

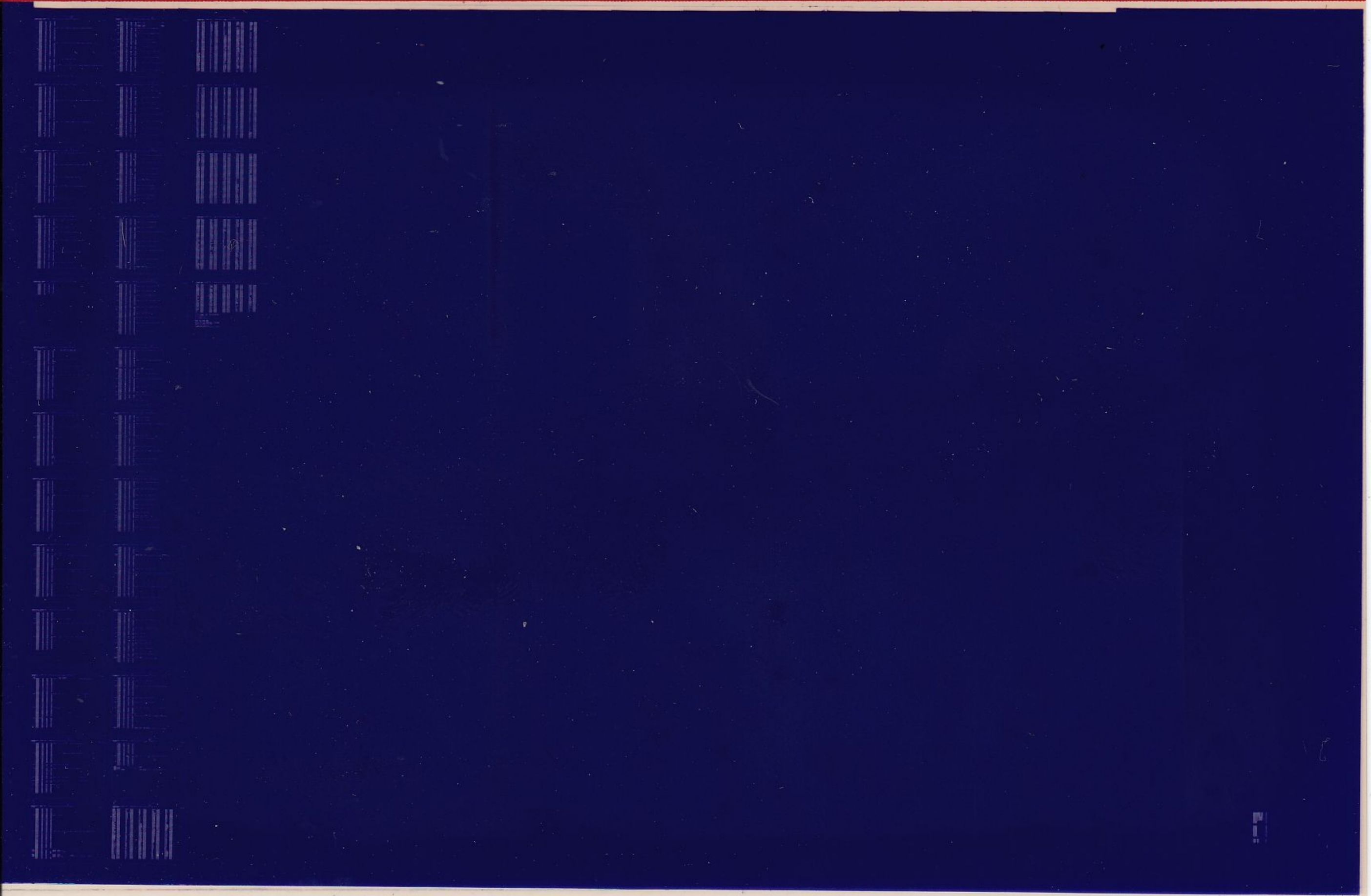
The image shows a dense grid of memory diagnostic data. The data is organized into columns and rows. Some sections are highlighted in white, indicating specific memory addresses or data points. The text is small and difficult to read, but appears to be hexadecimal or binary values. There are some faint markings and a small white circle on the left side of the grid.

MSV11-J

MSV11-J MEMORY DIAG
CVMJAA0

AH-U136A-MC
3 OF 3 JUL 1985
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IDENTIFICATION

PRODUCT CODE: AC-U135A-MC
PRODUCT NAME: CVMJAA MSV11 J MEMORY DIAGNOSTIC
PRODUCT DATE: MARCH 1985
MAINTAINER: E.S.D. METHODS

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OPERATIONAL SWITCH SETTINGS
SWITCH REGISTER DEFINITIONS

* 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 (UNRELOCATED 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

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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

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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)

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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

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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

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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

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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.

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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 extremely time consuming.

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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 conjunction with the corresponding

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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.

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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".

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604 SW10 = BELL ON ERROR
605 (2000)
606 This causes a bell (or beep or click) on each error
607 trap
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610 SW9 = LOOP ON ERROR
611 (1000)
612 This will cause looping from failure point back to the
613 last correctly initialized area of the current test.
614
615
616 SW8 = HALT PROGRAM
617 (400)
618 This initiates the following sequence:
619
620 1. If program is relocated it moves back to bank zero.
621 2. Flush out all possible DBE's.
622 3. Turns off Memory Management.
623 4. Restore loaders.
624 5. Unmap the Unibus Map (if there is one).
625 6. Halt if under APT or ACT branch sel.
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634 SW7 = DETAILED ERROR REPORTS
635 (200)
636 After any normal error report is typed this option
637 causes the contents of the following registers to be
638 typed:
639 R0, R1, R2, R3, R4, R5, SP, "CONTROL", "CPUERR
640
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642 SW6 = INHIBIT CONFIGURATION MAP
643 (100)
644 This inhibits the printing of a map showing the memory
645 configuration - reference section 7.3
646
647
648 SW5 = LIMIT MAX ERRORS PER BANK
649 (40)
650 This will limit the number of error typeouts per bank.
651 The default is 10. DECIMAL, however this can be
652 changed by changing location "ERRMAX" manually.
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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	BAFPAF	Banks forward, patterns reverse
(4)	2	BAWPAF	Banks worst first, patterns forward.
(6)	3	BAWPAF	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.

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Assume also that Bank 3 is known bad by the program via the sizing routine or previous runs The testing sequence would be as follows:

;TEST MSV11-J MEMORY TYPES FIRST
;TEST KNOWN BAD MEMORY (BANK 3)

TEST 17, BANK 3
TEST 7, BANK 3
TEST 1, BANK 3
TEST 2, BANK 3
TEST 4, BANK 3
TEST 5, BANK 3
TEST 21, BANK 3
TEST 20, BANK 3
TEST 22, BANK 3
TEST 26, BANK 3

;TEST PRESUMED GOOD MEMORY (BANKS 2,4,5)

TEST 17, BANK 2
TEST 7, BANK 2
TEST 1, BANK 2
TEST 2, BANK 2
TEST 4, BANK 2
TEST 5, BANK 2
TEST 21, BANK 2
TEST 20, BANK 2
TEST 22, BANK 2
TEST 26, BANK 2
TEST 17, BANK 4
TEST 7, BANK 4
TEST 1, BANK 4
TEST 2, BANK 4
TEST 4, BANK 4
TEST 5, BANK 4
TEST 21, BANK 4
TEST 20, BANK 4
TEST 22, BANK 4
TEST 26, BANK 4
TEST 17, BANK 5
TEST 7, BANK 5
TEST 1, BANK 5
TEST 2, BANK 5
TEST 4, BANK 5
TEST 5, BANK 5
TEST 21, BANK 5
TEST 20, BANK 5
TEST 22, BANK 5
TEST 26, BANK 5

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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
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NOTE

This is an example not an actual sequence.

The test sequence was forward (the simple patterns first, complex tests last) sequence of patterns (MSV11-L = 17, 7, 1, 2, 4, 5, 21, 20, 22, 26)(MSV11-J = 1, 2, 3, 4, 5, 26).

If the bank selection is forward the banks will be tested in the following order:

1. ECC banks that are not protected or program space (from 0 to 167).
2. Parity banks that are not program space (from 0 to 167).
3. The program now relocates tests:
4. ECC banks that were protected or program space (from 0 to 167).
5. Parity banks that were program space (from 0 to 167).

If bank selection is worst first the configuration table will be consulted and banks will be tested in the following order.

1. ECC banks that are known bad and are not protected or program space (from 0 to 167).
2. Parity banks that are known bad and are not program space (from 0 to 167).
3. ECC banks that are presumed good and are not protected or

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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 forward

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

872 from 0 to 167 except those requiring relocation*, then
873 presumed good banks are tested from 0 to 167 except
874 those requiring relocation*.
875
876 While testing each bank the patterns are run with the
877 most complex ones first, working to the simple ones.
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879 MODE 4 = "PAFBAF" = Patterns forward, banks forward
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881 This mode tests each pattern completely with the simple
882 ones first, building to the more complex.
883
884 While testing each pattern the banks are run from 0 to
885 167 except those requiring relocation*.
886
887
888 MODE 5 = "PAFBAW" = Patterns forward, banks worst first
889
890 This mode tests each pattern completely with the simple
891 ones first, building to the more complex.
892
893 While testing each pattern first each known bad bank
894 from 0 to 167 except those requiring relocation* is
895 run, then presumed good banks are run from 0 to 167
896 except those requiring relocation*.
897
898 MODE 6 = "PARBAF" = Patterns Reverse, Banks Forward
899
900 This mode tests each pattern completely with the most
901 complex ones first, working to the simple ones.
902
903 While testing each pattern the banks are run from 0 to
904 167 except those requiring relocation*.
905
906 MODE 7 = "PARBAW" = Patterns Reverse, Banks Worst First
907
908 This mode tests each pattern completely with the most
909 complex ones first, working to the simple ones.
910
911 While testing each pattern first each known bad bank
912 from 0 to 167 except those that require relocation* is
913 run, then presumed good banks are run from 0 to 167
914 except those requiring relocation*.
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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)!

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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.

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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).

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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, unrellocate 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).

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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" (Continue)

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

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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.

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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.

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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.

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2.4.4.7.8 Field Service Command 7 (SOB-A-LONG TEST)

This command allows execution of the SOB-A-LONG Test on all non-protected Banks reference Section 6.2.2.26. Operation is identical to command 5 except that no Pattern or Bank is entered and each pass causes a Bell.

2.4.4.7.9 Field Service Command 8 (Error Summary)

This command types out the number of passes and the total number of errors. If there were any errors it will type out the Banks and the number of errors per bank up to 255 DECIMAL.

This becomes useful after long runs (all night) on systems with a video console terminal.

2.4.4.7.10 Field Service Command 9 (Refresh TEST)

This command allows execution of the Refresh Test on all non-protected Banks reference Section 6.2.2.19. Operation is identical to command 5 except that no Pattern or Bank is entered and each pass causes a Bell.

2.4.4.7.11 Field Service Command 10 (Set Fill Count)

This command allows setting of the terminal fill count (necessary for LA30's, ASR33's, and VT05's). It is normally set to zero for LA36's, VT52's, VT100's, etc.

2.4.4.7.12 Field Service Command 11 (Enter Kamikaze Mode)

This command allows you to run patterns that are normally not executed unless under APT or ACT. They are usually very time consuming and can result in failures that are fatal to the program. In effect you are trying to find a hardware failure regardless of the consequences. Note that most crashes do not wipe out the display information which is telling you what the program was doing just prior to failure. There are two ways to die here Impatience and Crashes.

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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 inaccessible 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).

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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.

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2.5.3 Typical (Tests)

Test Time	Description
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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
MTC035 ; <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

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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.

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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.
APTM'S	APT MOS size.
BAC	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

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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.

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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

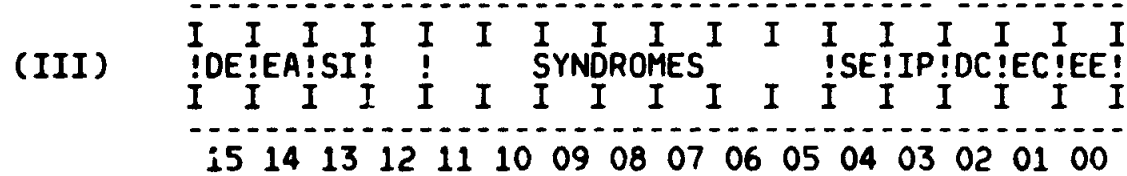
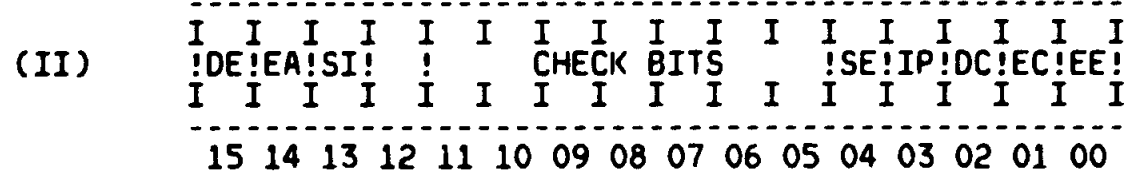
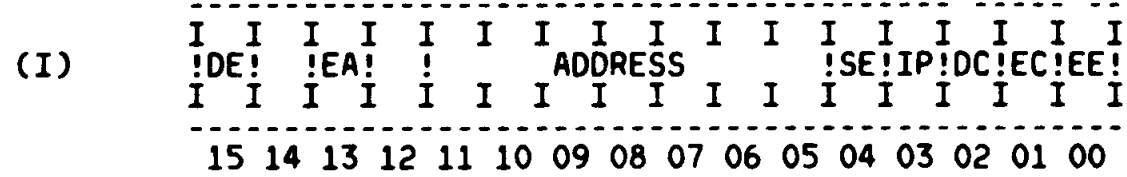
The following is a picture view of the current control status registers which can be tested by this program. It shows bit assignments and definitions to provide a handy reference, and shows the similarities and differences between each one:

NOTE

All unused bits in each CSR are equal to zero.

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5.1 MSV11-J CSR



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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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

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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 set 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 syndromes will

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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.

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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

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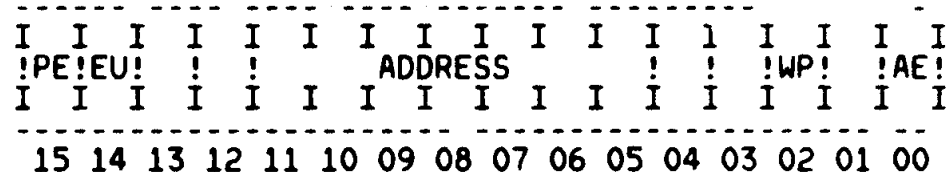
have been generated on the data written. This means that if a single or double error existed in the location accessed, it would be cleared (unless the errors were hard).

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.

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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.

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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

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6.2 Tests

6.2.1 General Test Information

Actual Tests are identified by symbolic locations "MTPXY" 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
\$DDW1:	.WORD	177777	;ECC CSR TESTS
\$DDW2:	.WORD	177777	;ECC TESTS
\$DDW3:	.WORD	177777	;ECC TESTS
\$DDW4:	.WORD	177777	;PARITY TESTS
\$DDW5:	.WORD	177777	;PARITY TESTS

```
177777 TABLE = MKCSRT:
177777 TABLE = MKCSRT:
103777 TABLE = MKPAT:
177777 TABLE = MKPAT:
003777 TABLE = MJPAT:
177774 TABLE = MJPAT:
```

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2111
2112
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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 PERRO2 and NOP are replaced with INC @#PATERR).

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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
2166
2167
2168
2169
2170
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6.2.2.3 Test 2 Complement Address Test

Writes the complement of the physical address from high addresses to low (write down) and reads from low addresses to high (read up).

This provides the complement of the coverage of Test 1 in both data pattern and addressing sequence.

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

2175
2176
2177
2178
2179
2180
2181
2182
2183
2184
2185
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2187
2188
2189
2190
2191
2192

6.2.2.4 Test 3 3 XOR 9

Writes Reads a Test that complements as address bits 3 and 9 change.

This test is run 4 times (1) with Zeros Ones, (2) with Ones Zeros, (3) with 401 Ones, and (4) with Ones 401. The test of the 401 is to force a the parity bits to become involved.

It can execute out of the USER Data PDR's, the User Instruction PAR's, the Kernel Data PAR's and the Supervisor Data PAR's.

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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.

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2237
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2239
2240
2241
2242
2243

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.

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6.2.2.8 Test 7 Address Bit Test

Writes a background of all Zeros.

Read Address 1 for a 0 Byte.

Complement Address 1.

Read Address 1 for a non 0 Byte.

For each Address Bit position from Bit 1:

Virtual (2, 4, 10, 20, 40, 100, 200, 400, 1000, 2000, 4000, 10000,
60000, 20000)

Physical (60002, 60004, 60010, 60020, 60040, 60100, 60200, 60400,
61000, 62000, 64000, 70000, 140000, 100000)

Read Address for a 0 word.

Complement Address contents.

Read Address for a non-zero word.

This is a very quick check of the address bit uniqueness.

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6.2.2.9 Test 10 Byte Addressing Test

With ECC Disabled.

Writes all ones to a double word.

For each of the 4 Bytes in the Double Word.

Clears one byte.

Reads all 4 bytes from double word.

Checks for only proper byte clear.

All other bytes set to all ones.

This is only done on one double word address.

NOTE

This is run for ECC memory only

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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 exists 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

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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.

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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

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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.

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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	LSB's	MSB'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).

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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).

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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).

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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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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.

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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).

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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).

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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 (Kamikeze Mode).

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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 ;INC LOW BYTE
        ADCB BGTEST ;END LOOP AFTER 128 TIMES
        BMI 1$ ;INC HIGH BYTE
        INCB BGTEST+1 ;LOOP 128 TIMES
        BR BRGOBB ;BRANCH IF V-BIT SET (SHOULD BE)
1$:     BVS ERROR ;ERROR TRAP
        CLV ;CLEAR V-BIT
2$:     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 originally came from the PDP-11 Family Instruction Exerciser DZQKA-A. The first MOS memorys fell succceptable 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).

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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.

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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 occurs.
3. Make sure error address bits are set correctly.
4. Write good parity without trapping, and make sure no trap occurs when read.

NOTE

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

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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 occur 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

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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.

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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.

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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 appear 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

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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 corresponding 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

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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

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6.2.2.31 Test 45 Syndrome Bits to the CSR on a DBE Test

1. Write CSR with Diag mode to enable Check/Syndrome bit Register.
2. Write CSR with DBE check bits of 110011 with Diag mode.
3. Write memory with data of zeros creating a DBE.
4. Clear CSR.
5. Read memory to detect DBE.
6. Read CSR for Uncorrectable error indicator.
7. Write CSR to Diag mode to read Syndrome bits into CSR.
8. Read CSR for correct Syndrome bits of 111111.
9. Repeat (1-8) with Multiple Bit Error check bits of 111100 and corresponding Syndrome Bits of 110000.

This test checks the ability of the CSR to detect a DBE and read for the proper Syndrome bits generated by the EDC chip. This test is then repeated with check bits corresponding to a Multiple Bit error.

NOTE

This test is only run for the MSV11-J

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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 occurred.
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 as 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

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- 6.2.2.33 Test 47 NO CSR Update On SBE with existing 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 indicator
 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

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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.

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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

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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 overcome this because the QBUS Map can fool APT.

Because of the previous arguments this program does not relocate in the true sense 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

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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			
		0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3
ERRORS																													
MEMTYPE		E	E	E	E	E	E	E	E	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	E	E	E	E
CSR		0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PROTECT		P	P							I	I	I	I	I	I	I	I	P	P	P	P	P	P	P	I	I	I	I	I
										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		0		1		2		3		4		5		6		7													
		4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
ERRORS																													
MEMTYPE		E	E	E	E																								
CSR		4	4	4	4																								
PROTECT																													

Displayed 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 sizing routine could not write zeros and ones in Banks 10 11, hence 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:

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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 line 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.

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7.4.1 Sample Source File -
.ENABL ABS
.ENABL AMA
.MCALL .SUPER
.SUPER
;LST$$=0
BITS=40
A: 0
B: 0
C: 0
D: 0
E: 0
F: 0
G: 0
H: 0
I: 0
J: 0
.PAGE
;LET EXAMPLES
LET RO := A
LET B := C + D
LET E := F + 1
LET G := H + 2
LET J := J + 01
LET A :B= B
;IF EXAMPLES
IF A IS TRUE
MOV 23,D
END ;OF IF A
IF B IS FALSE
MOV 34,E
END ;OF IF B
IF A EQ B THEN LET C := D
IF A LT B
MOV C,D
ELSE
MOV E,D
END ;OF IF A
IF A EQ B AND C NE D
MOV F,G
END ;OF IF A
IF A EQ B OR C NE D
MOV F,G
END ;OF IF A
IFB A EQ B AND C EQ 1
MOV H,J
ELSE
MOV E,J
END ;OF IFB A
IFB A EQ B ANDB C EQ 1
MOV H,J
ELSE
MOV E,J

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3423      END ;OF IFB A
3424      IF RESULT IS EQ
3425      MOV   A,B
3426      END ;OF IF RESULT
3427      IF BITS SET.IN A
3428      MOV   B,C
3429      END ;OF IF BITS
3430      IF BITS OFF.IN A
3431      MOV   C,D
3432      END ;OF IF BITS
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 RO := 0 TO 140 BY 4
3453      DEC  A(RO)
3454      END ;OF FOR RO
3455      FOR I := 133 DOWNT0 3 BY 2
3456      ADD  A,B
3457      END ;OF FOR I
3458      ;BEGIN EXAMPLES
3459      BEGIN ALPHA
3460      FOR RO := 0 TO 167
3461      MOVB A(RO),B
3462      IF B LT 0 THEN LEAVE ALPHA
3463      END ;OF FOR RO
3464      FOR RO := 400 TO 567
3465      IF B GE 0 THEN LEAVE ALPHA
3466      END ;OF FOR RO
3467      END ALPHA
3468      ;$RETURN EXAMPLES
3469      $RETURN
3470      $RETURN ERROR
3471      $RETURN NOERROR
3472      ;CASE EXAMPLES
3473      MOV   A,RO
3474      CASE RO
3475      A

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B
C
D
E
F
END ;OF CASE R0
.END

7.4.2 Sample Listing File (with No Expanded Macros) - -
.MAIN. MACRO M1111 01 APR-79 16:41 PAGE 2

1	000000			.ENABL ABS
2				.ENABL AMA
3				.MCALL .SUPER
4	000000			.SUPER
5				;LST\$\$=0
6		000040		BIT5=40
7	000000	000000	A:	0
8	000002	000000	B:	0
9	000004	000000	C:	0
10	000006	000000	D:	0
11	000010	000000	E:	0
12	000012	000000	F:	0
13	000014	000000	G:	0
14	000016	000000	H:	0
15	000020	000000	I:	0
16	000022	000000	J:	0

.MAIN. MACRO M1111 01-APR-79 16:41 PAGE 3

18				;LET EXAMPLES
19	000024			LET RO := A
20	000030			LET B := C + D
21	000044			LET E := F + 1
22	000056			LET G := H + 2
23	000072			LET J := J + 01
24	000100			LET A :B= B
25				;IF EXAMPLES
26	000106			IF A IS TRUE
27	000114	012737	000023	MOV 23,D
28	000122		000006	END ;OF IF A
29	000122			IF B IS FALSE
30	000130	012737	000034	MOV 34,E
31	000136			END ;OF IF B
32	000136			IF A EQ B THEN LET C := D
33	000154			IF A LT B
34	000164	013737	000004	MOV C,D
35	000172			ELSE

