  042106  KSTACK  002574  L127    014464
ENDADD  002562  E41     027234  FSCMD5  042426  LAST  = 157776  L13     005274
ENDFLG  002564  E42     030064  FSCMD6  043344  LASTBA  002556  L130    014614
ENERGI= 104420  E43     030270  FSCMD7  043352  LASTBL  002560  L131    014744
ENEXBK  040446  E44     030256  FSCMD8  043644  LASTER  002016  L132    015074
EOFLAG  002132  E45     030536  FSCMD9  044072  LBLS0 = 000530  L133    015246
ERRADD  002460  E46     031022  FSINFL  002442  LBLS1 = 000107  L134    015376
ERRGEN= 104512  E47     031220  FSPAT   043126  LBLS2 = 000520  L135    015550
ERRMAX  002554  E5      006612  FSSTAC  002306  LBLS3 = 000513  L136    015630
ERROR = 104000  E50     031542  FS1     041140  LBLS4 = 000366  L137    015666
ERRPC   002020  E51     031524  FS7FLA  002446  LBLS5 = 000370  L14     005300
ERRPSW  002030  E52     031510  FULLRE  002542  LBLS6 = 000023  L140    015676
ERRSP   002024  E53     031726  GBLENG= 000076  LCSROU= 000063  L141    016324
ERRVEC= 000004  E54     032212  GETCSR  032674  LCSRRE= 000101  L142    016306
EVEN    002364  E55     032202  GETDAT  045252  LCSRSA= 000077  L143    016356
EXBANK  040052  E56     032170  GETDA1  045350  LEGALC= 000010  L144    016626
EXCMD3  042040  E57     035020  GETDIS  051430  LF    = 000012  L145    016736
EXCMD4  042360  E6      011676  GOOD    002044  LINK1   002522  L146    017074
EXIT    040604  E60     035020  GOOD2   002046  LINK2   002524  L147    017122
EXIT2   040610  E61     035164  GOOD3   002050  LKS   = 177546  L15     005610
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L150	017126	L237	026764	L334	033434	L416	043044	L501	051604		
L151	017130	L24	006156	L335	033530	L417	0430	L502	052044		
L152	017174	L240	026714	L336	033520	L42	0065	L503	052000		
L153	017230	L241	026726	L337	033526	L420	04307	L504	052024		
L154	017234	L242	026744	L34	006374	L421	043422	L505	052044		
L155	017236	L243	026752	L340	033536	L422	043424	L506	052064		
L156	017404	L244	026776	L341	033562	L423	043536	L507	052256		
L157	017764	L245	027134	L342	033664	L424	044050	L51	006700		
L16	005610	L246	027034	L343	034532	L425	044034	L510	052126		
L160	020370	L247	027046	L344	034540	L426	044004	L511	052254		
L161	020400	L25	006146	L345	034776	L427	044142	L512	052204		
L162	020400	L250	027100	L346	034776	L43	006554	L513	052216		
L163	020472	L251	027064	L347	035040	L430	044144	L514	052254		
L164	020502	L252	027076	L35	006430	L431	044256	L515	052264		
L165	020502	L253	027122	L350	035046	L432	044546	L516	052620		
L166	021036	L254	027110	L351	035142	L433	044550	L517	053546		
L167	021070	L255	027122	L352	035142	L434	045014	L52	010636		
L17	005724	L256	027234	L353	035204	L435	045030	L520	053752		
L170	021134	L257	030134	L354	035212	L436	045034	L521	053756		
L171	021754	L26	006154	L355	035334	L437	045052	L522	054036		
L172	021732	L260	030140	L356	036416	L44	006576	L523	054042		
L173	021754	L261	030224	L357	036432	L440	045200	L524	055044		
L174	022020	L262	030242	L36	006434	L441	045202	L525	055050		
L175	022142	L263	030246	L360	036444	L442	045246	L526	055172		
L176	022120	L266	030364	L361	036444	L443	045472	L527	055262		
L177	022142	L267	030522	L362	036546	L444	045600	L53	010642		
L2	005032	L27	006164	L363	036576	L445	046060	L530	055264		
L20	005752	L271	030570	L364	036720	L446	047376	L54	010644		