3531	36	000174	013737	000010	000006
3532	37	000202			
3533	38	000202			
3534	39	000222	013737	000012	000014
3535	40	000230			
3536	41	000230			
3537	42	000250	013737	000012	000014
3538	43	000256			
3539	44	000256			
3540	45	000276	013737	000016	000022
3541	46	000304			
3542	47	000306	013737	000010	000022
3543	48	000314			
3544	49	000314			
3545	50	000334	013737	000016	000022
3546	51	000342			
3547	52	000344	013737	000010	000022
3548	53	000352			
3549	54	000352			
3550	55	000354	013737	000000	000002
3551	56	000362			
3552	57	000362			
3553	58	000372	013737	000002	000004
3554	59	000400			
3555	60	000400			
3556	61	000410	013737	000004	000006
3557	62	000416			
3558	63				
3559	64				
3560	65	000416			
3561	66	000420	013737	000000	000002
3562	67	000426			
3563	68	000430	013737	000004	000002
3564	69	000436			
3565	70	000436			
3566	71	000440	013737	000004	000002
3567	72	000446			
3568	73	000450	013737	000000	000002
3569	74	000456			

```

MOV E,D
END ;OF IF A
IF A EQ B AND C NE D
MOV F,G
END ;OF IF A
IF A EQ B OR C NE D
MOV F,G
END ;OF IF A
IFB A EQ B AND C EQ 1
MOV H,J
ELSE
MOV E,J
END ;OF IFB A
IFB A EQ B ANDB C EQ 1
MOV H,J
ELSE
MOV E,J
END ;OF IFB A
IF RESULT IS EQ
MOV A,B
END ;OF IF RESULT
IF BITS SET.IN A
MOV B,C
END ;OF IF BITS
IF BITS OFF.IN A
MOV C,D
END ;OF IF BITS
;ON.ERROR IS LIKE AN IF STATEMENT ON THE C-BIT
;ON.ERROR EXAMPLES
ON.ERROR
MOV A,B
ELSE
MOV C,B
END ;OF ON.ERROR
ON.NOERROR
MOV C,B
ELSE
MOV A,B
END ;OF ON.NOERROR

```

.MAIN. MACRO M1111 01-APR-79 16:41 PAGE 3-1

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3572					
3573					
3574					
3575	75	000456			
3576	76				
3577	77	000466			
3578	78	000474	005237	000000	
3579	79	000500			
3580	80	000514			
3581	81	000516	005360	000000	
3582	82	000522			
3583	83	000534			

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ON.ERROR THEN LET A :B= B
;FOR EXAMPLES
FOR I := -5 TO 23
INC A
END ;OF FOR I
FOR RO := 0 TO 140 BY 4
DEC A(RO)
END ;OF FOR RO
FOR I := 133 DOWNT0 3 BY 2

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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 RO := 0 TO 167
3590	89	000570	116037	000000	000002	MOVB A(RO),B
3591	90	000576				IF B LT 0 THEN LEAVE ALPHA
3592	91	000604				END ;OF FOR RO
3593	92	000614				FOR RO := 400 TO 567
3594	93	000620				IF B GE 0 THEN LEAVE ALPHA
3595	94	000626				END ;OF FOR RO
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,RO
3603	102	000654				CASE RO
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 RO
3611	110					
3612	111		000001			.END

7.4.3 Sample Listing File (with Expanded Macros) - -
 .MAIN. MACRO M1111 01-APR-79 16:10 PAGE 2

3617	1	000000				.ENABL ABS
3618	2					.ENABL AMA
3619	3					.MCALL .SUPER
3620	4	000000				.SUPER
3621	5		000000			LST\$\$=0
3622	6		000040			BIT5=40
3623	7	000000	000000		A:	0
3624	8	000002	000000		B:	0
3625	9	000004	000000		C:	0
3626	10	000006	000000		D:	0
3627	11	000010	000000		E:	0
3628	12	000012	000000		F:	0
3629	13	000014	000000		G:	0
3630	14	000016	000000		H:	0
3631	15	000020	000000		I:	0
3632	16	000022	000000		J:	0

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19 000024 013700 000000
20 000030 000030 013737 000004 000002
000036 063737 000006 000002
21 000044 000044 013737 000012 000010
000052 005237 000010
22 000056 000056 013737 000016 000014
000064 062737 000002 000014
23 000072 000072 062737 000001 000022
24 000100 000100 113737 000002 000000
25
26 000106 000106 005737 000000
000112 001403
27 000114 012737 000023 000006
28 000122 000122
29 000122 000122 005737 000002
000126 001003
30 000130 012737 000034 000010
31 000136 000136
32 000136 000136 023737 000000 000002
000144 001003
000146 013737 000006 000004
000154
33 000154 000154 023737 000000 000002
000162 002004
34 000164 013737 000004 000006
35 000172 000172 000403
000174
36 000174 013737 000010 000006
37 000202 000202
38 000202 000202 023737 000000 000002
000210 001007
000212 023737 000004 000006
000220 001403
39 000222 013737 000012 000014
40 000230

;LET EXAMPLES
LET RO := A
MOV A,RO
LET B := C * D
MOV C,B
ADD D,B
LET E := F * 1
MOV F,E
INC E
LET G := H * 2
MOV H,G
ADD 2,G
LET J := J * 01
ADD 01,J
LET A := B * B
MOVB B,A
;IF EXAMPLES
IF A IS TRUE
TST A
BEQ L0
MOV 23,D
END ;OF IF A
L0:
IF B IS FALSE
TST B
BNE L1
MOV 34,E
END ;OF IF B
L1:
IF A EQ B THEN LET C := D
CMP A,B
BNE L2
MOV D,C
L2:
IF A LT B
CMP A,B
BGE L3
MOV C,D
ELSE
BR L4
L3:
MOV E,D
END ;OF IF A
L4:
IF A EQ B AND C NE D
CMP A,B
BNE L5
CMP C,D
BEQ L5
MOV F,G
END ;OF IF A

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000230
41 000230
000230 023737 000000 000002
000236 001404
000240 023737 000004 000006
000246 001403

L5:
IF A EQ B OR C NE D
CMP A,B
BEQ L6
CMP C,D
BEQ L7

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

000250
42 000250 013737 000012 000014
43 000256
000256
44 000256
000256 123737 000000 000002
000264 001010
000266 023727 000004 000001
000274 001004
45 000276 013737 000016 000022
46 000304
000304 000400
000306
47 000306 013737 000010 000022
48 000314
000314
49 000314
000314 123737 000000 000002
000322 001010
000324 123727 000004 000001
000332 001004
50 000334 013737 000016 000022
51 000342
000342 000403
000344
52 000344 013737 000010 000022
53 000352
000352
54 000352
000352 001003
55 000354 013737 000000 000002
56 000362
000362
57 000362
000362 032737 000040 000000
000370 001403
58 000372 013737 000002 000004
59 000400
000400
60 000400
000400 032737 000040 000000

L6:
MOV F,G
END ;OF IF A
L7:
IFB A EQ B AND C EQ 1
CMPB A,B
BNE L10
CMP C, 1
BNE L10
MOV H,J
ELSE
BR L11
L10:
MOV E,J
END ;OF IFB A
L11:
IFB A EQ B ANDB C EQ 1
CMPB A,B
BNE L12
CMPB C, 1
BNE L12
MOV H,J
ELSE
BR L13
L12:
MOV E,J
END ;OF IFB A
L13:
IF RESULT IS EQ
BNE L14
MOV A,B
END ;OF IF RESULT
L14:
IF BITS SET.IN A
BIT BITS,A
BEQ L15
MOV B,C
END ;OF IF BITS
L15:
IF BITS OFF.IN A
BIT BITS,A

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3744      61 000410 013737 000004 000006      MOV   C,D
3745
3746      62 000416      END ;OF IF BITS
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

```

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```

3762
3763
3764
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      MOV  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 000000      ADD  4,R0
3795      000526 020027 000140      CMP  R0, 140

```

3797		000532	003771						
3798		000534							
3799		83	000534					E1:	BLE B1
3800			000534	012737	000133	000020			FOR I := 133 DOWNT0 3 BY 2
3801			000542						MOV 133,I
3802		84	000542	063737	000000	000002		B2:	ADD A,B
3803		85	000550						END ;OF FOR I
3804			000550	162737	000002	000020			SUB 2,I
3805			000556	023727	000020	000003			CMP I, 3
3806			000564	002366					BGE B2
3807			000566					E2:	
3808		86							;BEGIN EXAMPLES
3809		87	000566						BEGIN ALPHA
3810			000566					B3:	
3811		88	000566						FOR RO := 0 TO 167
3812			000566	005000					CLR RO
3813			000570					B4:	
3814		89	000570	116037	000000	000002			MOVB A(RO),B
3815		90	000576						IF B LT 0 THEN LEAVE ALPHA
3816			000576	005737	000002				TST B
3817			000602	002415					BLT E3
3818		91	000604						END ;OF FOR RO
3819			000604	005200					INC RO
3820			000606	020027	000167				CMP RO, 167
3821			000612	003766					BLE B4
3822			000614					E4:	
3823		92	000614						FOR RO := 400 TO 567
3824			000614	012700	000400				MOV 400,RO

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3825									
3826									
3827									
3828									
3829									
3830			000620					B5:	
3831		93	000620						IF B GE 0 THEN LEAVE ALPHA
3832			000620	005737	000002				TST B
3833			000624	002004					BGE E3
3834		94	000626						END ;OF FOR RO
3835			000626	005200					INC RO
3836			000630	020027	000567				CMP RO, 567
3837			000634	003771					BLE B5
3838			000636					E5:	
3839		95	000636						END ALPHA
3840			000636					E3:	
3841		96							;\$RETURN EXAMPLES
3842		97	000636						\$RETURN
3843			000636	000207					RTS PC
3844		98	000640						\$RETURN ERROR
3845			000640	000261					SEC
3846			000642	000207					RTS PC
3847		99	000644						\$RETURN NOERROR
3848			000644	000241					CLC
3849			000646	000207					RTS PC

```

3851      100
3852      101 000650 013700 000000
3853      102 000654
3854          000654 010046
3855          000656 006316
3856          000660 004737 000700
3857      103 000664 000000
3858      104 000666 000002
3859      105 000670 000004
3860      106 000672 000006
3861      107 000674 000010
3862      108 000676 000012
3863      109 000700
3864          000700
3865          000700 062616
3866          000702 013646
3867          000704 004736
3868      110
3869      111          000001
    
```

```

;CASE EXAMPLES
MOV     A,RO
CASE RO
MOV RO,-(SP)
ASL @SP
JSR PC,L24
A
B
C
D
E
F
END ;OF CASE RO

L24:
ADD (SP)+,@SP
MOV @SP+,-(SP)
JSR PC,@(SP)+
.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

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7.5.3 Memory Management Mapping For QBUS-11's W/o Supervisor Mode (eg 11/2³) -

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


```

3918 .LIST TOC
3919 000000 .ENABL ABS
3920 .ENABL AMA
3921 .DSABL GBL
3922 ;NOTE: CVMJAO.SML IS THE SUPER.MAC SOURCE AND IS RELEASED WITH
3923 ;THIS PROGRAM. ALL THESE .MCALL STATEMENTS REFERENCE THAT FILE.
3924 .MCALL SMACIT,..PUSH,..POP,..TAG,..BRAN,.EMIT,.EMITN,.EMITL,.EMITR
3925 .IFOPR,.IS,.GENBR,.OPADD,.OPSUB,CLEAR,SET,CLEARB,SETB
3926 .MCALL RNE,REQ,RLT,RGE,RGT,RLE,RPL,RMI,RHI,RLOS,RHIS,RLO,RCS,RCC
3927 .MCALL IF,.OR,.IFARI,.LEAVE,.GOTO,OR,AND,THEN,ELSE,WHILE,CASE
3928 .MCALL FOR,TO,DOWNTO,REPEAT,UNTIL,THRU,END,BEGIN
3929 .MCALL $$END,LEAVE,JUMPTO,GOTO,PUSH,POP,LET
3930 .MCALL .SIMPLE,.ARITH,ORB,ANDB,IFB,UNTILB,WHILEB,ON.ERROR,ON.NOERROR
3931 .MCALL $CALL,$RETURN
3932
3933 .NLIST TTM ;I WANT FAT PAPER!
3934 .LIST MC,SYM ;LIST MACRO CALLS, SYMBOL TABLE
3935 .NLIST MD,CND,ME ;DON'T LIST MACRO DEFS & CONDITIONALS & EXPANSIONS
3936 000000 LST$$= 0 ;DEFINED TO LIST SUPERMAC EXPANSIONS
3937 163000 $SWR= 163000 ;USE THESE SYSMAC SWITCHES
3938 000001 $TN= 1 ;FIRST TEST NUMBER TO ONE(1)
3939 000000 SMACIT

```

```

3942          .SBTTL DEFINE TRAPS
3943          ;ALL ENTRIES HERE MUST HAVE A CORRESPONDING ENTRY IN THE
3944          ;TRAP TABLE "$TRPAD" (NEAR END OF PROGRAM).
3945          ;*TRAP DEFINITIONS
3946          ;
3947          ;HERE IS HOW TRAPS WORK IN THIS PROGRAM
3948          ;
3949          ;ALL TRAPS EXECUTE A "TRAP" INSTRUCTION WHICH TAKES THE PROGRAM
3950          ;TO SYMBOLIC LOCATION "$TRAP"
3951          ;
3952          ;AT $TRAP THE PROGRAM PICKS UP THE RIGHT BYTE OF THE TRAP INSTRUCTION
3953          ;AND INDEXES INTO A TABLE AT LOCATION "$TRPAD" WHICH SENDS THE PROGRAM TO
3954          ;THE SPECIFIC ROUTINE TO HANDLE THAT SPECIFIC TRAPS TASK.
3955          ;
3956          ;THE ULTIMATE DESTINATION OF A TRAP INSTRUCTION CAN BE GUESSED AT AS FOLLOWS
3957          ;
3958          ;EXAMPLE:          NOP
3959                          NOP
3960                          NOP
3961                          KERNEL          ;ENTER KERNFL MODE
3962                          NOP
3963          ;
3964          ;          ADD A DOLLAR SIGN TO THE SYMBOLIC NAME AND CHECK THE CRF FOR SOMETHING CLOSE
3965          ;          IN THIS CASE THE CRF HAS $KERNE LISTED AS 032546
3966          ;          AT LOCATION 32546 YOU FIND THE ROUTINE $KERNEL
3967          ;
3968          ;          NOTE THAT CRF SYMBOLS ARE TRUCNATED TO 6 CHARACTERS
3969          ;          SYMBOLIC NAMES GREATER THAT 6 CHARACTERS ARE USED SO I CAN
3970          ;          REMEMBER WHAT THEY MEAN!
3971          ;
3972          ;          ALL GOOD TRAP ROUTINES RETURN VIA AN "RTI" INSTRUCTION
3973          ;          TYPEIT= 104401          ;;TTY TYPEOUT ROUTINE
3974          ;          TYPOC= 104402          ;;TYPE OCTAL NUMBER (WITH LEADING ZEROS)
3975          ;          TYPOS= 104403          ;;TYPE OCTAL NUMBER (NO LEADING ZEROS)
3976          ;          TYPON= 104404          ;;TYPE OCTAL NUMBER (AS PER LAST CALL)
3977          ;          TYPDS= 104405          ;;TYPE DECIMAL NUMBER (WITH SIGN)
3978          ;          TYPBN= 104406          ;;TYPE BINARY (ASCII) NUMBER
3979          ;
3980          ;          GTSWR= 104407          ;;GET SOFT-SWR SETTING
3981          ;          CKSWR= 104410          ;;TEST FOR CHANGE IN SOFT-SWR
3982          ;
3983          ;          RDCHR= 104411          ;;TTY TYPEIN CHARACTER ROUTINE
3984          ;          RDLIN= 104412          ;;TTY TYPEIN STRING ROUTINE
3985          ;          RDOCT= 104413          ;;READ AN OCTAL NUMBER FROM TTY
3986          ;          RDDEC= 104414          ;;READ A DECIMAL NUMBER FROM TTY
3987          ;
3988          ;          SAVREG= 104415          ;;SAVE R0-R5 ROUTINE
3989          ;          RESREG= 104416          ;;RESTORE R0-R5 ROUTINE
3990          ;
3991          ;          KERNEL= 104417          ;ENTER KERNEL MODE
3992          ;
3993          ;          ENERGIZE=104420          ;TURN ON MEMORY MANAGEMENT & TRAPS
3994          ;          DEENERGIZE=104421          ;TURN OFF MEMORY MANAGEMENT & TRAPS
3995          ;          KMAP= 104422          ;MAP KERNEL 1 TO 1
3996          ;
3997          ;          CACHON= 104423          ;TURN ON CACHE
3998          ;          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
4057

104513
104514

CBREG =104513
SYNREG =104514

;ENABLES CHECKBIT REGISTER
;ENABLES SYNDROME BIT REGISTER

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4060          .SBTTL  DEFINE  BASIC PDP11 STUFF
4061
4062          ;*INITIAL ADDRESS OF THE STACK POINTER
4063          002000      STACK= 2000          ;;FIRST ADDRESS OF THE STACK
4064          002000      KERSTK= STACK        ;;KERNEL STACK
4065          000740      SUPSTK= 740         ;;SUPERVISOR STACK
4066          000700      USESTK= 700         ;;USER STACK
4067          104000      ERROR=EMT           ;;BASIC DEFINITION OF ERROR CALL
4068          000004      SCOPE=IOT           ;;BASIC DEFINITION OF SCOPE CALL
4069          177776      PSW= 177776        ;;PROCESSOR STATUS WORD
4070          ;STKLMT=177774                ;;STACK LIMIT REGISTER
4071          ;PIRQ= 177772                  ;;PROGRAM INTERRUPT REQUEST REGISTER
4072          177570      DSWR= 177570        ;;HARDWARE SWITCH REGISTER
4073          177570      DDISP= 177570      ;;HARDWARE DISPLAY REGISTER
4074          177546      LKS= 177546         ;;LINE CLOCK (KW11-L) STATUS REGISTER
4075
4076          ;*MISCELLANEOUS DEFINITIONS
4077          000011      HT= 11              ;;CODE FOR HORIZONTAL TAB
4078          000012      LF= 12              ;;CODE LINE FEED
4079          000015      CR= 15              ;;CODE CARRIAGE RETURN
4080          000200      CRLF= 200           ;;CODE FOR CARRIAGE RETURN-LINE FEED
4081          000007      MFPT= 7            ;;CODE FOR PROCESSOR TYPE INSTRUCTION
4082
4083          ;*GENERAL PURPOSE REGISTER DEFINITIONS
4084          ;SP=R6          ;;STACK POINTER
4085          ;KSP=SP        ;;KERNEL STACK POINTER
4086          000006      SSP=SP             ;;SUPERVISOR STACK POINTER
4087          000006      USP=SP            ;;USER STACK POINTER
4088          ;PC=R7        ;;PROGRAM COUNTER
4089
4090          ;*"SWITCH REGISTER" SWITCH DEFINITIONS
4091          100000      SW15= 100000
4092          040000      SW14= 40000
4093          020000      SW13= 20000
4094          010000      SW12= 10000
4095          004000      SW11= 4000
4096          002000      SW10= 2000
4097          001000      SW9= 1000
4098          000400      SW8= 400
4099          000200      SW7= 200
4100          000100      SW6= 100
4101          000040      SW5= 40
4102          000020      SW4= 20
4103          000010      SW3= 10
4104          000004      SW2= 4
4105          000002      SW1= 2
4106          000001      SW0= 1
4107
4108          ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
4109          100000      BIT15= 100000
4110          040000      BIT14= 40000
4111          020000      BIT13= 20000
4112          010000      BIT12= 10000
4113          004000      BIT11= 4000
4114          002000      BIT10= 2000
4115          001000      BIT9= 1000
4116          000400      BIT8= 400

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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      MMRO= 177572
4156      177574      MMR1= 177574
4157      177576      MMR2= 177576
4158      172516      MMR3= 172516
4159
4160      ;*USER "I" PAGE DESCRIPTOR REGISTERS
4161      177600      UIPDRO= 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

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4174      ;UDPDR3=      177626
4175      ;UDPDR4=      177630
4176      ;UDPDR5=      177632
4177      ;UDPDR6=      177634
4178      ;UDPDR7=      177636
4179
4180      ;*USER "I" PAGE ADDRESS REGISTERS
4181      177640 FASTCITY=UIPAR0
4182      177640 UIPAR0= 177640      ;PATTERN PROGRAM SPACE
4183      177642 UIPAR1= 177642      ;PATTERN PROGRAM SPACE
4184      177644 UIPAR2= 177644      ;PATTERN PROGRAM SPACE
4185      177646 UIPAR3= 177646      ;PATTERN PROGRAM SPACE
4186      177650 UIPAR4= 177650      ;PATTERN PROGRAM SPACE
4187      177652 UIPAR5= 177652      ;PATTERN PROGRAM SPACE
4188      177654 UIPAR6= 177654      ;PATTERN PROGRAM SPACE
4189      ;UIPAR7=      177656      ;PATTERN PROGRAM SPACE
4190
4191      ;*USER "D" PAGE ADDRESS REGISTERS
4192      177660 UDPAR0= 177660      ;PATTERN PROGRAM SPACE
4193      ;UDPAR1=      177662      ;PATTERN PROGRAM SPACE
4194      ;UDPAR2=      177664      ;PATTERN PROGRAM SPACE
4195      ;UDPAR3=      177666      ;PATTERN PROGRAM SPACE
4196      ;UDPAR4=      177670      ;PATTERN PROGRAM SPACE
4197      ;UDPAR5=      177672      ;PATTERN PROGRAM SPACE
4198      ;UDPAR6=      177674      ;PATTERN PROGRAM SPACE
4199      177676 UDPAR7= 177676      ;PATTERN PROGRAM SPACE
4200
4201      ;*SUPERVISOR "I" PAGE DESCRIPTOR REGISTERS
4202      172200 SIPDR0= 172200
4203      ;SIPDR1=      172202
4204      ;SIPDR2=      172204
4205      ;SIPDR3=      172206
4206      ;SIPDR4=      172210
4207      ;SIPDR5=      172212
4208      ;SIPDR6=      172214
4209      ;SIPDR7=      172216
4210
4211      ;*SUPERVISOR "D" PAGE DESCRIPTOR REGISTERS
4212      ;SDPDR0=      172220
4213      ;SDPDR1=      172222
4214      ;SDPDR2=      172224
4215      ;SDPDR3=      172226
4216      ;SDPDR4=      172230
4217      ;SDPDR5=      172232
4218      ;SDPDR6=      172234
4219      ;SDPDR7=      172236
4220
4221      ;*SUPERVISOR "I" PAGE ADDRESS REGISTERS
4222      172240 SIPAR0=      172240
4223      ;SIPAR1=      172242
4224      ;SIPAR2=      172244
4225      172246 SIPAR3=      172246      ;TEST AREA
4226      ;SIPAR4=      172250      ;TEST AREA
4227      172252 SIPAR5=      172252      ;TEST AREA
4228      172254 SIPAR6=      172254      ;TEST AREA
4229      ;SIPAR7=      172256
4230