L200	022326	L272	030576	L365	036720	L447	047400	L55	011374		
L201	022326	L273	030722	L366	036720	L45	006602	L56	011410		
L202	022434	L274	030772	L367	036700	L450	050230	L57	011512		
L203	022406	L276	031132	L37	006464	L451	050242	L6	005230		
L204	022464	L277	031202	L370	036720	L452	050260	L60	011516		
L205	022654	L3	005054	L371	036762	L453	050262	L61	011662		
L206	023170	L301	031354	L372	036762	L454	050302	L62	011662		
L207	023424	L302	031430	L373	037012	L455	050314	L63	011662		
L21	005770	L303	031446	L374	040204	L456	050332	L64	011662		
L210	023444	L304	031474	L375	040374	L457	050334	L65	011656		
L211	023544	L31	006262	L376	040556	L460	050350	L66	011734		
L212	023724	L310	031636	L377	040624	L461	050552	L67	011740		
L213	023732	L311	031700	L4	005072	L462	050560	L7	005230		
L214	024070	L313	032016	L40	006510	L463	050606	L70	011742		
L215	024076	L314	032022	L400	040630	L464	050620	L71	012124		
L216	024256	L315	032074	L401	040636	L465	050636	L72	012124		
L217	024264	L316	032076	L402	040652	L466	050650	L73	012124		
L220	024270	L317	032134	L403	040664	L467	050662	L74	012130		
L221	025704	L32	006266	L404	041076	L470	050704	L75	012346		
L222	025742	L320	032154	L405	041106	L471	050752	L76	012346		
L223	026022	L321	032160	L406	041242	L472	051032	L77	012336		
L225	026172	L325	032252	L407	041302	L473	051046	MAINT =	177750		
L226	026176	L326	032250	L41	006562	L474	051050	MAPH0 =	170202		
L227	026272	L327	032272	L410	041306	L475	051164	MAPKER	037740		
L230	026350	L33	006332	L411	041336	L476	051254	MAPL0 =	170200		
L231	026366	L330	032272	L412	041350	L477	051264	MAPL1 =	170204		
L232	026372	L331	032410	L413	042536	L5	005150	MAPPER	035716		
L235	026642	L332	032456	L414	042576	L50	006636	MASK	002320		
L236	026652	L333	033034	L415	042636	L500	051604	MBERR	012602		

MEMDON 013620
MFPT = 000007
MJPAT 017430
MJTEST 017324
MKCNT 016476
MKCONT 015656
MKCSRT 017014
MKFLAG 002120
MKLOOP 016040
MKPAT 017244
MKTEST 017104
MMR0 = 177572
MMR1 = 177574
MMR2 = 177576
MMR3 = 172516
MMTRAP 034126
MMVEC = 000250
MONFLG 002276
MSEEDH 002606
MSEEDL 002610
MSGA12 071210
MSGA34 067207
MSGB34 067245
MSG000 071422
MSG001 065123
MSG002 065205
MSG003 065262
MSG004 065367
MSG005 065475
MSG006 065507
MSG008 071370
MSG009 065544
MSG010 065556
MSG011 065656
MSG012 065744
MSG013 066056
MSG014 066060
MSG015 066062
MSG016 066064
MSG017 066076
MSG018 066107
MSG019 066112
MSG020 066116
MSG021 066137
MSG022 066725
MSG023 066747
MSG025 066763
MSG026 067007
MSG027 067021
MSG028 067036
MSG029 067052
MSG030 067072
MSG031 067111
MSG032 067151
MSG033 067170
MSG035 067273
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MSG037 067315
MSG038 067334
MSG039 067352
MSG040 067374
MSG041 067420
MSG042 067445
MSG043 067463
MSG046 067505
MSG047 067540
MSG048 067557
MSG049 067617
MSG051 067652
MSG055 067671
MSG056 067712
MSG058 067745
MSG061 067767
MSG062 067776
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MSG064 070027
MSG065 070037
MSG066 070051
MSG067 070120
MSG070 070127
MSG073 070160
MSG075 070176
MSG076 070230
MSG077 070251
MSG079 070265
MSG085 070311
MSG088 070336
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MSG092 070424
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MSG095 070446
MSG101 070456
MSG102 070506