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4231                                     ;*SUPERVISOR "D" PAGE ADDRESS REGISTERS
4232      172260      SDPAR0=      172260
4233      ;SDPAR1=      172262
4234      ;SDPAR2=      172264
4235      ;SDPAR3=      172266
4236      ;SDPAR4=      172270
4237      172272      SDPAR5=      172272
4238      172274      SDPAR6=      172274
4239      172276      SDPAR7=      172276
4240
4241                                     ;*KERNEL "I" PAGE DESCRIPTOR REGISTERS
4242      172300      KIPDR0=      172300
4243      ;KIPDR1=      172302
4244      ;KIPDR2=      172304
4245      ;KIPDR3=      172306
4246      ;KIPDR4=      172310
4247      ;KIPDR5=      172312
4248      ;KIPDR6=      172314
4249      ;KIPDR7=      172316
4250
4251                                     ;*KERNEL "D" PAGE DESCRIPTOR REGISTERS
4252      ;KDPDR0=      172320
4253      ;KDPDR1=      172322
4254      ;KDPDR2=      172324
4255      ;KDPDR3=      172326
4256      ;KDPDR4=      172330
4257      ;KDPDR5=      172332
4258      ;KDPDR6=      172334
4259      ;KDPDR7=      172336
4260
4261                                     ;*KERNEL "I" PAGE ADDRESS REGISTERS
4262      172340      KIPAR0=      172340
4263      ;KIPAR1=      172342
4264      ;KIPAR2=      172344
4265      ;KIPAR3=      172346
4266      172350      KIPAR4=      172350
4267      172352      KIPAR5=      172352
4268      172354      KIPAR6=      172354
4269      ;KIPAR7=      172356
4270
4271                                     ;*KERNEL "D" PAGE ADDRESS REGISTERS
4272      172360      KDPAR0=      172360
4273      ;KDPAR1=      172362
4274      ;KDPAR2=      172364
4275      ;KDPAR3=      172366
4276      ;KDPAR4=      172370
4277      ;KDPAR5=      172372
4278      172374      KDPAR6=      172374
4279      172376      KDPAR7=      172376
4280

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4283          .SBTTL DEFINE Q-BUS MAP REGISTERS
4284          ;*THE LOWER 16 BITS OF THE MAP REGISTERS ARE LABELED 'MAPLXX'
4285          ;*THE UPPER 6 BITS OF THE MAP REGISTERS ARE LABELED 'MAPHXX'
4286          170200      MAPL0 = 170200
4287          170202      MAPH0 = 170202
4288          170204      MAPL1 = 170204
4289          ;MAPH1 = 170206
4290          ;MAPL2 = 170210
4291          ;MAPH2 = 170212
4292          ;MAPL3 = 170214
4293          ;MAPH3 = 170216
4294          ;MAPL4 = 170220
4295          ;MAPH4 = 170222
4296          ;MAPL5 = 170224
4297          ;MAPH5 = 170226
4298          ;MAPL6 = 170230
4299          ;MAPH6 = 170232
4300          ;MAPL7 = 170234
4301          ;MAPH7 = 170236
4302          ;MAPL10 = 170240
4303          ;MAPH10 = 170242
4304          ;MAPL11 = 170244
4305          ;MAPH11 = 170246
4306          ;MAPL12 = 170250
4307          ;MAPH12 = 170252
4308          ;MAPL13 = 170254
4309          ;MAPH13 = 170256
4310          ;MAPL14 = 170260
4311          ;MAPH14 = 170262
4312          ;MAPL15 = 170264
4313          ;MAPH15 = 170266
4314          ;MAPL16 = 170270
4315          ;MAPH16 = 170272
4316          ;MAPL17 = 170274
4317          ;MAPH17 = 170276
4318          ;MAPL20 = 170300
4319          ;MAPH20 = 170302
4320          ;MAPL21 = 170304
4321          ;MAPH21 = 170306
4322          ;MAPL22 = 170310
4323          ;MAPH22 = 170312
4324          ;MAPL23 = 170314
4325          ;MAPH23 = 170316
4326          ;MAPL24 = 170320
4327          ;MAPH24 = 170320
4328          ;MAPL25 = 170324
4329          ;MAPH25 = 170326
4330          ;MAPL26 = 170330
4331          ;MAPH26 = 170332
4332          ;MAPL27 = 170334
4333          ;MAPH27 = 170336
4334          ;MAPL30 = 170340
4335          ;MAPH30 = 170342
4336          ;MAPL31 = 170344
4337          ;MAPH31 = 170346
4338          ;MAPL32 = 170350
4339          ;MAPH32 = 170352

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4340      ;MAPL33 = 170354
4341      ;MAPH33 = 170356
4342      ;MAPL34 = 170360
4343      ;MAPH34 = 170362
4344      ;MAPL35 = 170364
4345      ;MAPH35 = 170366
4346      ;MAPL36 = 170370
4347      ;MAPH36 = 170372
4348      ;MAPL37 = 170374
4349      ;MAPH37 = 170376
4350
4351
4352      .SBTTL  DEFINE  SOFTWARE SWITCH & DISPLAY REGISTERS
4353      000174  DISPREG=174
4354      000176  SWREG= 176
4355
4356      .SBTTL  DEFINE  CONTROL STATUS REGISTERS
4357      172100  CSRADD=172100
4358
4359      .SBTTL  DEFINE  PARAMETERS
4360      060000  FIRST=60000      ;START OF THE 16K TEST PATTERN AREA
4361      157776  LAST=157776     ;END OF THE 16K TEST PATTERN AREA
4362      040000  SIZE=40000      ;SIZE OF THE 16K TEST PATTERN AREA (FOR SOB INSTRUCTIONS)

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      .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

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.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>
$$NEWTST \ $TN,<ASCII>,SCOPE
.IFF
$$NEWTST \ $TN,<ASCII>,<COMAND>
.ENDC
.NLIST
.LIST ME
.LIST
.IF NE 4000&$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

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4506

```

.SBTTL MACRO $$$NEWTEST
.MACRO $$$NEWTEST A,ASC,COMND
.IRP ASCII,<ASC>
.IF EQ $NWTST
$NWTST=1
.SBTTL T'A' ASCII
.NLIST
.LIST ME
.LIST
;*****
;*TEST A ASCII
.IFF
ASCII
.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 ASCII,<ASC>
.SBTTL ASCII
.NLIST
.LIST ME
.LIST
;*****
;*SUBTEST ASCII
.ENDM
;*****
.NLIST ME
.ENDM $SUBTST

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4511
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.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

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4599
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4601
4602

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.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

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4605
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.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

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4671
4672
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4676
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4680
4681
4682
4683
4684
4685
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4692
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4698
4699
4700
4701
4702
4703

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.SBTTL MACRO BMOV
:***** BMOV *****
:
: THIS MACRO MOVES A BLOCK OF DATA.
:
: ARGUMENTS:
:
: 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

```

4704
4705
4706
4707
4708
4709
4710

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

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```

.SBTTL MACRO MAP
;***** MAP *****
; THIS MACRO MAPS A MEMORY BANK (16K) INTO THE
; TEST PATTERN AREA (SUPERVISOR VIRTUAL (60000-15777)).
; ARGUMENTS:
; 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

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4752
4753
4754
4755
4756
4757
4758
4759
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4771
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4773
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.SBTTL MACRO SUPERVISOR
;***** SUPERVISOR *****
;
; THIS MACRO SWITCHES TO SUPERVISOR MODE.
;
; ARGUMENTS: 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.
;
; ARGUMENTS: 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

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4795
4796
4797
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4800
4801
4802
4803
4804
4805
4806
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4808
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4811
4812
4813
4814

```
.SBTTL MACRO TESTAREA
;***** TESTAREA *****
; THIS MACRO SWITCHES TO THE SPECIFIED TEST MODE.
; ARGUMENTS: 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
```

4817
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4819
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```

.SBTTL MACRO SET4 & RES4
;***** SET4 & RES4 *****
;
; THESE MACROS SET & RESTORE VECTOR 4(TIMEOUT TRAP)
;
; IN IT'S RESTORED MODE TRAPS ARE REPORTED AS SUCH.
;
; ARGUMENTS: 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

;THAT A EXPECTED TRAP COULD HAVE SET
.DSABL CRF
.IIF DF LST$$ .NLIST ME
.ENABL CRF
.ENDM RES4
101$:

```

4862
4863
4864
4865
4866
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.SBTTL MACRO DLEFT
;***** DLEFT *****
; THIS MACRO DOES A DOUBLE WORD LEFT SHIFT
; ARGUMENTS: 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)
;*****
ABORT: TSTB $DDW7 ;TEST FOR USER FRIENDLY MODE
BEQ ABORT2 ;IF NOT UFD THEN CONTINUE NORMAL OPERATION
MOV SAV30,30 ;RESTORE EMT LOCATION (30)
MOV SAV32,32 ;RESTORE EMT PRIORITY LOCATION (32)
EMT +42 ;GET DCA LOCATION INTO RO FROM MONITOR
MOV #-1,42(RO) ;SET A -1 INTO LOCATION DRSEERR IN MONITOR
ABORT1: MOV 42,RO ;AND PUT THE MONITOR RETURN ADDRESS IN RO
CLR 42 ;CLEAR MONITOR RETURN FLAG
JMP $ENDAD ;RETURN TO MONITOR DO NOT PUSH STACK HERE
ABORT2: RTS PC ;IF NOTUFD RETURN TO MAINLINE

```

000000	105737	056732	
000004	001420		
000006	013737	003706	000030
000014	013737	003710	000032
000022	104042		
000024	012760	177777	000042
000032	013700	000042	
000036	005037	000042	
000042	000137	014042	
000046	000207		

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4902
4903
4904 000000 000000 000000
4905          000177
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4923
4924
4925          000046
4926 000046 014042
4927          000052
4928 000052 000020
4929
4930          000024
4931 000024 000200
4932          000042
4933 000042 002000
4934          000044
4935 000044 056750
4936          000200
4937 000200 000437
4938 000202 000442
4939          000300
4940 000300 005037 002626
4941 000304 000137 003670
4942 000310
      000310 012737 177777 002626
4943 000316 000137 003670
4944          002000

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.SBTTL TRAP CATCHER
.=0
.WORD 0,0
.REPT 177          ;.WORD .+2,HALT

.SBTTL ACT11 HOOKS
;*THE HOOKS REQUIRED BY ACT11 ARE DEFINED AND SETUP BELOW:
;*
;* DEFINITIONS:
;*
;* 1)LOC.46          "END OF-PASS" HOOK
;*                  =ADDRESS OF END OF PASS ROUTINE
;*                  MODIFIED BY ACT11.
;*
;* 2)LOC.52          PROGRAM NEEDS HOOK
;*                  BIT 15=1 PROGRAM SHOULD BE POWER
;*                  FAILED WHILE RUNNING
;*                  =0 NO POWER FAIL
;*
;* BIT 14=1 PROGRAM MEMORY SIZE DEPENDENT
;*                  =0 NOT MEMORY SIZE DEPENDENT
;*
;* BIT 13=1 PROGRAM REQUIRES MANUAL INTERVENTION
;*                  =0 MANUAL INTERVENTION NOT REQUIRED
;*
;* BITS 12-0 MUST BE ZERO'S
;*
.=46
$ENDAD          ;:1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
.=52
.WORD BIT4          ;:2)SET LOC.52 TO INDICATE MEMORY SIZE DEPENDANT
.SBTTL APT11 HOOKS
.=24          ;;SET POWER FAIL TO POINT TO START OF PROGRAM
200          ;;FOR APT START UP
.=42
STACK          ;SO RT11 CAN START WITH RUN COMMAND
.=44          ;;POINT TO APT INDIRECT ADDRESS PNTR.
$APTHDR          ;;POINT TO APT HEADER BLOCK
.=200
START3: BR START1          ;"NORMAL" START
      BR START2          ;RESTART (SAVE ERROR ACCOUNTING)
.=300
START1: CLR RESTART
      JMP START
START2: SET RESTART
      JMP START
.=STACK
MOV #-1,RESTART

```


Address	Value	Variable Name	Description
4947		.SBTTL VARIABLES	INITIALIZED TO ZERO
4948		;	*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
4949		;	*USED IN THE PROGRAM.
4950	002000	\$CMTAG:	;; START OF COMMON TAGS
4951	002000 000000	UFDSET:0	;; USER FRIENDLY FLAG
4952	002002 000000	SEL ONLY:0	;; SELECT ONLY BANKS MARKED BY FIELD SERVICE MODE FLAG
4953	002004 000000	DIAGFLAG:0	;; SET FOR SHIFTING DIAGONAL TEST
4954	002006 000000	KAMIKAZE:0	;; SET FOR KAMIKAZE MODE TESTING
4955	002010 000000	SKIPKAMI:0	;; USED TO SKIP RESTORING KAMIKAZE MODE WHEN MODIFIED
4956		;	NEXT TWO BYTES ARE DISPLAYED IN THE DISPLAY REGISTER
4957	002012 000	\$PATMAR: .BYTE 0	;; PATTERN NUMBER
4958	002013 000	\$BANK: .BYTE 0	;; BANK & SIGN
4959	002014 000	\$ERFLG: .BYTE 0	;; CONTAINS ERROR FLAG
4960	002015 000	\$ITEMB: .BYTE 0	;; CONTAINS ITEM CONTROL BYTE
4961	002016 000000	LASTERROR: .WORD 0	;; NUMBER OF ERRORS ON LAST PASS
4962	002020 000000	ERRPC: .WORD 0	;; CONTAINS PC OF ERROR FOR TYPEOUT
4963	002022 000000	BADPC: .WORD 0	;; CONTAINS PC OF ERROR
4964	002024 000000	ERRSP: .WORD 0	;; CONTAINS SP OF ERROR FOR TYPEOUT
4965	002026 000000	BADSP: .WORD 0	;; CONTAINS SP OF ERROR
4966	002030 000000	ERRPSW: .WORD 0	;; CONTAINS PSW OF ERROR FOR TYPEOUT
4967	002032 000000	BADPSW: .WORD 0	;; CONTAINS PSW OF ERROR
4968	002034 000000	ADDRESS: .WORD 0	;; CONTAINS ADDRESS OF 'BAD' DATA
4969	002036 000000	PADDRESS: .WORD 0	;; ADDRESS OF PARITY ERROR
4970	002040 000000 000000	PHYADD: .WORD 0,0	;; 22 BIT PHYSICAL ADDRESS
4971	002044 000000	GOOD: .WORD 0	;; CONTAINS 'GOOD' DATA
4972	002046 000000	GOOD2: .WORD 0	;; CONTAINS 'GOOD2' DATA
4973	002050 000000	GOOD3: .WORD 0	;; CONTAINS 'GOOD3' DATA
4974	002052 000000	BAD: .WORD 0	;; CONTAINS 'BAD' DATA
4975	002054 000000	BAD2: .WORD 0	;; CONTAINS 'BAD2' DATA
4976	002056 000000	BAD3: .WORD 0	;; CONTAINS 'BAD3' DATA
4977	002060 000000	BADXOR: .WORD 0	;; XOR OF GOOD & BAD = BAD BITS!
4978	002062 000000	\$AUTO: .WORD 0	;; AUTOMATIC MODE INDICATOR FOR APT,ACT, & XXDP
4979	002064 000000	FATAL\$: .WORD 0	;; FATAL ERROR INDICATOR
4980	002066 000000	SKPERR: .WORD 0	;; USED TO SKIP ERROR MESSAGE IN "\$ERRGEN"
4981	002070 000000	NEMCNT: 0	;; NON-EXISTANT MEMORY COUNTER (HOLES)
4982	002072 000000	PARCNT: 0	;; PARITY ERROR COUNTER
4983	002074 000000	PATERR: 0	;; PATTERN ERROR COUNTER
4984	002076 000000	NOPAR: 0	;; NO PARITY ERROR MODE INDICATOR
4985	002100 000000	NONEM: 0	;; NO NON-EXISTANT MEMORY (HOLES) MODE INDICATOR
4986	002102 000000	BANK: 0	;; MEMORY BANK UNDER TEST
4987	002104 000000	BANKINDEX:0	;; USED TO INDEX INTO CONFIG TABLE
4988	002106 000000	CPUBIT: 0	;; CONTAINS 1 BIT TO IDENTIFY CPU TO CONFIGURATION TABLE
4989	002110 000000	MUT: 0	;; MEMORY UNDER TEST FLAG
4990	002112 000000	PATTERN:0	;; PATTERN NUMBER UNDER TEST
4991	002114 000000	KPFLAG: .WORD 0	;; BANK IS PROTECTED REGION OF ECC
4992	002116 000000	ACFLAG: .WORD 0	;; BANK CAN BE ACCESSED BY THIS CPU
4993	002120 000000	MKFLAG: .WORD 0	;; IF SET INDICATES MSV11-J OR MF11S-K UNDER TEST***** ?
4994	002122 000000	PFLAG: .WORD 0	;; BANK IS IN PROGRAM SPACE
4995	002124 000000	RRFLAG: .WORD 0	;; BANK IS WHERE PROGRAM RELOCATION IS REQUIRED TO TEST
4996	002126 000000	RLFLAG: .WORD 0	;; PROGRAM IS RELOCATED FLAG
4997	002130 000000	BMFLAG: .WORD 0	;; "BANK IS IDENTIFIED AS BAD MEMORY" FLAG
4998	002132 000000	EQFLAG: .WORD 0	;; "BANK HAS EQB MEMORY" FLAG
4999	002134 000000	TMFLAG: .WORD 0	;; "TYPE OF MEMORY TO TEST" FLAG; 0 = PARITY, 1 = ECC
5000	002136 000000	INTFLAG: .WORD 0	;; "BANK IS INTERLEAVED" FLAG***** ? **
5001	002140 000000	INT64K: .WORD 0	;; "BANK IS 64K INTERLEAVED" FLAG***** ? **
5002	002142 000000	PMEMFLG: .WORD 0	;; "MEMORY UNDER TEST IS A MSV11-J" FLAG
5003	002144 000000	ABORTFLAG: .WORD 0	;; "ABORT OCCURED" FLAG

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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 DETRO: 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 OLDCCACHE: .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 RELGCIATION 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

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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: 0,0,0,0,0,0,0,0,0 ;USED TO STORE INFORMATION ABOUT THE 16
5109 002470 000000 000000 000000
5109 002476 000000 000000 000000
5109 002502 000000 000000 000000 0,0,0,0,0,0,0,0,0 ;POSSIBLE CSR'S
5109 002510 000000 000000 000000
5109 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/PUR'S CR 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*****

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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	

5121					.SBTTL	VARIABLES	INITIALIZED TO NON ZERO
5122	002544	000401	000000		CACHKN:	401,0	;CACHE CONSTANT (MOVED TO CONTRL TO TURN ON CACHE)
5123	002550	001014			CACHKF:	1014	;CACHE CONSTANT (MOVED TO CONTRL TO TURN OFF CACHE)
5124	002552	040000			TESTMODE:	40000	;USED TO SELECT THE PROPER TEST MODE FOR A PATTERN RUN
5125	002554	000012			ERRMAX:	10.	;MAX # OF ERRORS PER BANK WITH SW11
5126	002556	000177			LASTBANK:	177	;HIGHEST BANK OF MEMORY
5127	002560	177000			LASTBLOCK:	177000	;HIGHEST BANK OF MEMORY+1 (IN PAR FORMAT)
5128	002562	160000			ENDADD:	160000	;ENDING ADDRESS
5129	002564	000000			ENDFLG:	0	;END FLAG
5130	002566	000000			SWRFLG:	0	;USED TO BUMP STACK ON FIRST CALL TO GTSWR
5131	002570	000000			PASCNT:	0	;PASS COUNTER
5132	002572	000031			SOBK:	25.	;SOB CONSTANT
5133	002574	002000			KSTACK:	STACK	;STACK BEGINNING
5134	002576	000001			LOADHOME:	1	;HOME BANK OF LOADERS
5135	002600	177777			WORST:	177777	;SET IF TESTING BANKS IN WORST FIRST MODE(1ST PASS)
5136	002602	176543			SEEDHI:	176543	;WORKING SEED HI (USED FOR RANDOM NUMBER GENERATOR)
5137	002604	123456			SEEDLO:	123456	;WORKING SEED LO (USED FOR RANDOM NUMBER GENERATOR)
5138	002606	176543			MSEEDH:	176543	;MASTER SEED HI (USED FOR RANDOM NUMBER GENERATOR)
5139	002610	123456			MSEEDL:	123456	;MASTER SEED LO (USED FOR RANDOM NUMBER GENERATOR)
5140	002612	177777			HEADER:	177777	;USED TO PRINT HEADINGS ONLY ONCE
5141	002614	177777			ONES:	177777	;FOR AID IN "MOV" INSTRUCTIONS
5142	002616	000003			FLIPLOC:	3	;COUNTER FOR FLIPPING DATA ON WORST CASE NOISE TEST
5143	002620	052525			SOFTPAT:	52525	;PATTERN FOR SOFT ERROR BACKGROUND TESTS
5144	002622	000000			\$LPADR:	.WORD 0	;CONTAINS SCOPE LOOP ADDRESS
5145	002624	000000			\$LPERR:	.WORD 0	;CONTAINS SCOPE RETURN FOR ERRORS
5146	002626	000000			RESTART:	0	;RESTART (START ADD 202) FLAG
5147	002630	000000			\$ERTTL:	.WORD 0	;CONTAINS TOTAL ERRORS
5148							
5149					;***** NOTE THESE TWO LOCATIONS MUST STAY TOGETHER *****		
5150	002632	000377			BAKPAT:	.WORD 377	;BACKGROUND PATTERN *
5151	002634	177400			SWAPAT:	.WORD 177400	;SWAPPED BAKPAT *
5152					;*****		
5153							
5154	002636	177570			SWR:	.WORD DSWR	:: ADDRESS OF SWITCH REGISTER
5155	002640	177570			DISPLAY:	.WORD DDISP	:: ADDRESS OF DISPLAY REGISTER
5156	002642	177560			\$TKS:	177560	:: TTY KBD STATUS
5157	002644	177562			\$TKB:	177562	:: TTY KBD BUFFER
5158	002646	177564			\$TPS:	177564	:: TTY PRINTER STATUS REG. ADDRESS
5159	002650	177566			\$TPB:	177566	:: TTY PRINTER BUFFER REG. ADDRESS
5160	002652	012			\$FILLC:	.BYTE 12	:: INSERT FILL CHARS. AFTER A "LINE FEED"
5161	002653	207	377	377	\$BELL:	.ASCIZ <207><377><377>	:: CODE FOR BELL
	002656	000					
5162	002657	077			\$QUES:	.ASCII /?/	:: QUESTION MARK
5163	002660	015			\$CRLF:	.ASCII <15>	:: CARRIAGE RETURN
5164	002661	012	000		\$LF:	.ASCIZ <12>	:: LINE FEED
5165					.EVEN		

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5190 002664 000201
5193 003670

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.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
CONFIG: .REPT 201
CONFIEND:

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5195 .SBTTL ***** MAIN *****
5196 003670 START: SUBTST <<INITIALIZE VARIABLES TO ZERO>>
;*****
;*SUBTEST INITIALIZE VARIABLES TO ZERO
;*****

5197 SUBTST <<SAVEMT>>
5198 003670 ;*****
;*SUBTEST SAVEMT
;*****
;SAVEMT SAVES THE EMULATOR AND PRIORITY LOCATION
;UNDER THE NAMES OF SAV30 AND SAV32.

5199 EMTSAV: MOV 30,SAV30 ;;SAVE EMULATOR ADDRESS
5200 MOV 32,SAV32 ;;SAVE EMULATOR PRIORITY LEVEL
5201 BR VMKOR ;;GET AROUND TAG AREA
5202 003670 013737 000030 003706 SAV30: .WORD 0 ;;PUT EMULATOR INFO HERE
5203 003676 013737 000032 003710 SAV32: .WORD 0 ;;PUT PRIORITY LOCATION HERE
5204 003704 000402 VMKOR: TSTB $ENV
5205 003706 000000 BNE NORES
5206 003710 000000 RESET
5207 003712 105737 056666 NORES: CLEAR MONFLG ;;CLEAR RETURN TO MONITOR FLAG
5208 003716 001001 CLR MONFLG
5209 003720 000005 MOV SP,SAVMON ;;SAVE XXDP MONITOR RESTART ADDRESS
5210 003722 005037 002276 MOV KSTACK,SP ;;SETUP THE STACK POINTER
5211 003726 010637 002274 MOV #CMTAG,RO ;;FIRST LOCATION TO BE CLEARED
5212 003732 013706 002574 1$: CLR (RO)+ ;;CLEAR MEMORY LOCATION
5213 003736 012700 002000 CMP #CMTGE,RO ;;DONE?
5214 003742 005020 BNE 1$ ;LOOP BACK IF NO
5215 003744 022700 002544 MOV #177,LASTBANK ;RESTORE LASTBANK (THIS MUST BE DONE PRIOR TO SYSTEM SIZING)
5216 003750 001374 SUBTST <<CLEAR NON-PROGRAM SPACE>>
5217 003752 012737 000177 002556 ;*****
;*SUBTEST CLEAR NON-PROGRAM SPACE
;*****
;THIS ATTEMPS TO GET RID OF ANY PARITY ERRORS BY WRITING INTO
;EVERY LOCATION THAT IS NOT LOADED INTO BY THE PROGRAM OR ALLOCATED
;TO THE XXDP LOADERS
5218 003760 012737 000001 002076 MOV #1,NOPAR ;PARITY ACTION = COUNT & IGNORE
5219 003760 005000 CLR RO
5220 003766 000241 2$: CLC
5221 003770 000241 CLC
5222 003760 012737 000001 002076 ADC (RO)+
5223 003766 005000 CMP RO,#160000
5224 003770 000241 BLO 2$
5225 003772 005520 CLR NOPAR ;RESTORE DEFAULT PARITY ACTION
5226 003774 020027 160000
5227 004000 103773
5228 004002 005037 002076
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 012737 004074 000004 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 RO 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$: MOV #TYPE,34          ;LOAD TRAP VECTOR
5243 004040 004040 104401 071474 TYPEIT MSG130          ;TELL THEM BAD PROCESSOR TYPE
      .DSABL CRF
5244 004044 000000  HALT          ;NO NEED TO GO ON
5245 004046 012737 000012 000010 2$: MOV #12,10          ;RESTORE TRAPS TO 10
5246 004054 110037 004010 MOVB RO,PROTYP          ;MOV THE CODE TO PROTYP
5247 004060 012737 004074 000004 SET4 #3$
      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 012737 004146 000004 SET4 #4$
      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 012737 004254 000004 22$: SET4 #7$
      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
004262 022737 000005 004010
004270 001002
004272 005037 177766
004276

101\$:

MOV #TIMEOUT,4
CMP #5,PROTYP
BNE 101\$
CLR CPUERR

;IS THIS AN 11/83/84 ?
;BRANCH IF NOT
;CLEAR OUT THE CPU ERROR REGISTER BITS
;THAT A EXPECTED TRAP COULD HAVE SET

.DSABL CRF

5275

5278 004276

SUBTST <<INITIALIZE VARIABLES TO NON ZERO>>

;*SUBTEST INITIALIZE VARIABLES TO NON ZERO

5279 004276

SET WORST

MOV #-1,WORST

5280 004304

012737 177777 002600

MOV #3,FLIPLC

5281 004312

012737 000003 002616

SET HEADER

MOV #-1,HEADER

5282 004320

012737 177777 002612

MOV #176543,MSEEDH

5283 004326

012737 176543 002606

MOV #123456,MSEEDL

5284 004334

013737 123456 002610

MOV MSEEDH,SEEDHI

;PRIME THE RANDOM NUMBER GENERATOR

5285 004342

013737 002610 002604

MOV MSEEDL,SEEDLO

;BOTH HIGH AND LOW WORDS

5286 004350

012737 000377 002632

MOV #377,BAKPAT

5287 004356

012737 177400 002634

MOV #177400,SWAPAT

5288 004364

SUBTST <<INITIALIZE VECTORS>>

;*SUBTEST INITIALIZE VECTORS

5289 004364

012737 051146 000020

MOV #SCOPE,IOTVEC

::IOT VECTOR FOR SCOPE ROUTINE

5290 004372

012737 000340 000022

MOV #340,IOTVEC+2

::LEVEL 7

5291 004400

012737 051502 000030

MOV #ERROR,EMTVEC

::EMT VECTOR FOR ERROR ROUTINE

5292 004406

012737 000340 000032

MOV #340,EMTVEC+2

::LEVEL 7

5293 004414

012737 056764 000034

MOV #TRAP,TRAPVEC

::TRAP VECTOR FOR TRAP CALLS

5294 004422

012737 000340 000036

MOV #340,TRAPVEC+2

::LEVEL 7

5295 004430

012737 045352 000024

MOV #PWRDN,PWRVEC

::POWER FAILURE VECTOR

5296 004436

012737 000340 000026

MOV #340,PWRVEC+2

::LEVEL 7

5297 004444

012737 033744 000114

MOV #PARITY,PARVEC

::GET READY FOR PARITY ERRORS

5298 004452

012737 000340 000116

MOV #340,PARVEC+2

5299 004460

012737 034140 000010

MOV #PDP1105,RESVEC

::RESERVED INSTRUCTION TRAP

5300 004466

012737 000340 000012

MOV #340,RESVEC+2

5301 004474

012737 034114 000004

MOV #TIMEOUT,ERRVEC

::SETUP TIMEOUT ERRORS

5302 004502

012737 000340 000006

MOV #340,ERRVEC+2

::SET PRIORITY OF ERROR TRAPS

5303 004510

012737 034126 000250

MOV #MMTRAP,MMVEC

::VECTOR FOR MEMORY MANAGEMENT

5304 004516

012737 000340 000252

MOV #340,MMVEC+2

5305 004524

104423

CACHON

::TURN CACHE ON

5308 004526

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.

5309
5310
5311
5312
5313 004526 012700 056734
5314 004532 012001
5315 004534 012703 017014
5316 004540 012702 000020
5317 004544 004737 004644
5318 004550 012001
5319 004552 012702 000010
5320 004556 004737 004644
5321 004562 012001
5322 004564 012703 017244
5323 004570 012702 000020
5324 004574 004737 004644
5325 004600 012001
5326 004602 012702 000010
5327 004606 004737 004644
5328 004612 012001
5329 004614 012703 017430
5330 004620 012702 000020
5331 004624 004737 004644
5332 004630 012001
5333 004632 012702 000010
5334 004636 004737 004644
5335 004642 000417
5336
5337 004644

MOV #DDW0,R0
MOV (R0)+,R1
MOV #MKCSRT,R3
MOV #16.,R2
CALL PATPLUG
MOV (R0)+,R1
MOV #8.,R2
CALL PATPLUG
MOV (R0)+,R1
MOV #MKPAT,R3
MOV #16.,R2
CALL PATPLUG
MOV (R0)+,R1
MOV #8.,R2
CALL PATPLUG
MOV (R0)+,R1
MOV #MJPAT,R3
MOV #16.,R2
CALL PATPLUG
MOV (R0)+,R1
MOV #8.,R2
CALL PATPLUG
BR SUBAAA

PATPLUG:SUBTST <<SUBR PLUG IN NULL PATTERNS>>

;*SUBTEST SUBR PLUG IN NULL PATTERNS

FOR I := #1 TO R2

5338 004644
004644 012737 000001 002452
004652
5339 004652 006001
5340 004654
004654 103402
5341 004656 012713 024220
5342 004662
004662
5343 004662 062703 000002
5344 004666
004666 005237 002452
004672 023702 002452
004676 003765
004700
5345 004700 000207

ROR R1
ON.NOERROR ;IF CARRY CLEAR
MOV #MT0999,(R3)
END ;OF ON.ERROR
ADD #2,R3
END ;OF FOR
RETURN

MOV #1,I
B0:;;;;;
BCS L0
L0:;;;;;
INC I
CMP I,R2
BLE B0
E0:;;;;;

5348 004702

SUBAAA: SUBTST <<CLEAR THE CONFIGURATION TABLE>>
;*****
;*SUBTEST CLEAR THE CONFIGURATION TABLE
;*****

5349
5350
5351
5352 004702 005737 002626
004702 001006
004706 002664

;THIS ZEROS (UNLESS WE STARTED AT ADDRESS 202) THE CONFIG TABLE
;WHICH IS FULLY DISCRIBED AT LOCATION "CONFIG".
.ENABLE LSB
IF RESTART IS FALSE

TST RESTART
BNE L1

5353 004710 012700 002664
5354 004714 005020
5355 004716 022700 003670
5356 004722 001374
5357 004724
004724

1\$: MOV #CONFIG,R0
CLR (R0)+
CMP #CONFIEND,R0
BNE 1\$
END ;OF IF RESTART

L1:::~::~

5358
5359 004724 012737 000002 002106
5360 004732

.DSABL LSB
MOV #BIT1,CPUBIT ;SET ID BIT
SUBTST <<SIZE FOR A HARDWARE SWITCH REGISTER>>

;*****
;*SUBTEST SIZE FOR A HARDWARE SWITCH REGISTER
;*****

5361
5362
5363
5364 004732 012737 004766 000004
004732

;IF NOT FOUND OR IT IS
;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.

.ENABL LSB
SET4 #3\$;TRAPS TO 4 GOTO 3\$
MOV #3\$,4
.DSABL CRF

5365 004740 012737 177570 002636
5366 004746 012737 177570 002640
5367 004754 022777 177777 175654
004754 001023
004762 000403

MOV #DSWR,SWR ;;SETUP FOR A HARDWARE SWITCH REGISTER
MOV #DDISP,DISPLAY ;;AND A HARDWARE DISPLAY REGISTER
IF #-1 EQ @SWR ;IF NO TRAP FROM REFERENCE TO @SWR AND @SWR = #-1
CMP #-1,@SWR
BNE L2

5368 004764 000403
5369 004766 012716 004774
5370 004772 000002
5371 004774 012737 034114 000004
004774 022737 000005 004010
005002 001002
005010 005037 177766
005012
005016

3\$: BR 2\$;;BRANCH IF NO TIMEOUT
MOV #2\$, (SP) ;;SET UP FOR TRAP RETURN
RTI
2\$: RES4 ;RESET TRAPS TO 4 TO DEFAULT

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

5372 005016 012737 000176 002636
5373 005024 012737 000174 002640
5374 005032
005032

.DSABL CRF
MOV #SWREG,SWR ;;POINT TO SOFTWARE SWR
MOV #DISPREG,DISPLAY
END ;OF IF #-1

L2:::~::~

5375

.DSABL LSB

5378 005032

SUBAAB: SUBTST <<SETUP ACT, APT, & XXDP>>
;*****
;SUBTEST SETUP ACT, APT, & XXDP
;*****

5379

5380

5381 005032 005037 056654

5382 005036 132737 000040 056667

005044 001403

5383 005046

005046 012737 177777 002360

5384 005054

005054

5385 005054

005054 132737 000200 056667

005062 001403

5386 005064

005064 012737 177777 002444

5387 005072

005072

5388 005072

005072 123727 056666 000001

005100 001023

5389 005102

005102 012737 177777 002352

005110 012737 177777 002346

005116 012737 177777 002062

005124 012737 177777 002436

5390 005132 012737 040720 000024

5391 005140 012737 056670 002636

;THIS SETS UP A BUNCH OF FLAGS TO TELL THE PROGRAM EVERYTHING
;IT CARES TO KNOW ABOUT APT, ACT, & XXDP.
CLR \$PASS ;CLEAR PASS COUNT
IFB #BITS SET.IN \$ENVM BITB #BITS,\$ENVM
BEQ L3
SET \$TPFLG ;INDICATE NO TERMINAL
MOV #-1,\$TPFLG
END ;OF IFB #BITS
L3:::::
IFB #BIT7 SET.IN \$ENVM BITB #BIT7,\$ENVM
BEQ L4
SET APTSIZE
MOV #-1,APTSIZE
END ;OF IFB #BIT7
L4:::::
IFB \$ENV EQ #1
CMPB \$ENV,#1
BNE L5
SET APTFLAG,QVFLAG,\$AUTO,QUICK
MOV #-1,APTFLAG
MOV #-1,QVFLAG
MOV #-1,\$AUTO
MOV #-1,QUICK
MOV #APTDOWN,PWRVEC
MOV #SWREG,SWR ;USE APT SWR

```

5392 005146      000430
      005146
      005150
5393 005150      023727 000042 002000
      005156      001424
      005160      005737 000042
      005164      001421
5394 005166      012737 177777 002346
      005174      012737 177777 002062
5395 005202      023727 000042 014042
      005210      001004
5396 005212      012737 177777 002350
5397 005220      000403
      005222
5398 005222      012737 177777 002354
      005222
5399 005230
      005230
5400 005230
      005230
5401 005230
      005230

```

```

ELSE
      IF 42 NE #STACK AND 42 NE #0
          SET QVFLAG,$AUTO
      IF 42 EQ #ENDAD
          SET      ACTFLAG
      ELSE
          SET      XXDPCHAIN
      END ;OF IF 42
      END ;OF IF 42
      END ;OF IFB $ENV

```

```

BR L6
L5:~~~~~
      CMP 42,#STACK
      BEQ L7
      TST 42
      BEQ L7
      MOV #-1,QVFLAG
      MOV #-1,$AUTO
      CMP 42,#ENDAD
      BNE L10
      MOV #-1,ACTFLAG
BR L11
L10:~~~~~
      MOV #-1,XXDPCHAIN
L11:~~~~~
L7:~~~~~
L6:~~~~~

```

5403 005230

```

SUBTST <<PROTECT PROGRAM & LOADERS>>
;*****
;*SUBTEST   PROTECT PROGRAM & LOADERS
;*****
BIS    #BIT7,CONFIG      ;PROTECT PROGRAM SPACE (BANK 0)
BIS    #BIT7,CONFIG+4    ;PROTECT LOADER SPACE (BANK 1)
IF    #ENDAD NE 42      ;NOT ACT-11?
                                CMP #ENDAD,42
                                BEQ L12
IF NO22BIT NE #0      ;
                                TST NO22BIT
                                BEQ L13
SET    MONFLG          ;RETURN TO XXDP MONITOR
                                MOV #-1,MONFLG
ERROR +64              ;ILLEGAL PROCESSOR
ELSE                    ;
                                BR L14
                                L13:::
TYPE    MSG000          ;TYPE PROGRAM TITLE
TYPEIT ,MSG000
.DSABL CRF
END
                                L14:::
END ;OF IF #ENDAD      L12:::

```

5404 005230 052737 000200 002664
5405 005236 052737 000200 002670
5406 005244
005244 022737 014042 000042
005252 001412
5407 005254
005254 005737 002454
005260 001405
5408 005262
005262 012737 .77777 002276
5409 005270 104064
5410 005272
005272 000402
005274
5411 005274
005274 104401 071422
5412 005300
005300
5413 005300
005300
5414
5415 005300

5416
5417
5418 005300
005300 012737 005500 000004
5419 005306 005737 177746
5420 005312
005312 012737 005412 000004
5421 005320 005737 172516
5422 005324 013746 000004
5423 005330 012737 005400 000004
5424 005336 032737 001000 177750
5425 005344 001415
5426 005346
005346 104401 071100
5427 005352 052737 000400 177730 12:
5428 005360 042737 000077 177734
5429 005366
005366 104401 071547
5430 005372 012637 000004
5431 005376 000411
5432 00540^ 012637 000004 14:
5433 005404
005404 104401 071112

```

SUBTST <<CHECK FOR CACHE AND MEMORY MANAGEMENT>>
;*****
;*SUBTEST   CHECK FOR CACHE AND MEMORY MANAGEMENT
;*****
;* THIS FIGURES OUT IF THERE IS A CACHE AND MEMORY MANAGEMENT
;* ON THE SYSTEM, AND WHETHER IT IS ENABLED OR DISABLED.
SET4   #3$
MOV    #3$,4
.DSABL CRF
TST    CONTRL          ;IS THERE A CONTROL REGISTER?
SET4   #1$
MOV    #1$,4
.DSABL CRF
TST    MMR3           ;IS THERE A MMR3 REGISTER?
MOV    4,-(SP)        ;;V SAVE OLD TIME OUT
MOV    #14$,4         ;;V PASS ON KTJ11
BIT    #BIT9,@#177750 ;;V TEST FOR 1184
BEQ    14$            ;;V ELSE REPORT 1183
TYPE   M1184         ;;V REPORT 1184
TYPEIT ,M1184
.DSABL CRF
BIS    #BIT8,@#177730 ;;V SET ABILITY TO CLEAR
BIC    #77,@#177734  ;;V UNIBUS MEMORY ACCESS
TYPE   NOUBMT        ;;V TO UNIBUS
TYPEIT ,NOUBMT
.DSABL CRF
MOV    (SP)+,4       ;;V AND REPORT NO UNIBUS
BR     4$            ;;V MEMORY ACCESS AND CONTINUE
MOV    (SP)+,4       ;;V ALSO RESTORE OLD TIME OUT
TYPE   MSG117        ; 11/83
TYPEIT ,MSG117

```

5434	005410	000404			.DSABL	CRF		
5435	005412				BR	4\$		
	005412	012737	177777	002276	1\$:	SET	MONFLG	;PROCESSOR NOT SUPPORTED BY THIS DIAGNOSTIC 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 SEI
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 INFG 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	
	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
5453 005512 005737 002456
5454 005516 001011

8\$: DEENERGIZE ;TURN OFF MEMORY MANAGEMENT
TST NOSUPER ;IS THERE A SUPERVISOR MODE?
BNE 5\$;NO-SKIP SUPERVISOR SETUP.

5455
5456
5457 005520 042737 030000 177776
5458 005526 052737 010000 177776

;SET PREVIOUS MODE TO SUPERVISOR
BIC #BIT13!BIT12,PSW
BIS #BIT12,PSW

5459
5460 005534
005534 012746 000740
5461 005540 006606

PUSH #SUPSTK
MTPI SSP
MOV #SUPSTK,-(SP)

5462
5463
5464 005542 052737 030000 177776 5\$:
5465

;SET PREVIOUS MODE TO USER
BIS #BIT13!BIT12,PSW

5466 005550
005550 012746 000700
5467 005554 006606

PUSH #USESTK
MTPI USP
MOV #USESTK,-(SP)

5468
5469 005556

SUBTST <<GET SOFTWARE SWITCH REGISTER IF NECESSARY>>

;*SUBTEST GET SOFTWARE SWITCH REGISTER IF NECESSARY

5470 005556
005556 005737 002062
005562 001012
5471 005564
005564 023727 002636 000176
005572 001006

IF \$AUTO IS FALSE ;IF NOT(APT OR ACT)
TST \$AUTO
BNE L15
IF SWR EQ #SWREG ;IF SOFTWARE SWITCH REG SELECTED
CMP SWR,#SWREG
BNE L16

5472 005574
005574 012737 177777 002566

SET SWRFLG ;;SET FLG TO BUMP STACK
MOV #-1,SWRFLG

5473 005602 104407
5474 005604 005037 002566
5475 005610
005610

GTSWR ;;GET SOFT-SWR SETTINGS
CLR SWRFLG ;;CLEAR IT FOR REST OF PROGRAM
END ;OF IF SWR

5476 005610
005610
5477
5478 005610

END ;OF IF \$AUTO
L16:::~::~
L15:::~::~

SUBTST <<GET MEMORY MANAGEMENT READY>>

;*SUBTEST GET MEMORY MANAGEMENT READY

5479 005610 104422
5480 005612
005612 010346
005614 012703 000200
005620 004737 035716

KMAP ;MAP KERNEL SPACE 1 TO 1
MAP ;MAP SUPERVISOR SPACE (TEST AREA) 1 TO 1
MOV R3,-(SP)

005624 012603
5481 005626 104420

MOV #200,R3
CALL MAPPER
.DSABL CRF
MOV (SP)+,R3
ENERGIZE ;TURN ON MEMORY MANAGEMENT

5484 005630

005630 000004

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5491
5492
5493
5494
5495
5496
5497
5498
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5500
5501
5502
5503 005632 005005
5504 005634 005000
5505 005636 012703 172100
5506 005642 012737 000001 002076
5507 005650
005650 012737 006024 000004

5508 005656
005656
5509 005656 005713
5510 005660 052705 000001
5511 005664 005004
5512 005666 042760 000006 002462
5513 005674 052760 000030 002462
5514 005702 005013
5515 005704
005704 012713 020000
5516 005710
005710 032713 020000
005714 001403
5517 005716 052760 000001 002462
5518 005724
005724
5519 005724 005013
5520 005726 004737 006220
5521 005732
005732 026027 002462 000030
005740 100004
5522 005742 016037 002462 002052
5523 005750 104021
5524 005752
005752
5525 005752 062700 000002
5526 005756 062703 000002

```

NEWSTST <<BIT TEST OF ALL CSR'S>>
;*****
;*TEST 1 BIT TEST OF ALL CSR'S
;*****
TST1: SCOPE
;* THE FIRST PART OF THE CONFIGURATION ANALYSIS DOES THE FOLLOWING:
;* 1) FINDS WHICH CSR'S RESPOND, AND PUTS THEM INTO THE CSR INFORMATION
;* TABLE, AND STORES ANOTHER BIT FOR "TOTCSRS".
;* 2) TESTS THE CSR BITS COMMON TO ALL CSR'S.
;* 3) FIGURES OUT IF THE MODULE IS A ECC, OR PARITY MEMORY
;* 4) TESTS THE BITS PARTICULAR TO THAT TYPE OF CSR.
;* 5) IF ANY BITS TEST BAD IN THE CSR UNDER TEST, THE CSR OK BIT IN THE
;* CSR INFORMATION TABLE IS CLEARED.
;* THE INFORMATION BITS ONE THROUGH THREE FORM A CODE WHICH GIVES THE TYPE
;* OF CSR:
;*
;* TYPE ECC
;* BIT0
;*
;* MSV11-L/P 0 PARITY
;* MSV11-J 1 ECC
;*
;* THIS MEMORY CODE WILL BE USED IN THE SECOND PART OF THIS ANALYSIS
;*
CLR R5 ;R5 IS THE TOTAL CSR NUMBER
CLR R0 ;R0 IS A TABLE INDEX
MOV #CSRADD,R3 ;R3 HAS THE CSR ADDRESS
MOV #1,NOPAR ;IGNORE PARITY ERRORS
SET4 #CSRBMP
MOV #CSRBMP,4
.DSABL CRF
REPEAT
;*****
; B1:::
TST (R3) ;DOES THIS CSR RESPOND???
BIS #1,R5 ;MARK IT IN CSR MAP
CLR R4 ;CLEAR THE LAST CSR INDICATOR
BIC #6,CSRINFO(R0) ;CLEAR UNUSED BITS
BIS #BIT4:BIT3,CSRINFO(R0) ;YES-MARK IT IN CSR INFORMATION TABLE
CLR (R3) ;CLEAR THE CSR UNDER TEST
LET (R3) := #BIT13 ;IS THIS AN ECC MEMORY???
MOV #BIT13,(R3)
IF #BIT13 SET.IN (R3);IS BIT 13 SET
BIT #BIT13,(R3)
BEQ L17
BIS #BIT0,CSRINFO(R0);MARK IT IN THE TABLE AS BEING A ECC MEMORY
END ;
; L17:::
CLR (R3) ;CLEAR CSR UNDER TEST
CALL RWCSR ;BIT TEST OF ALL BITS IN CSR'S
IF CSRINFO(R0) MI #30 ;DO WE HAVE A LEGAL CONFIGURATION?
CMP CSRINFO(R0),#30
BPL L20
MOV CSRINFO(R0),BAD ;MOVE IN BAD DATA
ERROR +21
END ;
; L20:::
NXTCSR: ADD #2,R0 ;GO TO NEXT CSR
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          ;
5529 005766 005204          INC R4          ;YES SET CSR PRESENT FLAG
5530 005770          END              ;
          005770          UNTIL R0 EQ #40      ;UNTIL ALL CSR'S ARE DONE
5531 005770 020027 000040          ;
          005774 001330          ;
          005776          ;
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          ;
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          ;
5537 006014 004737 006034          CALL CSRMAP    ;PRINT CSR MAP
5538 006020          JUMPTO CTEST    ;
          006020 000137 006714          ;
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