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MSG104 070557
MSG105 070561
MSG106 070634
MSG107 070652
MSG11A 065570
MSG11B 066041
MSG11C 066043
MSG11D 066045
MSG110 070727
MSG111 070773
MSG112 071025
MSG113 071057
MSG117 071112
MSG119 071124
MSG120 071133
MSG121 071154
MSG122 071174
MSG125 071242
MSG126 071264
MSG127 071331
MSG128 071350
MSG129 071471
MSG130 071474
MSIZE 002402
MTA030 022212
MTEST 015562
MTPA03 024750
MTPA04 025106
MTPA21 026442
MTPA24 027266
MTPA26 027360
MTPB03 025010
MTPB04 025142
MTPB21 026472
MTPB24 027326
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NC 047400
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NEWLOA 037774
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NOCH 054552
NOERRO 002430
NOFSMO 002426
NONEM 002100
NONEXI 034050
NOOJ 033034
NOOJ1 033144
NOPAR 002076
NORES 003722
NOSCOP 002440
NOSUPE 002456
NOTAB 002372
NOTRCE 051200
NOUBMT 071547
NO22BI 002454
NULLFL 002344
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OLDCSR 002156
ONES 002614
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PARBAF 015260
PARBAW 015410
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PERR25= 104451
PERR26= 104452
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PERR31= 104455
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PERR34= 104460   SAV32   003710   SUPDR1  002162   TOOMAN  002406   WOOPUP  046472
PERR35= 104461   SAV4    002270   SUPDR2  002164   TOTCSR  002224   WORST   002600
PERR36= 104462   SBEMSK  002252   SUPDR3  002166   TRACE   006216   XOCHAR  047246
PERR37= 104463   SBENT   016756   SUPDR4  002170   TRAPVE= 000034   XXDPCH  002354
PERR40= 104464   SBESYN  026422   SUPDR5  002172   TSTBAN  011302   ZEROS   002336
PERR41= 104465   SBETES  016500   SUPDR6  002174   TSTDAT  002246   $APTHD  056750
PERR42= 104466   SCOPE = 000004   SUPLIM  047456   TSTRD1  034542   $AUTO   002062
PERR43= 104467   SDPAR0= 172260   SUPSTK= 000740   TSTREA= 104510   $BANK   002013
PERXOR  050422   SDPAR5= 172272   SWAPAT  002634   TST1    005630   $BASE   056722
PFECDF  052732   SDPAR6= 172274   SWR     002636   TST2    010460   $BELL   002653
PFECDH  052672   SDPAR7= 172276   SWREG = 000176   TST3    010644   $CACHF  034256
PFECDT  052722   SEEDHI  002602   SWREND  055054   TST4    011526   $CACHN  034232
PFECEM  052636   SEEDLO  002604   SWRFLG  002566   TST5    013552   $CBCSR  034672
PFECWS  052626   SELONL  002002   SW0   = 000001   TST6    013624   $CBREG  035662
PFLAG   002122   SETPAT  040510   SW1   = 000002   TYPDS = 104405   $CB1CS  034714
PGMCSR  002532   SHADL1  011444   SW10  = 002000   TYPEIT= 104401   $CDW1   056726
PHEBE   012604   SHUTUP  040636   SW11  = 004000   TYPOC = 104402   $CDW2   056730
PHYADD  002040   SIPAR0= 172240   SW12  = 010000   TYPOS = 104403   $CHARC  047434
PMEMFL  002142   SIPAR3= 172246   SW13  = 020000   TYPS0 = 000000   $CHKDI  035266
PROTYP  004010   SIPAR5= 172252   SW14  = 040000   TYPS1 = 000002   $CHK1D  035302
PSIZE   002404   SIPAR6= 172254   SW15  = 100000   TYPS2 = 000000   $CKSWR  054530
PSW   = 177776   SIPDR0= 172200   SW2   = 000004   TYPS3 = 000000   $CLRCS  035244
PTABLE  030276   SIZE  = 040000   SW3   = 000010   TYPS4 = 000000   $CLR1C  035256
PWRVEC= 000024   SKIPKA  002010   SW4   = 000020   TYPS5 = 000000   $CMTAG  002000