5545 006034 005000

5546 006036 104401 071370

5547 006042 104401 066064

5548 006046 005001

5549 006050 006050

5550 006050 010102

5551 006052 022702 000011

5552 006056 100002

5553 006060 062702 000007

5554 006064 062702 000060

5555 006070 110237 066062

5556 006074 104401 066062

5557 006100 104401 066060

5558 006104 005201

5559 006106 020127 000020

006106 001356

006112 001356

006114

5560 006114 104401 065544

5561 006120 006120

5562 006120 005760 002462

006124 001414

5563 006126 032760 000001 002462

006134 001404

5564 006136 112737 000105 066062

5565 006144 000403

006146

5566 006146 112737 000120 066062

5567 006154 006154

5568 006154 000403

006156

5569 006156 112737 000040 066062

5570 006164 006164

5571 006164 104401 066062

```

CSRMAP: SUBTST <<PRINT CSR REGISTER MAP>>
;*****
;*SUBTEST PRINT CSR REGISTER MAP
;*****
CLR R0 ;CLEAR CSR INFO POINTER
TYPE MSG008 ;PRINT TITLE
TYPEIT ,MSG008
.DSABL CRF
TYPE MSG016 ;PRINT CSR NUMBERS
TYPEIT ,MSG016
.DSABL CRF
CLR R1 ;
REPEAT ;
; B2:::;
MOV R1,R2 ;
CMP #9.,R2 ;
BPL 1$ ;JUMP AROUND NEXT INSTRUCTION
ADD #7,R2 ;
ADD #60,R2 ;MAKE IT ASCII
MOVB R2,MSG015 ;
TYPE MSG015 ;
TYPEIT ,MSG015 ;
.DSABL CRF ;TYPE SINGLE SPACE
TYPE MSG014 ;
TYPEIT ,MSG014 ;
.DSABL CRF ;
INC R1 ;
UNTIL R1 EQ #16. ;
; CMP R1,#16.
; BNE B2
; E2:::;
TYPE MSG009 ;TYPE MEMTYPE
TYPEIT ,MSG009 ;
.DSABL CRF ;
REPEAT ;
; B3:::;
IF CSRINFO(R0) NE #0 ;IS CSR NONEXSISTANT???
TST CSRINFO(R0)
BEQ L24
IF #BIT0 SET.IN CSRINFO(R0)
BIT #BIT0,CSRINFO(R0)
BEQ L25
MOV #'E,MSG015 ;IT IS A MSV11-J
ELSE
BR L26
L25:::;
MOV #'P,MSG015 ;IT IS A MSV11-L/P
END
L26:::;
ELSE
BR L27
L24:::;
MOV #' ,MSG015
END
L27:::;
TYPE MSG015 ;TYPE MEMORY TYPE
TYPEIT ,MSG015

```

5572	006170			.DSABL CRF		
	006170	104401	066060	TYPE MSG014	;TYPE SPACE	
				TYPEIT ,MSG014		
5573	006174	000240		.DSABL CRF		
				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
;*****
; THIS ROUTINE "RWCSR" CHECK TO SEE THAT THE CSR CAN BEWRITTEN ON CORRECTLY
; BY WRITING AND CHECKING FOR THE FOLLOWING PATTERNS:
;
;           1-ZEROS
;           2-ONES
;           3-SHIFTING A ONE THROUGH A FIELD OF ZEROS
;           4-SHIFTING A ZEROS THROUGH A FIELD OF ONES
;
RWCSR:
    PUSH R4,R5,UIPARO          ;SAVE R4,R5, AND UIPARO ON STACK
                                MOV R4,(SP)
                                MOV R5,(SP)
                                MOV UIPARO,-(SP)
    LET R5 := R0                ;GET CSR NUMBER FOR POSSIBLE ERROR
                                MOV R0,R5
    ASR R5                      ;
    LET CSRNO := R5             ;
                                MOV R5,CSRNO
    LET ADDRESS := R3           ;GET ADDRESS FOR POSSIBLE ERROR
                                MOV R3,ADDRESS
    IF #BIT0 SET.IN CSRINFO(R0) ;WHAT KIND OF MEMORY IS THIS??? ;GET BIT MASKS FOR D
                                BIT #BIT0,CSRINFO(R0)
                                BEQ L31
        LET R5 := #017740      ;MASK FOR MSV11-J
                                MOV #017740,R5
    ELSE                         ;IT IS A MSV11-L/P
                                BR L32
        LET R5 := #070032      ;MASK FOR MSV11-L/P
                                MOV #070032,R5
    END                          ;
                                L31:::::
    LET CSR1S := #177777        ;SET CSR1S TO ALL ONES
                                MOV #177777,CSR1S
    BIC R5,CSR1S                ;CLEAR BITS FOR GOOD DATA
    LET (R3) := #0              ;0 ---->CSR
                                CLR (R3)
    LET R4 := (R3)              ;MASK OUT UNWANTED BITS
                                MOV (R3),R4
    BIC R5,R4                    ;
    IF R4 NE #0                 ;DO WE HAVE A CORRECT READ
                                TST R4
                                BEQ L33
        LET GOOD := #0          ;GOOD DATA=0'S
                                CLR GOOD
        LET CSR := R4           ;BAD DATA=CSR
                                MOV R4,CSR
    ERROR +35                    ;BIT SET ERROR
    BIC #BIT3,CSRINFO(R0)       ;CLEAR CSR OK BIT
    END
                                L33:::::
    LET (R3) := CSR1S           ;ONES >(R3)
    
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 5590 006220
 5591 006220
 006220 010446
 006222 010546
 006224 013746 177640
 5592 006230
 006230 010005
 5593 006232 006205
 5594 006234
 006234 010537 002152
 5595 006240
 006240 010337 002034
 5596 006244
 006244 032760 000001 002462
 006252 001403
 5597 006254
 006254 012705 017740
 5598 006260
 006260 000402
 006262
 5599 006262
 006262 012705 070032
 5600 006266
 006266
 5601 006266
 006266 012737 177777 002322
 5602 006274 040537 002322
 5603 006300
 006300 005013
 5604 006302
 006302 011304
 5605 006304 040504
 5606 006306
 006306 005704
 006310 001410
 5607 006312
 006312 005037 002044
 5608 006316
 006316 010437 002150
 5609 006322 104035
 5610 006324 042760 000010 002462
 5611 006332
 006332
 5612 006332

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5613 006332 013713 002322          LET R4 := (R3)          ;MASK OUT CORRECT FIELD          MOV CSR15,(R3)
006336 011304          ;CLEAR OUT CSR          MOV (R3),R4
5614 006340 005013          CLR (R3)
5615 006342 040504          BIC R5,R4
5616 006344 020437 002322          IF R4 NE CSR15          ;WAS PATTERN WRITTEN CORRECTLY?
006350 001411          ;GOOD DATA = ALL LEGAL BITS SET          CMP R4,CSR15
5617 006352 013737 002322 002044          LET GOOD := CSR15          ;BAD DATA=CSR          BEQ L34
006352 010437 002150          LET CSR := R4          ;BIT CLEAR ERROR          MOV CSR15,GOOD
5618 006360 104010          ERROR +10          ;CLEAR CSR OK BIT          MOV R4,CSR
5619 006364 042760 000010 002462          BIC #BIT3,CSRINFO(R0)
5620 006366 000010 002462          END
5621 006374          ;
006374          ;SET UP LOOP COUNTER          L34:::
5622 006374 005037 002264          LET PASFLG := #0          ;REPEAT WITH A FIELD OF 1'S THROUGH 0'S          CLR PASFLG
5623 006400 006400          REPEAT          ;O'S THROUGH 1'S          B4:::
5624 006400 005237 002264          INC PASFLG          ;INCREMENT LOOP COUNTER          O'S THROUGH 1'S
5625 006404 012737 177777 177640          LET UIPARO := #-1          ;USE USER PAR FOR BIT COUNTER          MOV #-1,UIPARO
5626 006412 023727 002264 000001          IF PASFLG EQ #1          ;PASS 1          CMP PASFLG,#1
5627 006420 001003          ;1-- -->FIELD OF ZEROS          BNE L35
5628 006422 012702 000001          LET R2 := #1          ;PASS 2          MOV #1,R2
5629 006426 000402          ELSE          BR L36
5630 006430 012702 177776          LET R2 := #177776          ;0----->FIELD OF ONES          L35:::
5631 006434          END          ;          MOV #177776,R2
5632 006434          REPEAT          ;DO BITS 0-4 AND 13-15          L36:::
5633 006434 005237 177640          INC UIPARO          ;INCREMENT BIT POINTER          B5:::
5634 006440 023727 002264 000001          IF PASFLG EQ #1 AND #BIT0 OFF.IN CSRINFO(R0) ;          CMP PASFLG,#1
006446 001006          ;          BNE L37
006450 032760 000001 002462          BIC #BIT14,R2          ;IF THIS IS PASS 1 ON A MSV11-L/P,CLEAR BIT 14          BIT #BIT0,CSRINFO(R0)
5635 006460 042702 040000          END          ;          BNE L37
5636 006464          ;          L37:::
5637 006464 023727 002264 000002          IF PASFLG EQ #2 AND #BIT0 OFF.IN CSRINFO(R0) ;          CMP PASFLG,#2
006472 001006          ;          BNE L40
006474 032760 000001 002462          BIC #BIT14!BIT2,R2          ;IF THIS IS PASS 2 ON A MSV11-L/P, CLEAR ECRSRD BIT AND          BIT #BIT0,CSRINFO(R0)
5638 006504 042702 040004          END          ;          BNE L40
5639 006510          ;          L40:::
5640 006510 010213          LET (R3) := R2          ;WRITE DATA          MOV R2,(R3)
006510

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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 UIPARO EQ #15. ;UNTIL ALL BITS ARE DONE
      006602 023727 177640 000017    ;CMP UIPARO,#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

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

```

```

5678 ;THE FOLLOWING ROUTINE DETERMINES WHICH CSR CONTROLS PROGRAM SPACE
5679 ;
5680 006714 104424 ;TEST: 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

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```

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
5725 007162 104502          CLRCSR          ;DEBUG AID
5726 007164 012771 000000 000000  MOV      #0,@(R1)       ;CLEAR ALL CSR'S
5727 007172 012771 000000 000002  MOV      #0,@2(R1)       ;RESTORE TEST LOCATIONS
5728 007200 023127 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
          007222 104401 071264  TYPEIT   ,MSG126
          .DSABL CRF
          CLR      PGMCSR          ;ERROR - PROGRAM CSR NOT FOUND!
          ;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

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; THIS ROUTINE CLEARS ALL MEMORY SPACE BEGINNING AT ADDRESS 200,000 AND
; CONTINUES UNTIL THERE IS NO MEMORY LEFT. IT SHOULD CLEAR ANY PARITY ERRORS
; CREATED BY THE LAST ROUTINE, AND CLEAN UP ANY JUNK LEFT HANGING AROUND IN
; HIGHER MEMORY.

5742 007232 012737 007342 000004

CLRMEM: SET4 #CLREX ;NONEM TRAPS GO TO CLREX

5743 007240 005037 006216

MOV #CLREX,4

5744 007244 012737 000001 002076

.DSABL CRF

5745 007252 012737 002000 172350

CLR TRACE

5746 007260 012701 100C00

MOV #1,NOPAR ;IGNORE PARITY ERRORS

5747 007264 020127 117776

MOV #2000,KIPAR4 ;SET UP MAP TO START AT BANK 2

5748 007270 001003

MOV #100000,R1 ;R1 MAPS TO KIPAR4

5749 007272 012737 177777 006216

1\$: CMP R1,#117776 ;WHOLE 16K BANK DONE?

5750 007300 005021

BNE 2\$;KEEP GOING IF NOT

5751 007302 005737 006216

2\$: MOV #-1,TRACE ;USE TRACE FLAG TO FLAG END OF BANK

5752 007306 001001

CLR (R1)+ ;CLEAR CONTENTS & INCREMENT

5753 007310 000765

TST TRACE ;EOB FLAG SET?

5754 007312 062737 000200 172350

BNE 3\$;GO TO NEXT BANK IF SO

5755 007320 022737 177600 172750

3\$: ADD #200,KIPAR4 ;SET MAP FOR NEXT BANK

5756 007326 001405

CMP #177600,KIPAR4 ;ARE WE AT THE PERIPHERAL PAGE

5757 007330 005037 006216

BEQ CLREX ;YES-GO ON

5758 007334 012701 100000

CLR TRACE ;RESET FLAG

5759 007340 000751

MOV #100000,R1 ;RESET R1

5760 007342 000240

BR 1\$;CLEAR NEXT BANK

5761 007344 005037 006216

CLREX:

NOP

5762 007350

CLR TRACE

007350 012737 034114 000004

RES4

007356 022737 000005 004010

MOV #TIMEOUT,4

007364 001002

CMP #5,PROTYP ;IS THIS AN 11/83/84 ?

007366 005037 177766

BNE 101\$;BRANCH IF NOT

007372

101\$:

CLR CPUERR ;CLEAR OUT THE CPU ERROR REGISTER BITS

.DSABL CRF ;THAT A EXPECTED TRAP COULD HAVE SET

5765 007372

```

ANA2:  SUBTST <<MATCH ALL CSR'S WITH MEMORY>>
;*****
;SUBTEST      MATCH ALL CSR'S WITH MEMORY
;*****
;* THE SECOND PART OF THE ANALYSIS MATCHES UP THE CSR'S WITH THE MEMORY, AND
;* INSTALLS ALL THE INFORMATION FOUND IN THE CONFIGURATION TABLE.  FOR ECC,
;* THIS IS DONE BY TAKING EACH CSR FOUND IN THE PREVIOUS SECTION SEQUENTIALLY
;* AND CHECKING THROUGH ALL OF MEMORY, ONE BANK AT AT TIME, TO SEE WHICH BANKS
;* RESPOND TO THE CSR IN QUESTION.  THE FIRST DOUBLE WORD PAIR IN EACH BANK IS
;* WRITTEN WITH DATA AND DIAGNOSTIC CHECK MODE SET IN THE CSR AND ARE CHECKED
;* FOR EACH BANK THROUGH USE OF TESTADD AND KERNEL INSTRUCTION PAGE ADDRESS
;* REGISTERS 4 AND 5.  IF WE GET THE PROPER CHECKBITS BACK, WE HAVE A MATCH.
;* IF NOT, THE ROUTINE CHECKS FOR SINGLE OR DOUBLE BIT ERRORS.
;* IF ONE OR THE OTHER IS FOUND, THE ERROR ADDRESS IS CHECKED
;* TO SEE IF IT IS THAT BANK.  IF IT IS, WE HAVE A MATCH.  AT THE END OF EACH
;* BANK PASS, FOR EACH CSR PASS, THE PROGRAM COMES UP WITH A NUMBER, STORED IN
;* "I", WHICH DENOTES THE FOLLOWING:
;
;      I      MEMORY DESCRIPTION
;      -      -----
;      0      NON-EXISTANT MEMORY
;      1      MSV11-L/P MEMORY
;      2      MSV11-J MEMORY
;
; * NOTE THAT PARITY MEMORY WRITES WRONG PARITY TO THE DOUBLE WORDS, THEN LOOKS
; * FOR THE PARITY ERROR BIT TO BE SET.  IF THE BIT IS SET, WE HAVE A MATCH.
; *

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5790 007372 012737 010444 000004
5791 007400 005037 002314
5792 007404 012701 002412
5793 007410 013703 002224
5794 007414 005000
5795 007416 005005
5796 007420 005737 002454
5797 007424 001403
5798 007426 005037 002560
5799 007432 000413
5800 007434 022737 000177 002556 7$:
5801 007442 001407
5802 007444 013702 002556
5803 007450 005202
5804 007452 072227 000011
5805 007456 010237 002560
5806 007462 012702 000004 1$:
5807 007466 005037 002564
5808 007472 012737 001000 172350
5809 007500 012737 001000 172352
5810 007506 006303 2$:
5811 007510 103420
5812 007512 062700 000002
5813 007516 010037 002152
5814 007522 005703
5815 007524 001370
5816 007526 012737 001000 172350

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SET4 #100$ ;NE MEMORY TRAPS GO TO 100$
MOV #100$,4
.DSABL CRF
CLR CHECK ;CLEAR CHECK
MOV #TESTADD,R1 ;SET UP THE VIRTUAL ADDR. POINTER
MOV TOTCSRS,R3 ;MOVE CSR MAP INTO R3
CLR R0 ;CLEAR THE CSR POINTER
CLR R5 ;CLEAR THE PROGRAM CSR STATUS POINTER
TST NO22BIT ;DO WE HAVE 22 BIT ADDRESSING ?
BEQ 7$ ;BRANCH IF WE DO
CLR LASTBLOCK ;ADJUST LASTBLOCK INDICATOR FOR 124K MACHINE
BR 1$ ;BRANCH OVER NEXT PIECE OF CODE
CMP #177, LASTBANK ;IS THERE Q-BUS MEMORY ABOVE 17776000?
BEQ 1$ ;BRANCH IF NOT
MOV LASTBANK,R2 ;SET UP A NEW LAST BLOCK INDICATOR
INC R2
ASH #9.,R2
MOV R2, LASTBLOCK
MOV #4,R2 ;R2 IS INDEX FOR CONFIG TABLE
CLR ENDFLG ;CLEAR END OF MEMORY FLAG
MOV #1000,KIPAR4 ;SET KIPAR4 FOR BANK 1
MOV #1000,KIPAR5 ;SET KIPAR5 FOR BANK 1
ASL R3 ;DOES THIS CSR EXIST?
BCS 3$ ;BRANCH IF IT DOES EXIST
ADD #2,R0 ;INCREMENT THE CSR POINTER
MOV R0, CSRNO ;STORE IT IN CSRNO ALSO
TST R3 ;ARE THERE ANY MORE CSR'S TO DO?
BNE 2$ ;BRANCH IF ALL CSRS NOT DONE
MOV #1000,KIPAR4 ;RESTORE KIPAR4

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5817 007534 012737 001200 172352      MOV      #1200,KIPARS5      ;RESTORE KIPARS5
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      @2(R1)          ;TEST TO SEE THAT THERE IS MEMORY PRESENT
5830 007622 005237 002452              INC      I                ;MEMORY PRESENT
5831 007626              PUSH     @2(R1),@2(R1)    ;SAVE THE LOCATIONS UNDER TEST
                    007626 017146 000000              MOV @2(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,@2(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$:     MOV      #123456,@2(R1)   ;SET THE FIRST LOCATION UNDER TEST
5840 007704 012771 123456 000002      MOV      #123456,@2(R1)   ;SET THE SECOND LUT
5841 007712 104503              CLR1CSR
5842 007714 104475              CB1CSR
5843 007716 000240              NOP
5844 007720 005771 000000      41$:     TST      @2(R1)          ;SET DIAG. CHECK MODE IN CSR UNDER TEST
5845 007724 104426              READCSR                    ;DEBUG AID
5846 007726 000240              NOP
5847 007730 013704 002150              MOV      CSR,R4           ;READ THE FIRST LUT TO WRITE CKBITS. INTO CSR
5848 007734 000240              NOP
5849 007736 010437 002434              MOV      R4,TEMP         ;READ THE CSR UNDER TEST
5850 007742 104503              CLR1CSR                    ;DEBUG AID
5851 007744              POP      @2(R1),@2(R1)    ;GET THE CHECKBITS FROM THE CSR
                    007744 012671 000002              MOV (SP)+,@2(R1)
                    007750 012671 000000              MOV (SP)+,@2(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$:     ASH      #-5,R4          ;MANIPULATE THE CSR BITS
5858 010000 042704 177700              BIC      #+C77,R4        ;INTO A USABLE FORM.
5859 010004 012737 000040 002316      MOV      #40,CBITS       ;MSV11-J CHECK BITS
5860 010012 000240              NOP
5861 010014 023704 002316      77$:     CMP      CBITS,R4        ;DEBBUGGING AIDE
5862 010020 000240              NOP
5863 010022 001402              BEQ     25$              ;DO THE CHECKBITS COMPARE TO WHAT WAS WRITTEN?
5864 010024 000137 010170              JMP     22$              ;DEBBUG AIDE
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 EXTRANEIOUS 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 EXTRANEIOUS 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						;		
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						;		
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$:  ADD      #2,RO           ;INCREMENT CSR POINTER
5945 010434 000240              NOP                          ;DEBUG AID
5946 010436 104423              CACHON      ;TURN ON THE CACHE
5947 010440 000137 007462              JMP      1$             ;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

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5952 010454 104423
5953 010456 104472
5954 010460

010460 000004
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5961 010462 005037 002072
5962 010466 012737 000001 002076
5963 010474 005037 002070
5964 010500 012737 000001 002100
5965 010506
010506 012737 034050 000004

5966 010514 005000
5967 010516 012701 040000
5968 010522 104424
5969 010524 005720
5970 010526 077102
5971 010530 104423
5972
5973 010532 005737 002072
5974 010536 001403
5975 010540
010540 005237 002064
010544 104003

5976 010546 005737 002070
5977 010552 001406
5978 010554 162737 000002 002034
5979 010562
010562 005237 002064
010566 104004

5980 010570 053737 002106 002664
5981 010576
010576 012737 034114 000004
010604 022737 000005 004010
010612 001002
010614 005037 177766
010620

5982
5983 010620

5984 010620
010620 032777 000001 172010
010626 001003

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SUBAAS: CACHON ;MAKE SURE THE CACHE IS ON
ECCINIT ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
NEWSTST <<TEST BANK 0 ACCESSES>>
;*****
;*TEST 2 TEST BANK 0 ACCESSES
;*****
TST2: SCOPE
;THIS DOES A "TST" INSTRUCTION ON EVERY LOCATION IN BANK #0 TO SEE
;IF IT GETS ANY PARITY TRAPS.
;SINCE EVERY LOCATION IS EITHER LOADED OR WRITTEN INTO BY THE PROGRAM
;PRIOR TO THIS POINT - THEN A PARITY ERROR IMPLIES THAT THERE IS A
;HARDWARE FAILURE IN THE MEMORY.
;THESE ERRORS ARE COUNTED AND A FATAL ACTION IS TAKEN
CLR PARCNT ;CLEAR PARITY ERROR COUNTER
MOV #1,NOPAR ;SET THE NO PARITY ERROR FLAG
CLR NEMCNT ;CLEAR NON-EXISTANT MEMORY ERROR COUNTER
MOV #1,NONEM ;SET THE NON-EXISTANT MEMORY ERROR MODE TO COUNT
SET4 #NONEXIST ;TRAPS TO 4 GOTO NONEXIST
MOV #NONEXIST,4
.DSABL CRF
CLR RO
MOV #SIZE,R1
CACHOFF ;TURN CACHE OFF
1$: TST (RO)+ ;SEE IF I CAN DO A READ ACCESS WITHOUT A PARITY TRAP
SOB R1,1$
CACHON ;TURN CACHE ON
;SEE IF ANY FAILURES
TST PARCNT ;ANY PARITY ERRORS?
BEQ 2$ ;NO - SKIP
FATAL 3
INC FATAL$ ;SET FATAL INDICATOR
ERROR +3
.DSABL CRF
2$: TST NEMCNT ;ANY NON EXISTANT MEMORY (HOLES)?
BEQ 3$ ;SKIP IF EQUAL
SUB #2,ADDRESS ;UPDATE 1ST ADDRESS FAILURE FROM AUTO INCREMENT #
FATAL 4
INC FATAL$ ;SET FATAL INDICATOR
ERROR +4
.DSABL CRF
3$: BIS CPUBIT,CONFIG ;SET CORRECT ACCESSED BIT ON BANK 0
RES4 ;RESET TRAPS TO 4 TO DEFAULT
MOV #TIMEOUT,4
CMP #5,PROTYP ;IS THIS AN 11/83/84 ?
BNE 101$ ;BRANCH IF NOT
CLR CPUERR ;CLEAR OUT THE CPU ERROR REGISTER BITS
101$: ;THAT A EXPECTED TRAP COULD HAVE SET
.DSABL CRF
SUBTST <<ENABLE ECC FOR CORRECT TRAPS>>
;*****
;*SUBTEST ENABLE ECC FOR CORRECT TRAPS
;*****
IF #SWO SET.IN @SWR OR ACTFLAG IS TRUE
BIT #SWO,@SWR
BNE L52

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010630 005737 002350
010634 001402
010636
5985 010636 104506
5986 010640
010640 000401
010642
5987 010642 104472
5988 010644
010644

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ENASBE
ELSE

ECCINIT
END ;OF IF #SWO

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TST ACTFLAG
BEQ L53
L52:;;;;;
;TRAP ON SINGLE BIT ERRORS
BR L54
L53:;;;;;
;TRAP ON DOUBLE BIT ERRORS (NORMAL)
L54:;;;;;

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5991 010644

NEWSTST <<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!

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5999 010646 005037 002102

6000 010652 012737 000001 002076
6001 010660 012737 000002 002100
6002 010666 012737 034050 000004

CLR BANK
MOV #1,NOPAR ;SET NO PARITY ERROR FLAG
MOV #2,NONEM ;SET NON-EXISTANT MEMORY MODE TO EXIT TEST LOOP
SET4 #NONEXIST ;TRAPS TO 4 GOTO NONEXIST
MOV #NONEXIST,4

6003 010674 012737 011420 002522
6004 010702 012737 011422 002524
6005 010710 005237 002102
6006 010714 023737 002556 002102
6007 010722 103451
6008 010724 013701 002102

.DSABL CRF
MOV #MTST3+4, LINK1 ;SET UP LINKS
MOV #MTST3+6, LINK2
TAG9\$: INC BANK
CMP LASTBANK, BANK ;DONE?
BLO TAG2\$;YES - SKIP TO NEXT TEST
MOV BANK, R1

6009 010730 006301
6010 010732 006301
6011 010734 010137 002104
6012 010740 005037 002074
6013 010744 005037 002072
6014 010750 005037 002070
6015 010754
010754 010346
010756 013703 002102
010762 004737 035716

ASL R1
ASL R1 ;BANK * 4
MOV R1, BANKINDEX
CLR PATERR ;CLEAR PATTERN ERROR COUNTER
CLR PARCNT ;CLEAR PARITY ERROR COUNTER
CLR NEMCNT ;CLEAR NON-EXISTANT MEMORY COUNTER (HOLES)
MAP BANK ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
MOV R3, (SP)

6016 010766 012603
6017 010770 105761 002664
6018 010774 100542
6019 010776 012777 000207 171516 WARN1:
6020 011004 012700 060000
6021 011010 010004
6022 011012 012701 040000
6023 011016 010103
6024 011020 005002
6025 011022 104424
011024 053737 002552 177776

MOV (SP)+, R3
TSTB CONFIG(R1) ;IS THIS BANK PROTECTED?
BMI TSTBANK ;YES - GO TEST BANK SPECIAL
MOV #207, @LINK1 ;PUT "RETURN" INSTRUCTION AFTER WRITE ROUTINE
MOV #FIRST, R0
MOV R0, R4
MOV #SIZE, R1
MOV R1, R3
CLR R2

6026 011032 004737 011414
6027 011036 104417
6028 011040 104423
6029 011042 000240
6030 011044 000416
6031 011046 005037 002102
6032 011052
011052 012737 034114 000004
011060 022737 000005 004010

CACHOFF ;DATA IS ZEROS
TESTAREA ;TURN CACHE OFF
BIS TESTMODE, PSW ;ENTER SUPERVISOR MODE
;GO TO SYSTEM TEST MODE
.DSABL CRF
CALL MTST3

6026 011032 004737 011414
6027 011036 104417
6028 011040 104423
6029 011042 000240
6030 011044 000416
6031 011046 005037 002102
6032 011052
011052 012737 034114 000004
011060 022737 000005 004010

2\$: KERNEL ;ENTER KERNEL MODE
CACHON ;TURN CACHE ON
NOP
BR TAG3\$;SKIP NEXT INSTRUCTION
TAG2\$: CLR BANK ;RESET TRAPS TO 4 TO DEFAULT
RES4
MOV #TIMEOUT, 4
CMP #5, PROTP ;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
6033	011074	005037	002076		.DSABL	CRF		
6034	011100	000557			CLR	NOPAR		;INDICATE DEFAULT PARITY ACTION
6035	011102	005737	002070	TAG3\$:	BR	SUBAAI		
6036	011106	001401			TST	NEMCNT		;ANY TRAPS?
6037	011110	000677			BEQ	1\$;NO - SKIP
6038	011112	104424		1\$:	BR	TAG9\$;NOW - TRY NEXT BANK
6039	011114				CACHOFF			;TURN CACHE OFF
	011114	053737	002552	177776	TESTAREA			;ENTER SUPERVISOR MODE
					BIS	TESTMODE,PSW		;GO TO SYSTEM TEST MODE
6040	011122	004777	171376		.DSABL	CRF		
6041	011126	104417			CALL	@LINK2		;FINISH PATTERN
6042	011130	104423			KERNEL			;ENTER KERNEL MODE
6043	011132	000240			CACHON			;TURN CACHE ON
6044	011134	005737	002074		NOP			;DEBUG AID
6045	011140	001032			TST	PATERR		;ANY PATTERN ERRORS
6046	011142	005737	002072		BNE	2\$;YES - SKIP
6047	011146	001027			TST	PARCNT		;ANY PARITY ERRORS
6048	011150	005737	002070		BNE	2\$;YES - SKIP
6049	011154	001024			TST	NEMCNT		;ANY NON EXISTANT MEMORY
6050	011156	012700	060000		BNE	2\$;YES - SKIP
6051	011162	010004			MOV	#FIRST,R0		
6052	011164	012701	040000		MOV	R0,R4		
6053	011170	010103			MOV	#SIZE,R1		
6054	011172	013702	002614		MOV	R1,R3		
6055	011176	012777	000240	171316	MOV	ONES,R2		;DATA IS ONES
6056	011204	104424			MOV	#000240,@LINK1		;PUT "NOP" INSTRUCTION BACK IN SUBROUTINE
6057	011206				CACHOFF			;TURN CACHE OFF
	011206	053737	002552	177776	TESTAREA			;ENTER TEST MODE
					BIS	TESTMODE,PSW		;GO TO SYSTEM TEST MODE
6058	011214	004737	011414		.DSABL	CRF		
6059	011220	104417			CALL	MTST3		;DO IN MEMORY IF NOT
6060	011222	104423			KERNEL			;ENTER KERNEL MODE
6061	011224	000240			CACHON			;TURN CACHE ON
6062	011226	013700	002104	2\$:	NOP			;DEBUG AID
6063	011232	005737	002074		MOV	BANKINDEX,R0		
6064	011236	001006			TST	PATERR		;ANY PATTERN ERRORS?
6065	011240	005737	002072		BNE	3\$;YES - SKIP
6066	011244	001003			TST	PARCNT		;ANY PARITY ERRORS?
6067	011246	005737	002070		BNE	3\$;YES - SKIP
6068	011252	001406			TST	NEMCNT		;ANY HOLES?
6069	011254	052760	000001	002664	BEQ	4\$;NONE - SKIP
6070	011262				BIS	#BIT0,CONFIG(R0)		;SET ERROR BIT IN THIS BANK
	011262	012737	177777	002450	SET	CONFGERROR		;FORCE PRINTING OF CONFIGURATION TABLE
								MOV # 1,CONFGERROR
6071	011270	053760	002106	002664	4\$:	BIS	CPUBIT,CONFIG(R0)	;SET ACCESSED BIT
6072	011276	000137	010710		JMP	TAG9\$		
6073								
6074								
6075	011302							
	011302	010146						
6076	011304	012737	000001	002100				MOV R1,-(SP)
6077	011312	012700	060000		MOV	#1,NONEM		;SET NON-EXISTANT MEMORY TO COUNT
6078	011316	012701	020000		MOV	#FIRST,R0		
					MOV	#20000,R1		

```

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          TST (R0)+
6082 011334 077102          SOB R1,4$
6083 011336 104417          KERNEL
6084 011340 104423          CACHON          ;ENTER KERNEL MODE
6085 011342 012737 000002 002100  MOV #2,NONEM      ;TURN CACHE ON
6086 011350          POP R1          ;RESET NON-EXISTANT MEMORY TO EXIT TEST LOOP
      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)+
6096 011416 077102          SOB R1,MTST3
6097 011420 000240          NOP
6098 011422 012401          2$: MOV (R4)+,R1
6099 011424 020102          CMP R1,R2
6100 011426 001402          BEQ 3$
6101 011430 005237 002074          INC PATERR
6102 011434 077306          3$: SOB R3,2$
6103 011436 000207          RETURN
      ;WRITE MEMORY TO PATTERN
      ;DO TILL DONE
      ;THIS IS EITHER A NOP OR RETURN
      ;READ DATA
      ;DOES IT MATCH ?
      ;
      ;IF NOT COUNT ERRORS
      ;ANY WAY DO ALL MEMORY
      ;DONE....RETURN

```

6105 011440
6106
6107
6108
6109 011440 005037 002102
6110 011444 004737 040052
6111 011450 013700 002104
6112 011454
011454 005737 002116
011460 001414
011462 005737 002136
011466 001411
6113 011470 062702 000040
6114 011474 062737 000020 002102
6115 011502 052760 000200 002664
6116 011510
011510 000402
011512
6117 011512 005237 002102
6118 011516
011516
6119 011516 023737 002556 002102
6120 011524 002347

SUBAAI: SUBTST <<FIND SHADOW INHIBIT MODE POINTERS>>
;*****
;*SUBTEST FIND SHADOW INHIBIT MODE POINTERS
;*****
;* THIS SECTION LOOKS FOR INTERLEAVED MSV11-J MEMORIES AND FIGURES OUT
;* WHERE THE SHADOW INHIBIT MODE POINTERS ARE LOCATED. THESE AREAS
;* ARE THEN MARKED AS PROGRAM SPACE.
SHADL1: CLR BANK ;RESET BANK TO ZERO
CALL EXBANK ;SET BANK PARAMETERS
MOV BANKINDEX,R0
IF ACFLAG IS TRUE AND INTFLAG IS TRUE
ADD #40,R2 ;POINT TO BANKINDEX + 8
ADD #20,BANK ;POINT TO BANK + 16
BIS #BIT7,CONFIG(R0) ;MAKE NEW BANK PROGRAM SPACE
ELSE
BR L60
L57:;;;;;
INC BANK ;GO TO NEXT BANK
END; OF IF ACFLAG
L60:;;;;;
CMP LASTBANK,BANK ;HAVE WE DONE ALL THE BANKS?
BGE SHADL1 ;BRANCH IF NOT

TST ACFLAG
BEQ L57
TST INTFLAG
BEQ L57

6123 011526

NEWST <<ECC INHIBIT MODE POINTER TEST>>

;TEST 4 ECC INHIBIT MODE POINTER TEST

011526 000004
6124
6125
6126
6127
6128
6129
6130
6131
6132
6133
6134
6135
6136
6137
6138
6139
6140
6141 011530 104424
6142 011532 012737 177777 002156
6143 011540
011540 005037 002102
011544
6144 011544 012701 060000
6145 011550 004737 040052
6146 011554 013700 002104
6147 011560
011560 005737 002116
011564 001436
6148 011566
011566 005737 002120
011572 001433
6149 011574
011574 005737 002342
011600 001030
6150 011602 012703 000002
6151 011606 116002 002665
6152 011612 006302
6153 011614 042702 177741
6154 011620 010237 002152
6155 011624
011624 023737 002152 002156
011632 001413
6156 011634 013737 002152 002156
6157 011642
011642 005737 002122
011646 001003
6158 011650 052760 000100 002664
6159 011656
011656
6160 011656 004737 011750
6161 011662
011662

TST4: SCOPE
;THE MSV11-J OR MF11S-K INHIBIT ECC DISABLE AND DIAGNOSTIC CHECK MODE
;ON THE BOTTOM FIRST OR SECOND 16K WORDS CONTROLLED BY A CSR. THIS
;IS CONSIDERED TO BE A PROTECTED BANK BY THE PROGRAM. IT MAY BE
;QUITE COMPLEX TO DETERMINE ON A GIVEN SYSTEM CONFIGURATION WHICH
;BANKS CAN BE PROTECTED;
;SO
;THIS ROUTINE ATTEMPS TO CREATE A DOUBLE BIT ERROR IN ADDRESS 0 & 2
;OF EVERY ECC BANK. ECC HARDWARE WILL PREVENT THIS FROM HAPPENING
;IN PROTECTED BANKS WHICH SHOULD ALWAYS INCLUDE BANK ZERO - WHERE
;THE PROGRAM IS.
;
;WARNING:!!!!!!!!!!!!
; IN CASE OF HARDWARE FAILURE IT IS COMMON THAT A DOUBLE BIT ERROR
; WILL BE CREATED ON THE KERNEL STACK & "CRASH" THE DIAGNOSTIC
;DURING THIS ROUTINE. YOUR ONLY CLUE IS THAT YOU CAN GET AS FAR AS
;THIS ROUTINE BUT NOT PAST IT!
CACHOFF ;TURN CACHE OFF
MOV # -1,OLDCSR
FOR BANK := #0 TO LASTBANK

CLR BANK
B6:;;;;;
;SET UP VIRT ADDR POINTER

MOV #FIRST,R1
CALL EXBANK
MOV BANKINDEX,R0
IF ACFLAG IS TRUE
TST ACFLAG
BEQ L61

IF MKFLAG IS TRUE
TST MKFLAG
BEQ L62

IF SKIPMK IS FALSE
TST SKIPMK
BNE L63

MOV #2,R3 ;SET INDEX COUNTER
MOVB CONFIG+1(R0),R2
ASL R2
BIC #+C36,R2
MOV R2,CSRNO
IF CSRNO NE OLDCSR
CMP CSRNO,OLDCSR
BEQ L64

MOV CSRNO,OLDCSR
IF PFLAG IS FALSE
TST PFLAG
BNE L65

BIS #BIT6,CONFIG(R0)
END; OF IF PFLAG
L65:;;;;;

CALL IMPTEST
END; OF IF CSRNO
L64:;;;;;

```

6162 011662          END; OF IF SKIPMK          L63:;;;;;
      011662
6163 011662          END; OF IF MKFLAG          L62:;;;;;
      011662
6164 011662          END; OF IF ACFLAG          L61:;;;;;
      011662
6165 011662          END; OF FOR BANK
      011662 005237 002102          INC BANK
      011666 023737 002102 002556        CMP BANK, LASTBANK
      011674 003723          BLE B6
      011676
6166 011676          MAP          ;MAP TEST SPACE TO BANK 0
      011676 010346          E6:;;;;;
      011700 012703 000200        MOV R3, -(SP)
      011704 004737 035716        CALL #200, R3
      .DSABL CRF          CALL MAPPER
      .DSABL CRF          .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
6169 011734 104506          ENASBE          L66:;;;;;
6170 011736          ELSE          ;TRAP ON SINGLE BIT ERRORS
      011736 000401          BR L70
      011740
6171 011740 104472          ECCINIT          L67:;;;;;
6172 011742          END; OF IF #SW0        ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
      011742
6173 011742 104423          CACHON          L70:;;;;;
6174 011744 000137 012172        JMP SUBAAR        ;TURN THE CACHE BACK ON
      ;JUMP OVER THE SUBROUTINE
    
```



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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
      MOV (SP),R3
6178 011764 012603          CLR R5
6179 011766 005005          MOV #BIT13,CSR
6180 011770 012737 020000 002150    TESTAREA          ;ENTER TEST MODE
6180 011776          BIS TESTMODE,PSW          ;GO TO SYSTEM TEST MODE
      011776 053737 002552 177776    .DSABL CRF
      PUSH (R1)          ;SAVE TEST LOCATION
      MOV (R1),-(SP)
6181 012004          ADD R3,R1          ;INDEX TO NEXT LOCATION
      012004 011146          PUSH (R1)          ;SAVE TEST LOCATION
6182 012006 060301          MOV (R1),-(SP)
6183 012010          CHK1DIS          ;DISABLE ECC & WRITE CHECKBITS FOR 1 CSR
      012010 011146          MOV R4,(R1)          ;WRITE CHECKBITS (ALL ZEROS)
6184 012012 104505          SUB R3,R1
6185 012014 010411          MOV R4,(R1)
6186 012016 160301          CLR1CSR          ;CLEAR CSR
6187 012020 010411          TST (R1)          ;READ CHECKBITS INTO REAL CSR
6188 012022 104503          WAS1DBE          ;WAS THERE A DOUBLE BIT ERROR
6189 012024 005711
6190 012026 104501
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
6218 012124          END ;OF ON.NOERROR ;2
      012124          L73:::
      012124          L72:::

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6219 012124          END ;OF ON.NOERROR ;1
      012124
6220 012124          ON.ERROR
      012124 103001
6221 012126 005205  INC R5
6222 012130          END ;OF ON.ERROR
      012130
6223 012130 104471  ECC1DIS
6224 012132 010411  MOV R4,(R1)
6225 012134 060301  ADD R3,R1
6226 012136 010411  MOV R4,(R1)
6227 012140 104503  CLR1CSR
6228 012142 005705  TST R5
6229 012144 001405  BEQ 1$
6230 012146 050560  BIS R5,CONFIG(R0)
6231 012152 105260  INCB CONFIG+2(R0)
6232 012156 104036  ERROR +36
6233 012160          1$: POP (R1)
      012160 012611
6234 012162 160301  SUB R3,R1
6235 012164          POP (R1)
      012164 012611
6236 012166 104417  KERNEL
6237 012170 000207  RETURN
6238
6239 012172          SUBAAR: SET STOPOK
      012172 012737 177777 002420

```

L71:::

BCC L74

;IDENTIFY AS BAD BANK

L74:::

;DISABLE ERROR CORRECTION

;CLEAR OUT DOUBLE BIT ERROR!

;INDEX TO SECOND WORD

;CLEAR OUT DOUBLE BIT ERROR!

;RESTORE TEST LOCATION (2ND WORD)

MOV (SP)+,(R1)

;GO BACK TO FIRST WORD

;RESTORE TEST LOCATION (1ST WORD)

MOV (SP)+,(R1)

;PROGRAM CAN NOW BE HALTED

MOV #-1,STOPOK

6242 012200

SUBTST <<LEGAL CONFIGURATION CHECK>>

;SUBTEST LEGAL CONFIGURATION CHECK

6243 012200 012700 000020

MOV #16.,R0

6244 012204 012701 002462

MOV #CSRINFO,R1

6245 012210 005021

1\$: CLR (R1)+

6246 012212 077002

SOB RO,1\$

6247 012214

FOR BANK := #0 TO LASTBANK

012214 005037 002102

CLR BANK

012220

B7:::::

6248 012220 004737 040052

CALL EXBANK

6249 012224 013700 002104

MOV BANKINDEX,R0

6250

IF ACFLAG IS TRUE

6251 012230

012230 005737 002116

TST ACFLAG

012234 001444

BEQ L75

6252 012236 116003 002665

MOVB CONFIG+1(R0),R3

6253 012242 042703 177760

BIC #+C17,R3

6254 012246 006303

ASL R3

6255 012250 005263 002462

INC CSRINFO(R3)

6256 012254

IF MKFLAG IS TRUE

012254 005737 002120

TST MKFLAG

012260 001432

BEQ L76

6257

;MAKE SURE THAT EACH BANK HAS NO MORE THAN 2 CSRS

6258 012262

012262

BEGIN LEGALCSR

B10:::::

6259 012262

012262 005737 002136

IF INTFLAG IS TRUE

TST INTFLAG

012266 001423

BEQ L77

6260 012270 116003 002665

MOVB CONFIG+1(R0),R3

6261 012274 010304

MOV R3,R4

6262 012276 042703 177760

BIC #+C17,R3

6263 012302 072427 177774

ASH #-4,R4

6264 012306 042704 177760

BIC #+C17,R4

6265 012312

IF R3 EQ R4

012312 020304

CMP R3,R4

012314 001007

BNE L100

6266 012316 042760 014000 002666

BIC #BIT11!BIT12,CONFIG+2(R0)

6267 012324 042760 170000 002664

BIC #170000,CONFIG(R0)

6268 012332

LEAVE LEGALCSR

012332 000405

BR E10

6269 012334

END; OF IF R3

L100:::::

6270 012334

012334 000401

ELSE

BR L101

6271 012336

LEAVE LEGALCSR

L77:::::

6272 012340

012340 000403

END; OF IF INTFLAG

BR E10

6273 012340

012340 012737 177777 002450

SET CONFGERROR

L101:::::

6274 012346

012346

END LEGALCSR

MOV #-1,CONFGERROR

6275 012346

012346

END ;OF IF MKFLAG

E10:::::

L76:::::

```

6276 012346          END ;OF IF ACFLAG
      012346
6277 012346          END; OF FOR BANK
      012346 005237 002102
      012352 023737 002102 002556
      012360 003717
      012362
6278 012362          PUSH      R5,R0
      012362 010546
      012364 010046
6279 012366 005000          CLR      R0
6280 012370 005001          CLR      R1
6281 012372 005005          CLR      R5
6282 012374 005037 012602          CLR      MBERR
6283 012400 022761 000177 002462 2$:  CMP      #177,CSRINFO(R1)
6284 012406 002043          BGE      5$
6285 012410 022761 000010 002462          CMP      #10,CSRINFO(R1)
6286 012416 002003          BGE      3$
6287 012420 004737 012724          CALL    ILLCSR
6288 012424 000434          BR       5$
6289 012426 016005 002664          3$:  MOV      CONFIG(R0),R5
6290 012432 032705 000002          BIT      #BIT1,R5
6291 012436 001415          BEQ      4$
6292 012440 042705 170377          BIC      #C7400,R5
6293 012444 072527 177771          ASH      #-7,R5
6294 012450 020501          CMP      R5,R1
6295 012452 001007          BNE      4$
6296 012454 032760 010000 002666          BIT      #BIT12,CONFIG+2(P0)
6297 012462 001003          BNE      4$
6298 012464 012737 000001 012602          MOV      #1,MBERR
6299 012472 062700 000004          4$:  ADD      #4,R0
6300 012476 022700 000340          CMP      #340,R0
6301 012502 001351          BNE      3$
6302 012504 005737 012602          TST      MBERR
6303 012510 001402          BEQ      5$
6304 012512 004737 012724          CALL    ILLCSR
6305 012516 005000          5$:  CLR      R0
6306 012520 005037 012602          CLR      MBERR
6307 012524 062701 000002          ADD      #2,R1
6308 012530 022701 000040          CMP      #40,R1
6309 012534 001321          BNE      2$
6310 012536          POP      R0,R5
      012536 012600
      012540 012605
6311 012542 005037 012602          CLR      MBERR
6312 012546 012700 000774          MOV      #774,R0
6313 012552 032760 000002 002664 6$:  BIT      #BIT1,CONFIG(R0)
6314 012560 001003          BNE      7$
6315 012562 162700 000004          SUB      #4,R0
6316 012566 000771          BR       6$
6317 012570 006200          7$:  ASR      R0
6318 012572 006200          ASR      R0
6319 012574 010037 002556          MOV      R0,LASTBANK
6320 012600 000402          BR       SKUJ
6321 012602 000000          MBERR:  .WORD 0
6322 012604 000000          PHEBE:  .WORD 0
6323 012606 005000          SKUJ:  CLR      R0