QUICK   002436   SKIPMK  002342   SW5   = 000040   TYPS6 = 000002   $CMTGE  002544
QUIT    040534   SKJ     051226   SW6   = 000100   UDPAR0= 177660   $CNTLC  055736
QUIT1   040600   SKPERR  002066   SW7   = 000200   UDPAR7= 177676   $CNTLG  055750
QVFLAG  002346   SKUB    037012   SW8   = 000400   UFDSET  002000   $CNTLK  055144
RANODD  027410   SKUJ    012606   SW9   = 001000   UIPAR0= 177640   $CNTLU  055743
RDCHR = 104411   SOBK    002572   SYNREG= 104514   UIPAR1= 177642   $CPUOP  056674
RDDEC = 104414   SOBLEN= 000056   SYSSIZ  004012   UIPAR2= 177644   $CRLF   002660
RDLIN = 104412   SOFTPA  002620   TAG2$   011046   UIPAR3= 177646   $DBLK   054520
RDOCT = 104413   SOURCE  002312   TAG3$   011102   UIPAR4= 177650   $DB20   056526
READCS= 104426   SPLTCS  002240   TAG4$   024364   UIPAR5= 177652   $DDW0   056734
READON  002410   SSP   =%000006   TAG70$  052736   UIPAR6= 177654   $DDW1   056736
REALPA  002300   ST    = 177776   TAG71$  052746   UIPDR0= 177600   $DDW2   056740
REFRES  027166   STACK = 002000   TAG72$  052756   UNITOP  002416   $DDW3   056742
REFSUB  027236   START   003670   TAG73$  053026   UNMAP   040026   $DDW4   056744
REGCOP  032470   START1  000300   TAG74$  053066   UNRELO  037214   $DDW5   056746
RELENT  037022   START2  000310   TAG75$  053100   UPPFLG  002265   $DDW7   056732
RELOCA  036402   START3  000200   TAG76$  053112   USERMA  037610   $DEENE  034222
RELOC1  037036   STAR27  021634   TAG77$  053156   USESTK= 000700   $DEVCT  056656
RESREG= 104416   STOPOK  002420   TAG78$  053164   USP   =%000006   $DEVM   056724
RESTAR  002626   STRIPE  002366   TAG79$  053244   VMKOR   003712   $DIDD0= 000000
RESVEC= 000010   SUBAAA  004702   TAG9$   010710   WARN1   010776   $DOAGA  014156
RES0    041350   SUBAAB  005032   TBG4$   024542   WARN2   024762   $DOAGN  014052
RES1    041430   SUBAAI  011440   TCFIG1  033404   WARN3   024776   $DOWN   045722
RES2    041576   SUBAAP  012766   TCFIG2  033444   WARN4   025022   $DTBL   054510
RLFLAG  002126   SUBAAR  012172   TCFIG3  033600   WARN5   025036   $ECCDI  034570
RRFLAG  002124   SUBAAS  010454   TCONFI  033336   WASDBE= 104500   $ECCIN  034616
RTNVAL=%000000   SUCCES  002334   TEMP    002434   WASSBE= 104476   $ECC1D  034604
RWCSR   006220   SUPD0A  002262   TESTAD  002412   WAS1DB= 104501   $ECC1I  034632
SAVCSR  002154   SUPD01  024270   TESTM0  002552   WAS1SB= 104477   $ENASB  034644
SAVMON  002274   SUPD02  024304   TIME    002340   WHICHC  044670   $ENA1S  034660
SAVPAR  002272   SUPD03  024446   TIMEOU  034114   WOOPEN  046654   $ENDAD  014042
SAVREG= 104415   SUPD04  024462   TKVEC = 000060   WOOPS   046306   $ENERG  034212
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CVMJAA0 MSV11-J MEMORY DIAG. MACRO V05.01b Friday 15-Feb-85 16:10 Page 473-20
Symbol table

SEQ 0445

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$EOP    013676          $LPADR  002622          $PASTM  056756          $PWRDN  045352          $TSTM   056754
$ERFLG  002014          $LPERR  002624          $PATMA  002012          $PWRUP  045726          $TSTRD  034410
$ERRGE  035412          $L$    = 000000         $PER01  047456          $QUES   002657          $TTYIN  055712
$ERROR  051502          $MADR1  056700          $PER02  047504          $R     = 17777/         $TYPDS  054304