```

L75:::~::~;

INC BANK
CMP BANK, LASTBANK
BLE B7

E7:::~::~;

;SAVE CONTENTS OF R5, R0
MOV R5, -(SP)
MOV R0, -(SP)

;CLEAR REGISTERS

```

;CLEAR ERROR INDICATOR
;IS CURRENT CSR <= 177
;BRANCH IF SO
;IS CURRENT CSR < 10
;BRANCH IF SO
;CALL ERROR ROUTINE
;TRY NEXT CSR
;MOVE LOW WORD TO R5
;DOES MEMORY EXIST HERE?
;BRANCH IF NOT
;ISOLATE CSR NUMBER IN
;REGISTER 5
;IS IT THE CURRENT CSR?
;TRY NEXT WORD OF CONFIG IF NOT
;IS IT INTERLEAVED?
;BRANCH IF SO
;SET ERROR INDICATOR
;UPDATE CONFIG COUNTER
;CONFIG TABLE ALL DONE?
;BRANCH IF NOT
;ERRORS FOUND?
;TRY NEXT CSR IF NOT
;CALL ERROR ROUTINE
;REINITIALIZE CONFIG COUNTER
;CLEAR ERROR INDICATOR
;UPDATE CSR COUNTER
;ALL CSR'S DONE?
;BRANCH IF NOT
;RESTORE REGISTERS

```

MOV (SP)+,R0
MOV (SP)+,R5

```

;RESET ERROR INDICATOR
;INDEX TO TOP OF CONFIG TABLE ;R-C
;MEMORY PRESENT? ;R-C
;BRANCH IF SO ;R-C
;TRY NEXT LOWER ENTRY IN CONFIG TABLE ;R-C

```

```

;DIVIDE INDEX BY 4 TO GET BANK #;R-C
;STORE IN LASTBANK ;R-C

```

```

;SAVE SPACE FOR ERROR INDICATOR
;SAVE SPACE FOR ODD BOUNDARY INTERLEAVED INDICATOR
;CLEAR CONFIG COUNTER

```

```

6324 012610 005037 C12604          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,MSG122    ;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
CLR MSIZE
```

012766 005037 002400
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
```

6362 013010

```
IF CPUBIT SET.IN CONFIG(R1)
```

```
B11:::;;;
```

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
```

```
INC MSIZE
```

6365 013034

```
ELSE
```

```
BR L104
```

013034 000402

```
L103:::;;;
```

6366 013036

```
LET LSIZE := LSIZE + #
```

```
INC LSIZE
```

013036 005237 002400

6367 013042

```
END;IF BIT8
```

```
L104:::;;;
```

013042

6368 013042

```
END; OF IF CPUBIT
```

```
L102:::;;;
```

013042

6369 013042

```
END ;OF FOR ALL BANKS IN TABLE
```

```
ADD #4,R1
```

013042 062701 000004

```
CMP R1,R2
```

013046 020102

```
BLE B11
```

013050 003757

```
E11:::;;;
```

013052

6370

6371 013052 005037 002452

```
CLR I
FOR R1 := #0 TO #10 BY #2
```

```
CLR R1
```

6372 013056

```
B12:::;;;
```

013056 005001

6373 013060

```
ASL BSIZE(R1)
```

6374 013064

```
ASL BSIZE(R1)
```

6375 013070

```
ASL BSIZE(R1)
```

6376 013074

```
ASL BSIZE(R1)
```

6377 013100

```
ADD BSIZE(R1),I
```

```
;BSIZE(R1) := BSIZE(R1) * 16.
```

```
;I <- I + BSIZE(R1)
```

6378 013106 066137 002374 002452

```
END; FOR R1
```

```
ADD #2,R1
```

013106 062701 000002

```
CMP R1,#10
```

013112 020127 000010

```
BLE B12
```

013116 003760

```
E12:::;;;
```

6379 013120

```
FOR R1 := #0 TO #200 BY #4
```

```
CLR R1
```

013120 005001

```
B13:::;;;
```

6380 013122

```
IF CPUBIT SET.IN CONFIG(R1)
```

```
BIT CPUBIT,CONFIG(R1)
```

013122 033761 002106 002664

```
BEQ L105
```

013122 001402

6381 013132

```
LET UNITOP := UNITOP + #1
```

```

013132 005237 002416
6382 013136          END; OF IF CPUBIT          INC UNITOP
013136
6383 013136          END; OF FOR R1          L105:::::
013136 062701 000004          ADD #4,R1
013142 020127 000200          CMP #200
013146 003765          BLE B13
013150          E13:::::
5384 013150 006337 002416      ASL UNITOP
6385 013154 006337 002416      ASL UNITOP
6386 013160 006337 002416      ASL UNITOP
6387 013164 006337 002416      ASL UNITOP
6388 013170          IF I LT UNITOP THEN LET I := UNITOP * 16.
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 , $CRLF
                                .DSABL CRF
6390 013212 005737 002400          TST LSIZE
                                2$: BEQ 3$
6391 013216 001414          CMP #2048.,LSIZE
6392 013220 022737 004000 002400      BNE 12$
6393 013226 001003          SUB #4,LSIZE
6394 013230 162737 000004 002400      TYPDEC LSIZE
6395 013236          MOV LSIZE, -(SP)
                                12$: ; SUBTRACT 4K FOR THE I/O PAGE
013242 104405          TYPDS
                                ;:SAVE LSIZE FOR TYPEOUT
                                ;:GO TYPE--DECIMAL ASCII WITH SIGN
                                .DSABL CRF
6396 013244          TYPE MSG112
013244 104401 071025          TYPEIT ,MSG112
                                .DSABL CRF
6397 013250 005737 002402          TST MSIZE
                                3$: BEQ 5$
6398 013254 001414          CMP #2048.,MSIZE
6399 013256 022737 004000 002402      BNE 13$
6400 013264 001003

```

```

6401 013266 162737 000004 002402      SUB    #4,MSIZE      ; SUBTRACT 4K FOR THE I/O PAGE
6402 013274      TYPDEC  MSIZE
      013274 013746 002402      MOV    MSIZE,-(SP)   ;;SAVE MSIZE FOR TYPEOUT
      013300 104405      TYPDS  MSIZE,-(SP)   ;;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      TYPDEC  I
      013324 013746 002452      MOV    I,-(SP) ;;SAVE I FOR TYPEOUT
      013330 104405      TYPDS  I,-(SP) ;;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::::::

6414 013352

SUBTST <<CHECK APT SIZING>>

:SUBTEST CHECK APT SIZING

IF APTFLAG IS TRUE AND APTSIZE IS TRUE

6415 013352 005737 002352
013356 001475

TST APTFLAG
BEQ L110
TST APTSIZE
BEQ L110

013360 005737 002444
013364 001472

6416 013366 005037 002434
6417 013372 012700 056676

CLR TEMP
MOV #MAMS1,R0
FOR R2 := #0 TO #4

6418 013376 005002
013400

CLR R2
B14::::::::::

6419 013400 105760 000001
013404 001441

IFB 1(R0) NE #0

TSTB 1(R0)
BEQ L111

6420 013406 111001
6421 013410 042701 177400

MOVB (R0),R1
BIC #177400,R1
IF 2(R0) LT #0

TST 2(R0)
BGE L112

6422 013414 005760 000002
013420 002002

6423 013422 000261
6424 013424 000401

SEC
ELSE

BR L113
L112::::::::::

6425 013426 000241
6426 013430

CLC
END ;OF IF 2(R0)

L113::::::::::

6427 013430 006101
6428 013432 005201

ROL R1
INC R1
ASL R1
ASL R1
ASL R1
ASL R1
SUB TEMP,R1
MOV R1,TEMP
IFB 1(R0) EQ #3

;TO COMPENSATE FOR 4 BANKS BEING (0-3)

6429 013434 006301
6430 013436 006301

6431 013440 006301
6432 013442 006301

6433 013444 163701 002434
6434 013450 010137 002434

6435 013454 126027 000001 000003
013462 001002

CMPB 1(R0),#3
BNE L114

6436 013464 060137 002422
6437 013470

ADD R1,APTPAR
END ;OF IFB 1(R0)

L114::::::::::

6438 013470 126027 000001 000004
013476 001002

IFB 1(R0) EQ #4

CMPB 1(R0),#4
BNE L115

6439 013500 060137 002424
6440 013504

ADD R1,APTECC
END ;OF IFB 1(R0)

L115::::::::::

6441 013504 062700 000004
6442 013510

ADD #4,R0
END ;OF IFB 1(R0)

L111::::::::::

6443 013510 005202
013512 020227 000004

END ;OF FOR R2

INC R2
CMP R2,#4
BLE B14

013516 003730
013520

E14::::::::::

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
      013552 000004
6450 013554 005037 002222
6451 013560 017700 167052
6452 013564 042700 177761
6453 013570 004770 013600
6454 013574 000137 013620
6455 013600 014262
6456 013602 014370
6457 013604 014476
6458 013606 014626
6459 013610 014756
6460 013612 015106
6461 013614 015260
6462 013616 015410
6463
6464 013620 004737 014162
6465
6466 013624
      013624 000004
6467
6468
6469 013626 005737 002002
      013626 001015
6470 013634
      013634 012737 177777 002612
      013642 012737 177777 002110
6471 013650 004737 021610
6472 013654
      013654 012737 177777 002612
6473 013662 005037 002110
6474 013666
      013666
6475 013666 004737 014162
6479
6480 013672
      013672 004737 022200

```

```

LOOP:  NEWTST <<DIAGNOSTIC MODE DISPATCH ROUTINE>>
;*****
;*TEST 5      DIAGNOSTIC MODE DISPATCH ROUTINE
;*****
TST5:  SCOPE
      CLR      CONTFLAG
      MOV      @SWR,RO      ;GET SWITCHES
      BIC      #+C16,RO    ;MASK TO ONLY MODE BITS
      CALL     @DISPTBL(RO) ;DISPATCH TO ROUTINE THROUGH NEXT TABLE
      JMP      MEMDONE     ;GO TO NEXT TEST
DISPTBL:BAFPAF ;MODE 0;BANKS FORWARD, PATTERNS FORWARD
        BAFPAR ;MODE 1;BANKS FORWARD, PATTERNS REVERSE
        BAWPAF ;MODE 2;BANKS WORST FIRST, PATTERNS FORWARD
        BAWPAR ;MODE 3;BANKS WORST FIRST, PATTERNS REVERSE
        PAFBAF ;MODE 4;PATTERNS FORWARD, BANKS FORWARD
        PAFBAW ;MODE 5;PATTERNS FORWARD, BANKS WORST FIRST
        PARBAF ;MODE 6;PATTERNS REVERSE, BANKS FORWARD
        PARBAW ;MODE 7;PATTERNS REVERSE, BANKS WORST FIRST
MEMDONE:CALL DOBACK ;CHECK BACKGROUND PATTERN
      NEWTST<<UNIQUE BANK TEST>>
;*****
;*TEST 6      UNIQUE BANK TEST
;*****
TST6:  SCOPE
      ;MAKE SURE THAT EACH BANK CAN HAVE UNIQUE DATA
      ;WRITE AND READ THE BANK NUMBER IN EACH BANK (EXCEPT WHERE THE PROGRAM IS)
      IF SELONLY IS FALSE
          SET  HEADER,MUT
          TST SELONLY
          BNE L120
          MOV  #-1,HEADER
          MOV  #-1,MUT
          CALL MT0027
          SET  HEADER
          MOV  #-1,HEADER
          CLR  MUT
          END ;OF IF SELONLY
          CALL DOBACK ;RESTORE BACKGROUND PATTERN
          L120:::::
FLUSH: SUBTST <<FLUSH OUT DBE'S>>
;*****
;*SUBTEST    FLUSH OUT DBE'S
;*****
      CALL  MT0030

```

```

6484
6485
6486
6487
6488
6489
6490
6491 013676 005037 002442
6492 013702 012700 002666
6493 013706 042710 020000
6494 013712 062700 000004
6495 013716 020027 003620
6496 013722 003771
6497 013724 013737 002630 002016
6498 013732 005237 056654
6499 013736 042737 100000 056654
6500 013744
    013744 104401 070251
6501 013750
    013750 032777 004000 166660
    013756 001007
    013760 005737 002346
    013764 001004
    013766 023727 056654 000001
    013774 001004
    013776
6502 013776
    013776 104401 067273
6503 014002 005037 002346
6504 014006
    014006
6505 014006
    014006 013746 056654
    014012 104405
6506 014014 013700 000042
6507 014020 001456
6508 014022 022700 002000
6509 014026 001453
6510
6511 014030
    014030 010046
6512 014032 004737 040636
6513 014036
    014036 012600
6514 014040 000005
6515 014042 004710
6516 014044 000240
6517 014046 000240
6518 014050 000240
6519 014052
6520
6521
6522
6523

```

```

.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
$EOP: CLR FSINFLAG
      MOV #CONFIG+2,R0 ;MOVE 2ND WORD OF CONFIG TO R0
1$:   BIC #BIT13,(R0) ;CLEAR BACKGROUND VALID BIT
      ADD #4,R0 ;INCREMENT TO NEXT BANK
      CMP R0,#3620 ;DONE?
      BLE 1$ ;NO - BRANCH
      MOV $ERTTL,LASTERROR
      INC $PASS ;;INCREMENT THE PASS NUMBER
      BIC #100000,$PASS ;;DON'T ALLOW A NEG. NUMBER
      TYPE MSG077 ;;TYPE "END PASS #"
      TYPEIT ,MSG077
      .DSABL CRF
      IF #SW11 SET.IN @SWR OR QVFLAG IS TRUE OR $PASS EQ #1
                                          BIT #SW11,@SWR
                                          BNE L121
                                          TST QVFLAG
                                          BNE L121
                                          CMP $PASS,#1
                                          BNE L122
                                          L121:;;;;;
      TYPE MSG035 ;QV
      TYPEIT ,MSG035
      .DSABL CRF
      CLR QVFLAG
      END ;OF IF SW11
                                          L122:;;;;;
      TYPDEC $PASS
      MOV $PASS,-(SP) ;;SAVE $PASS FOR TYPEOUT
      TYPDS ;;GO TYPE--DECIMAL ASCII WITH SIGN
      .DSABL CRF
      MOV 42,R0 ;;GET MONITOR ADDRESS
      BEQ $DOAGAIN ;;BRANCH IF NO MONITOR
      $ZAP42: CMP #STACK,R0 ;ARE WE UNDER RT11
      BEQ $DOAGAIN ;YES - BRANCH
      ;WE ARE UNDER (HEAVEN HELP US) XXDP!
      PUSH R0
                                          MOV R0,-(SP)
      CALL SHUTUP
      POP R0
                                          MOV (SP),R0
      RESET ;;CLEAR THE WORLD
      $ENDAD: CALL (R0) ;;GO TO MONITOR
      NOP ;;SAVE ROOM
      NOP ;;FOR
      NOP ;;ACT11
      $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,RO     ;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
        014114 001420
6533 014116              IF $USWR EQ $PASS
        014116 023737 056672 056654
        014124 001014
6534 014126 012701 000050      APTHANG: MOV #50,R1
6535 014132 077001      2$: SOB RO,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
6542 014156              END ;OF IF APTFLAG
        014156
6543 014156 000137 013552      $DOAGAIN: JMP LOOP          ;RETURN
    
```

TST APTFLAG
BEQ L123

CMP \$USWR,\$PASS
BNE L124

L124:::::;

L123:::::;

```

6546 014162
6547 014162 005037 002112
6548 014166 005037 002102
      014166
      014172
6549 014172 004737 040052
6550 014176 005737 002116
      014176
      014202 001420
      014204 005737 002124
      014210 001015
6551 014212 012737 177777 002612
      014212 012737 177777 002110
      014220 004737 017104
6552 014226 005037 002110
6553 014232 012737 177777 002612
      014236
6554 014236 005237 002102
      014244 023737 002102 002556
      014244
      014250 003745
      014256
      014260
6557 014260 000207

```

```

DOBACK: SUBST <<WRITE BACKGROUND PATTERNS>>
;*****
;*SUBTEST WRITE BACKGROUND PATTERNS
;*****
      CLR PATTERN
      FOR BANK := #0 TO LASTBANK

      CALL EXBANK
      IF ACFLAG IS TRUE AND RRFLAG IS FALSE

      SET HEADER,MUT

      CALL MKTEST MUT
      CLR MUT
      SET HEADER

      END ;OF IF ACFLAG

      END ;OF FOR BANK

      RETURN

      CLR BANK
      B15:;;;;;

      TST ACFLAG
      BEQ L125
      TST RRFLAG
      BNE L125

      MOV #-1,HEADER
      MOV #-1,MUT
      ;CALL MJTEST WOULD ALSO WORK

      MOV #-1,HEADER
      L125:;;;;;

      INC BANK
      CMP BANK, LASTBANK
      BLE B15
      E15:;;;;;

```

```

6560
6561
6562 014262

6563 014262 005037 002102
6564
6565 014266 004737 040052
6566 014272 005737 002116
6567 014276 001412
6568 014300 005737 002124
6569 014304 001007
6570 014306 005037 002112
6571
6572 014312 004737 015562
6573
6574 014316 004737 040474
6575 014322 001373
6576
6577 014324 005037 002222
6578 014330 004737 040520
6579 014334 002354
6580
6581 014336 005737 002126
6582 014342 001401
6583 014344 000207
6584 014346 004737 036402
6585 014352
      014352 103001
      014354 000207
      014356

6586
6587 014356 004737 014262
6588 014362 004737 037214
6589 014366 000207

```

```

.SBTTL MTEST MODES
BAFPAF: SUBTST <<BANKS FORWARD,PATTERNS FORWARD **RECURSIVE*>>
;*****
;*SUBTEST BANKS FORWARD,PATTERNS FORWARD **RECURSIVE**
;*****
CLR BANK ;SET BANK TO 0
;START OF BANK LOOP
1$: CALL EXBANK ;EXAMINE BANK
TST ACFLAG ;CAN WE ACCESS THIS BANK?
BEQ 4$ ;NO - GO TO BANK LOOP TERMINATION
TST RRFLAG ;RELOCATION REQUIRED?
BNE 4$ ;YES - GO TO BANK LOOP TERMINATION
CLR PATTERN ;SET PATTERN TO 0
;START OF PATTERN LOOP
2$: CALL MTEST ;GO TEST CORRECT MEMORY
;TERMINATION OF PATTERN LOOP
CALL INCPAT ;GO SEE IF THIS IS THE LAST PATTERN
BNE 2$ ;NO LOOP ON THIS PATTERN
;TERMINATION OF BANK LOOP
4$: CLR CONFLAG
CALL INCBNK ;NEXT HIGHER BANK
BGE 1$ ;IF NOT DONE - LOOP ON THIS BANK
;END OF LOOPS
TST RLFLAG ;HAVE WE BEEN RELOCATED?
BEQ 5$ ;NO SKIP
RETURN ;YES - RETURN
5$: CALL RELOCATE ;MOVE & MAP PROGRAM
ON.ERROR THEN $RETURN

;***NOTE** RECURSIVE CALL
CALL BAFPAF ;CALL SELF
CALL UNRELOCATE ;UNMOVE & UNMAP PROGRAM
RETURN

```

```

BCC L126
RTS PC
L126:::

```

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 CONFLAG

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

014462 000207

014464

BCC L127
RTS PC

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
6624
6625 014502 004737 040052
6626 014506 005737 002116
6627 014512 001415
6628 014514 005737 002130
6629 014520 001412
6630 014522 005737 002124
6631 014526 001007
6632 014530 005037 002112
6633
6634 014534 004737 015562
6635
6636 014540 004737 040474
6637 014544 001373
6638
6639 014546 005037 002222
6640 014552 004737 040520
6641 014556 002351
6642
6643 014560 005137 002600
6644 014564 001003
6645
6646 014566 004737 014476
6647 014572 000207
6648 014574 005737 002126
6649 014600 001401
6650 014602 000207
6651 014604 004737 036402
6652 014610
014610 103001
014612 000207
014614

6653
6654 014614 004737 014476
6655 014620 004737 037214
6656 014624 000207

CLR BANK ;SET BANK TO 0
;START OF BANK LOOP
1\$: CALL EXBANK ;EXAMINE BANK
TST ACFLAG ;CAN WE ACCESS THIS BANK?
BEQ 4\$;NO - GO TO BANK LOOP TERMINATION
TST BMFLAG ;IS THIS BAD MEMORY (WORST FIRST)?
BEQ 4\$;NO - GO TO BANK LOOP TERMINATION
TST RRFLAG ;RELOCATION REQUIRED?
BNE 4\$;YES - GO TO BANK LOOP TERMINATION
CLR PATTERN ;SET PATTERN TO 0
;START OF PATTERN LOOP
2\$: CALL MTEST ;GO TEST CORRECT MEMORY
;TERMINATION OF PATTERN LOOP
CALL INCPAT ;GO SEE IF THIS IS THE LAST PATTERN
BNE 2\$;NO - LOOP ON THIS PATTERN
;TERMINATION OF BANK LOOP
4\$: CLR CONTFLAG
CALL INCBNK ;NEXT HIGHER BANK
BGE 1\$;IF NOT DONE - LOOP ON THIS BANK
;END OF LOOPS
COM WORST ;IS THIS AN EVEN NUMBERED PASS?
BNE 5\$;YES - SKIP
;**NOTE** RECURSIVE CALL
CALL BAWPAF ;CALL SELF
RETURN
5\$: TST RLFLAG ;HAVE WE BEEN RELOCATED?
BEQ 6\$;NO - SKIP
RETURN ;YES - RETURN
6\$: CALL RELOCATE ;MOVE & MAP PROGRAM
ON.ERROR THEN \$RETURN

;**NOTE** RECURSIVE CALL
CALL BAWPAF ;CALL SELF
CALL UNRELOCATE ;UNMOVE & UNMAP PROGRAM
RETURN

BCC L130
RTS PC
L130:;;;;;

```

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          ;
          014742  000207          ;
          014744          ;
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

```

BCC L131
RTS PC
L131:::;;

6696 014756

PAFBAF: SUBTST <<PATTERNS FORWARD,BANKS FORWARD **RECURSIVE**>>
;*****
;*SUBTEST PATTERNS FORWARD,BANKS FORWARD **RECURSIVE**
;*****

6697 014756 005037 002112
6698

CLR PATTERN ;SET PATTERN TO 0
;START OF PATTERN LOOP

6699 014762 005037 002102
6700

1\$: CLR BANK ;SET BANK TO 0
;START OF BANK LOOP

6701 014766 004737 040052
6702 014772 004737 040456

2\$: CALL EXBANK ;EXAMINE BANK
CALL BANKOK ;CORRECT MEMORY FOR THIS BANK?

6703 014776 001010
6704 015000 005737 002116

BNE 4\$;NO - GO TO BANK LOOP TERMINATOR
TST ACFLAG ;CAN WE ACCESS THIS BANK?