$ERRTB  057274          $MADR2  056704          $PER03  047532          $RAND   056432          $TYPE   047122
$ERRTY  052316          $MADR3  056710          $PER04  047562          $RDCHR  055264          $TYPEC  047250
$ERTTL  002630          $MADR4  056714          $PER07  047644          $RDDEC  056150          $TYPEX  047436
$ESCAP  002362          $MAIL   056646          $PER10  047666          $RDLIN  055414          $TYPOC  054102
$ETABL  056666          $MAMS1  056676          $PER11  047716          $RDOCT  056000          $TYPON  054116
$ETEND  056750          $MAMS2  056702          $PER12  047736          $READC  034370          $TYPOS  054056
$EXHAL  040630          $MAMS3  056706          $PER13  047760          $RESRE  056374          $T1    = 000000
$E$    = 000001         $MAMS4  056712          $PER14  050000          $SAVRE  056336          $T2    = 000530
$FATAL  056650          $MBADR  056752          $PER15  050022          $SAVR6  046304          $UNIT   056660
$FILLC  002652          $MNEW   055766          $PER16  050044          $SCOPE  051146          $UNITM  056760
$FILLS  002357          $MSGAD  056662          $PER17  050064          $STN   = 000001          $USWR   056672
$F$    = 000000         $MSGLG  056664          $PER20  050102          $SVLAD  051402          $VECT1  056716
$GTSWR  054704          $MSGTY  056646          $PER21  050120          $SV$   = 000000          $VECT2  056720
$HALT   052100          $MSWR   055755          $PER22  050140          $SWR   = 163000          $WASDB  035100
$HALT2  057024          $MTYP1  056677          $PER23  050156          $SWREG  056670          $WASSB  034734
$HIBTS  056750          $MTYP2  056703          $PER24  050174          $SYNRE  035700          $WAS1D  035214
$HIOCT  056146          $MTYP3  056707          $PER25  044756          $T     = 000531          $WAS1S  035050
$ILLUP  046300          $MTYP4  056713          $PER26  050364          $TESTN  056652          $XTSTR  051274
$INVAL  035362          $NOTRA  057020          $PER27  050404          $TKB    002644          $Y$    = 000000
$ITEMB  002015          $NULL   002356          $PER30  045204          $TKS    002642          $ZAP42  014022
$I$    = 000001         $NWTST= 000001          $PER31  050574          $TN    = 000007          $Z$    = 000000
$KERNE  034202          $OCNT   054300          $PER32  050672          $TPB    002650          $$S    = 000000
$KMAP   036310          $OCTVL  056630          $PER33  050740          $TPFLG  002360          $$T    = 000512
$K$    = 000103         $OCT8 = 056634          $PER34  051020          $TPS    002646          $$TT   = 000520
$L     = 000110         $OMODE  054302          $PER35  051052          $TRAP   056764          $OFILL  054301
$LF     002661          $OVER   051416          $PER36  051106

. ABS.  071612    000   (RW,I,GBL,ABS,OVR)
        000000    001   (RW,I,LCL,REL,CON)
Errors detected:  0

*** Assembler statistics


Work  file  reads: 1286
Work  file writes: 949
Size of work file: 25487 Words  ( 100 Pages)
Size of core pool: 17688 Words  ( 68 Pages)
Operating  system: RSX-11M/PLUS

Elapsed time: 00:32:57.57
CVMJA0.BIN,CVMJA0/NL:TOC=CVMJA0/ML,CVMJA0.MAC
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