6705 015004 001405
6706 015006 005737 002124

BEQ 4\$;NO - GO TO BANK LOOP TERMINATION
TST RRFLAG ;RELOCATION REQUIRED?

6707 015012 001002
6708 015014 004737 015562

BNE 4\$;YES - GO TO BANK LOOP TERMINATION
CALL MTEST ;GO TEST CORRECT MEMORY

6709
6710 015020 005037 002222

4\$: ;TERMINATION OF BANK LOOP
CLR CONTFLAG

6711 015024 004737 040520
6712 015030 002356

CALL INCBNK ;NEXT HIGHER BANK
BGE 2\$;IF NOT DONE - LOOP ON THIS BANK

6713
6714 015032 004737 040474

;TERMINATION OF PATTERN LOOP
CALL INCRPT ;NEXT HIGHER PATTERN

6715 015036 001351
6716

BNE 1\$;OK - LOOP; ELSE CONTINUE
;END OF LOOPS

6717 015040 005137 002134
6718

COM TMFLAG ;COMPLEMENT TYPE OF MEMORY
;IS THIS AN EVEN NUMBER PASS?

6719 015044 001403
6720

BEQ 5\$;YES - SKIP
;**NOTE** RECURSIVE CALL

6721 015046 004737 014756
6722 015052 000207

CALL PAFBAF ;CALL SELF
RETURN

6723 015054 005737 002126
6724 015060 001401

5\$: TST RLFLAG ;HAVE WE BEEN RELOCATED?
BEQ 6\$;NO - SKIP

6725 015062 000207
6726 015064 004737 036402

RETURN ;YES - RETURN
6\$: CALL RELOCATE ;MOVE & MAP PROGRAM
ON.ERROR THEN \$RETURN

6727 015070
015070 103001

BCC L132
RTS PC

015072 000207
015074

L132:::::;

6728
6729 015074 004737 014756

;**NOTE** RECURSIVE CALL
CALL PAFBAF ;CALL SELF

6730 015100 004737 037214
6731 015104 000207

CALL UNRELOCATE ;UNMOVE & UNMAP PROGRAM
RETURN

6734 015106

6735 015106 005037 002112
6736
6737 015112 005037 002102
6738
6739 015116 004737 040052
6740 015122 004737 040456
6741 015126 001013
6742 015130 005737 002116
6743 015134 001410
6744 015136 005737 002130
6745 015142 001405
6746 015144 005737 002124
6747 015150 001002
6748 015152 004737 015562
6749
6750 015156 005037 002222
6751 015162 004737 040520
6752 015166 002353
6753
6754 015170 004737 040474
6755 015174 001346
6756
6757 015176 005137 002134
6758
6759 015202 001403
6760
6761 015204 004737 015106
6762 015210 000207
6763 015212 005137 002600
6764 015216 001003
6765
6766 015220 004737 015106
6767 015224 000207
6768 015226 005737 002126
6769 015232 001401
6770 015234 000207
6771 015236 004737 036402
6772 015242
015242 103001
015244 000207
015246

6773
6774 015246 004737 015106
6775 015252 004737 037214
6776 015256 000207

```

PAFBAW: SUBST <<PATTERNS FORWARD,BANKS WORST FIRST **RECURSIVE**>>
;*****
;*SUBTEST PATTERNS FORWARD,BANKS WORST FIRST **RECURSIVE**
;*****
CLR PATTERN ;SET PATTERN TO 0
;START OF PATTERN LOOP
1$: CLR BANK ;SET BANK TO 0
;START OF BANK LOOP
2$: CALL EXBANK ;EXAMINE BANK
CALL BANKOK ;CORRECT MEMORY FOR THIS BANK?
BNE 4$ ;NO - GO TO BANK LOOP TERMINATOR
TST ACFLAG ;CAN WE ACCESS THIS BANK?
BEQ 4$ ;NO - GO TO BANK LOOP TERMINATION
TST BMFLAG ;IS THIS BAD MEMORY (WORST FIRST)
BEQ 4$ ;NO - GO TO BANK LOOP TERMINATION
TST RRFLAG ;RELOCATION REQUIRED?
BNE 4$ ;YES - GO TO BANK LOOP TERMINATION
CALL MTEST ;GO TEST CORRECT MEMORY
;TERMINATION OF BANK LOOP
4$: CLR CONFLAG
CALL INCBNK ;NEXT HIGHER BANK
BGE 2$ ;IF NOT DONE - LOOP ON THIS BANK
;TERMINATION OF PATTERN LOOP
CALL INCRPT ;NEXT HIGHER PATTERN
BNE 1$ ;OK - LOOP; ELSE CONTINUE
;END OF LOOPS
COM TMFLAG ;COMPLEMENT TYPE OF MEMORY
;IS THIS AN EVEN NUMBER PASS?
BEQ 5$ ;YES - SKIP
;***NOTE** RECURSIVE CALL
CALL PAFBAW ;CALL SELF
RETURN
5$: COM WORST ;4TH PASS?
BNE 6$ ;YES - SKIP
;***NOTE** RECURSIVE CALL
CALL PAFBAW ;CALL SELF
RETURN
6$: TST RLFLAG ;HAVE WE BEEN RELOCATED?
BEQ 7$ ;NO - SKIP
RETURN ;YES - RETURN
7$: CALL RELOCATE ;MOVE & MAP PROGRAM
ON.ERROR THEN $RETURN

;***NOTE** RECURSIVE CALL
CALL PAFBAW ;CALL SELF
CALL UNRELOCATE ;UNMOVE & UNMAP PROGRAM
RETURN

```

BCC L133
RTS PC
L133:::~::~

6779 015260

PARBAF: SUBTST <<PATTERNS REVERSE,BANKS FORWARD **RECURSIVE***>>
:*****
:*SUBTEST PATTERNS REVERSE,BANKS FORWARD **RECURSIVE**
:*****

6780 015260 004737 040510
6781
6782 015264 005037 002102
6783
6784 015270 004737 040052
6785 015274 004737 040456
6786 015300 001010
6787 015302 005737 002116
6788 015306 001405
6789 015310 005737 002124
6790 015314 001002
6791 015316 004737 015562
6792
6793 015322 005037 002222
6794 015326 004737 040520
6795 015332 002356
6796
6797 015334 005337 002112
6798 015340 100351
6799
6800 015342 005137 002134
6801
6802 015346 001403
6803
6804 015350 004737 015260
6805 015354 000207
6806 015356 005737 002126
6807 015362 001401
6808 015364 000207
6809 015366 004737 036402
6810 015372
015372 103001
015374 000207
015376
6811
6812 015376 004737 015260
6813 015402 004737 037214
6814 015406 000207

CALL HIPAT ;SET HIGHEST PATTERNS
;START OF PATTERN LOOP
1\$: CLR BANK ;SET BANK TO 0
;START OF BANK LOOP
2\$: CALL EXBANK ;EXAMINE BANK
CALL BANKOK ;CORRECT MEMORY FOR THIS BANK?
BNE 4\$;NO - GO TO BANK LOOP TERMINATOR
TST ACFLAG ;CAN WE ACCESS THIS BANK?
BEQ 4\$;NO - GO TO BANK LOOP TERMINATION
TST RRFLAG ;RELOCATION REQUIRED?
BNE 4\$;YES - GO TO BANK LOOP TERMINATION
CALL MTEST ;GO TEST CORRECT MEMORY
;TERMINATION OF BANK LOOP
4\$: CLR CONTFLAG
CALL INCBNK ;NEXT HIGHER BANK
BGE 2\$;IF NOT DONE - LOOP ON THIS BANK
;TERMINATION OF PATTERN LOOP
DEC PATTERN ;NEXT LOWER PATTERN
BPL 1\$;OK - LOOP; ELSE CONTINUE
;END OF LOOPS
COM TMFLAG ;COMPLEMENT TYPE OF MEMORY
BEQ 5\$;IS THIS AN EVEN NUMBER PASS?
;YES - SKIP
;***NOTE** RECURSIVE CALL
CALL PARBAF ;CALL SELF
RETURN
5\$: TST RLFLAG ;HAVE WE BEEN RELOCATED?
BEQ 6\$;NO SKIP
RETURN ;YES - RETURN
6\$: CALL RELOCATE ;MOVE & MAP PROGRAM
ON.ERROR THEN \$RETURN
;***NOTE** RECURSIVE CALL
CALL PARBAF ;CALL SELF
CALL UNRELOCATE ;UNMOVE & UNMAP PROGRAM
RETURN

BCC L134
RTS PC
L134:::~::~

6817 015410

PARBAW: SUBTST <<PATTERNS REVERSE,BANKS WORST FIRST **RECURSIVE**>>
;*****
;*SUBTEST PATTERNS REVERSE,BANKS WORST FIRST **RECURSIVE**
;*****

6818 015410 004737 040510
6819
6820 015414 005037 002102
6821
6822 015420 004737 040052
6823 015424 004737 040456
6824 015430 001013
6825 015432 005737 002116
6826 015436 001410
6827 015440 005737 002130
6828 015444 001405
6829 015446 005737 002124
6830 015452 001002
6831 015454 004737 015562
6832
6833 015460 005037 002222
6834 015464 004737 040520
6835 015470 002353
6836
6837 015472 005337 002112
6838 015476 100346
6839
6840 015500 005137 002134
6841
6842 015504 001403
6843
6844 015506 004737 015410
6845 015512 000207
6846 015514 005137 002600
6847 015520 001003
6848
6849 015522 004737 015410
6850 015526 000207
6851 015530 005737 002126
6852 015534 001401
6853 015536 000207
6854 015540 004737 036402
6855 015544
015544 103001
015546 000207
015550
6856
6857 015550 004737 015410
6858 015554 004737 037214
6859 015560 000207

CALL HIPAT ;SET HIGHEST PATTERN
;START OF PATTERN LOOP
1\$: CLR BANK ;SET BANK TO 0
;START OF BANK LOOP
2\$: CALL EXBANK ;EXAMINE BANK
CALL BANKOK ;CORRECT MEMORY FOR THIS BANK?
BNE 4\$;NO - GO TO BANK LOOP TERMINATOR
TST ACFLAG ;CAN WE ACCESS THIS BANK?
BEQ 4\$;NO - GO TO BANK LOOP TERMINATION
TST BMFLAG ;IS THIS BAD MEMORY (WORST FIRST)
BEQ 4\$;NO - GO TO BANK LOOP TERMINATION
TST RRFLAG ;RELOCATION REQUIRED?
BNE 4\$;YES - GO TO BANK LOOP TERMINATION
CALL MTEST ;GO TEST CORRECT MEMORY
;TERMINATION OF BANK LOOP
4\$: CLR CONTFLAG
CALL INCBNK ;NEXT HIGHER BANK
BGE 2\$;IF NOT DONE - LOOP ON THIS BANK
;TERMINATION OF PATTERN LOOP
DEC PATTERN ;NEXT LOWER PATTERN
BPL 1\$;OK - LOOP; ELSE CONTINUE
;END OF LOOPS
COM TMFLAG ;COMPLEMENT TYPE OF MEMORY
;IS THIS AN EVEN NUMBER PASS?
BEQ 5\$;YES - SKIP
;**NOTE** RECURSIVE CALL
CALL PARBAW ;CALL SELF
RETURN
5\$: COM WORST ;4TH PASS?
BNE 6\$;YES - SKIP
;**NOTE** RECURSIVE CALL
CALL PARBAW ;CALL SELF
RETURN
6\$: TST RLFLAG ;HAVE WE BEEN RELOCATED?
BEQ 7\$;NO - SKIP
RETURN ;YES - RETURN
7\$: CALL RELOCATE ;MOVE & MAP PROGRAM
ON.ERROR THEN \$RETURN
;**NOTE** RECURSIVE CALL
CALL PARBAW ;CALL SELF
CALL UNRELOCATE ;UNMOVE & UNMAP PROGRAM
RETURN

BCC L135
RTS PC
L135:::;::;

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

CLR PASFLG

015576 005037 002264

6866 015602

TST MKFLAG ;ECC?

015602 005737 002120

6867 015606

BEQ MT1 ;NO - SKIP

015606 001413

6868 015610

BEGIN HOLDLOOP

015610

B16:::::

6869 015610

IF CONTFLAG IS TRUE THEN LEAVE HOLDLOOP

015610 005737 002222

TST CONTFLAG

6870 015616

IF SKIPMK IS FALSE

015616 005737 002342

TST SKIPMK

6871 015624

CALL MKCONTROL

015624 004737 015656

BNE L136

6872 015630

END; OF IF SKIPMK

015630

L136:::::

6873 015630

END HOLDLOOP

015630 004737 017104

E16:::::

6874 015634

CALL MKTEST ;YES - DO ECC TESTS

015634 000402

6875 015636

BR MT2

015636 004737 017324

6876 015642

MT1: CALL MJTEST ;DO PARITY TESTS

015642 005037 002110

6877 015646

CLR MUT ;NOW - NO MEMORY UNDER TEST

015646 012737 177777 002612

6878 015646

SET HEADER ;ALLOW HEADERS NORMAL

015646 012737 177777 002612

MOV #-1,HEADER

6879 015654

RETURN

015654 000207

```

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 002336 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

```

6916 016100 012603
6917 016102 104511
6918 016104 005037 002334
6919 016110 005737 002116
016114 001503
016116 005737 002124
016122 001100
6920 016124 013737 002226 002230
6921 016132 062737 004000 002230
6922 016140 013737 002226 002412
016146
6923 016146 013737 002412 002414
6924 016154 005737 002240
6925 016160 001404
6926 016162 062737 040000 002414
6927 016170 000403
6928 016172 062737 000002 002414
6929 016200 004737 016500
6930 016204
016204 103440
6931 016206 104424
6932 016210 005037 002076
6933 016214 005037 002452
016220
6934 016220 012737 177777 002612
016226 005037 002264
6935 016232 013700 002452
6936 016236 010346
016240 010637 002146
6938 016244 162737 000002 002146
6939 016252 004737 017004
6940 016256 012603
6941 016260
016260 005237 002452
016264 023727 002452 000027
016272 003752
016274
6943 016274 104423
6944 016276 012737 177777 002334
016304 000407
6945 016306
016306
6946 016306
016314 062737 000004 002412
023737 002412 002230

```

```

MOV (SP),R3
INVALIDATE BACKGROUND PATTERN
BEGIN CSRSTUFF
B21:::
CLR SUCCESS
IF ACFLAG IS TRUE AND RRFLAG IS FALSE
TST ACFLAG
BEQ L141
TST RRFLAG
BNE L141
MOV CSRFIRST,CSRLAST
ADD #4000,CSRLAST
FOR TESTADD := CSRFIRST TO CSRLAST BY #4
MOV CSRFIRST,TESTADD
B22:::
MOV TESTADD,TESTADD+2
TST SPLTCSR
BEQ 1$
ADD #40000,TESTADD+2
BR 2$
1$: ADD #2,TESTADD+2
2$: CALL SBETEST
ON.NOERROR
BCS L142
CACHOFF ;TURN CACHE OFF
CLR NOPAR ;INDICATE PARITY ACTION
FOR I := #0 TO #27
CLR I
B23:::
SET HEADER
MOV #-1,HEADER
CLR PASFLG
LET R0 := I
PUSH R3 ;SAVE LOOP COUNTER
MOV I,R0
;SAVE VECTOR IN CSR OF +K
MOV R3,-(SP)
MOV SP,CTLKVEC
SUB #2,CTLKVEC
CALL CSRCASE
POP R3 ;RESTORE LOOP COUNTER
MOV (SP),R3
END ;OF FOR I
INC I
CMP I,#27
BLE B23
E23:::
CACHON ;TURN CACHE ON
SET SUCCESS
MOV #-1,SUCCESS
LEAVE CSRSTUFF
BR E21
END ;OF ON.NOERROR
L142:::
END ;OF FOR TESTADD
ADD #4,TESTADD
CMP TESTADD,CSRLAST

```

```

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

```

6973 016500

SBETEST:SUBTST <<CHECK FOR SBE FREE LOCATIONS>>
:*****
:*SUBTEST CHECK FOR SBE FREE LOCATIONS
:*****

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6996
6997
6998 016500
016500 010046
016502 010146
016504 010446
6999 016506 013701 002412
7000 016512 013704 002414
7001 016516
016516 053737 002552 177776
7002 016524 104424
7003 016526 104471
7004 016530
016530 005011
016532 005014
7005 016534 005711
7006 016536 001107
7007 016540 005714
7008 016542 001105
7009
7010 016544 104503
7011 016546
016546 005011
016550 005014
7012 016552 005711
7013 016554 001100
7014 016556 005714
7015 016560 001076
7016
7017 016562 104510

:IN ORDER TO DETERMINE IF A LOCATION IS SBE FREE I DO THIS
:
:WRITE ZEROS WITH ECC DISABLE
:READ ZEROS BACK
:IF NOT ZEROS THEN RETURN ERROR
:
:WRITE ZEROS WITH ECC ENABLED BUT TRAPS DISABLED
:READ ZEROS BACK
:IF NOT ZEROS THEN RETURN ERROR
:
:TEST THE LOCATION FROM THE PAR'S (WITH NO PROGRAM FETCHES)
:IF THERE WERE ANY SBE'S OR DBE'S THEN RETURN ERROR
:
:COMPLIMENT ZEROS TO ONES WITH ECC DISABLE
:READ ONES BACK
:IF NOT ONES THEN RETURN ERROR
:
:WRITE 100,100000,00000 (CHECKBITS COMPLIMENT OF BEFORE)
: WITH ECC ENABLED BUT TRAPS DISABLED
:TEST THE LOCATION FROM THE PAR'S (WITH NO PROGRAM FETCHES)
:IF THERE WERE ANY SBE'S OR DBE'S THEN RETURN ERROR
:
:IF NONE OF THE ABOVE FORCES A RETURN ERROR THEN RETURN NO.ERROR
:ENABL LSB
PUSH R0,R1,R4 ;PUSH R0,R1,R4 ONTO STACK
MOV R0,-(SP)
MOV R1,-(SP)
MOV R4,-(SP)
MOV TESTADD,R1
MOV TESTADD+2,R4
TESTAREA ;ENTER TEST MODE
BIS TESTMODE,PSW ;GO TO SYSTEM TEST MODE
.DSABL CRF
CACHOFF ;TURN CACHE OFF
ECC1DIS ;DISABLE ECC ON 1 SELECTED CSR
CLEAR (R1),(R4)
CLR (R1)
CLR (R4)
TST (R1)
BNE SBENT
TST (R4)
BNE SBENT
CLR1CSR ;CLEAR 1 SELECTED CSR
CLEAR (R1),(R4)
CLR (R1)
CLR (R4)
TST (R1)
BNE SBENT
TST (R4)
BNE SBENT
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

017004 010046
017006 006316
017010 004737 017074

MOV RO,-(SP)
ASL @SP
JSR PC,L146

7070

;WARNING IF YOU CHANGE THIS TABLE ALSO
;CHANGE "\$DDWO" - "\$DDWS" (THE PATTERN BIT MAP)

7071

7072

7073

7074 017014 020222

MKCSRT: ;PAT TIME DESCRIPTION
;MT0006 ;<1 SEC INITIAL DATA TEST

7075

7076

7077

7078

MSV11-J ECC TESTS

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 RO

017074

017074 062616

017076 013646

017100 004736

7103 017102 000207

RETURN

L146:::~::~
ADD (SP),@SP
MOV @SP,-(SP)
JSR PC,@SP

```

7106 017104 MKTEST: SUBTST <<SUBR ECC TEST DISPATCH>>
;*****
;*SUBTEST SUBR ECC TEST DISPATCH
;*****
IF #SWO SET.IN @SWR OR ACTFLAG IS TRUE
                                BIT #SWO,@SWR
                                BNE L147
                                TST ACTFLAG
                                BEQ L150
                                L147:;;;;;
7107 017104 032777 000001 163524                                ;DISABLE ERROR CORRECTION
                                017104 001003                                BR L151
                                017112 001003                                L150:;;;;;
                                017114 005737 002350                                CLRCR                                ;CLEAR ALL CSR'S
                                017120 001402                                END ;OF IF
                                017122                                L151:;;;;;
7108 017122 104470 ECCDIS                                ;INDICATE PARITY ACTION
7109 017124 000401 ELSE                                ;TRAPS ADD 2 TO PC
                                017124 000401                                MOV #2,NOPAR
                                017126                                MOV #2,PCBUMP
7110 017126 104502                                ;GET PATTERN NUMBER
7111 017130 012737 000002 002076                                ;MAKE IT A WORD ADDRESS
7112 017130 012737 000002 002326                                IF MKPAT(RO) NE #MT0034 AND MKPAT(RO) NE #MT0999
7113 017136 012737 000002 002326                                CMP MKPAT(RO),#MT0034
7114 017144 013700 002112                                BEQ L152
7115 017150 006300                                CMP MKPAT(RO),#MT0999
7116 017152 026027 017244 023346                                BEQ L152
                                017152 026027 017244 024220                                INVALIDATE                                ;INVALIDATE BACKGROUND PATTERN ON "BANK"
                                017160 001405                                END ;OF IF MKPAT(RO)
                                017162 026027 017244 024220                                L152:;;;;;
                                017170 001401                                MOV SP,CTLKVEC                                ;SAVE VECTOR IN CASE OF 'K
7117 017172 104511                                SUB #2,CTLKVEC
7118 017174 010637 002146                                CALL @MKPAT(RO)                                ;INDEX OFF TABLE
7119 017174 010637 002146                                IF #SWO SET.IN @SWR OR ACTFLAG IS TRUE
7120 017200 162737 000002 002146                                BIT #SWO,@SWR
7121 017206 004770 017244                                BNE L153
7122 017212 032777 000001 163416                                TST ACTFLAG
                                017212 032777 000001 163416                                BEQ L154
                                017220 001003                                L153:;;;;;
                                017222 005737 002350                                ENASBE                                ;TRAP ON SINGLE BIT ERRORS
                                017226 001402                                ELSE
                                017230                                BR L155
7123 017230 104506                                L154:;;;;;
7124 017232 000401                                ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
                                017232 000401                                ECCINIT
                                017234 104472                                END ;OF IF #SWO
7125 017234 104472                                L155:;;;;;
7126 017236 012737 000002 002146                                CLR NOPAR                                ;INDICATE PARITY ACTION
7127 017236 005037 002076                                RETURN
7128 017242 000207
7129
7130 ;WARNING IF YOU CHANGE THIS TABLE ALSO
7131 ;CHANGE "$DDW0" - "$DDW5" (THE PATTERN BIT MAP)
7132 ;PAT TIME DISCRPTION
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
7163 017332 012737 000002 002326
7164 017340 012737 060000 002412
7165 017346 012737 060002 002414
7166 017354 013700 002112
7167 017360 006300

MOV #2,NOPAR ;INDICATE PARITY ACTION
MOV #2,PCBUMP ;TRAPS ADD 2 TO PC
MOV #FIRST,TESTADD
MOV #FIRST+2,TESTADD+2
MOV PATTERN,RO ;GET PATTERN NUMBER
ASL RO ;MAKE IT A WORD ADDRESS
IF MJPAT(RO) NE #MT0034 AND MJPAT(RO) NE #MT0999

7168 017362 026027 017430 023346
017370 001405
017372 026027 017430 024220
017400 001401

CMP MJPAT(RO),#MT0034
BEQ L156
CMP MJPAT(RO),#MT0999
BEQ L156

7169 017402 104511

INVALIDATE ;INVALIDATE BACKGROUND PATTERN ON "BANK"
END ;OF IF MJPAT(RO)

7170 017404 017404
7171 017404 010637 002146
7172 017410 162737 000002 002146
7173 017416 004770 017430
7174 017422 005037 002076
7175 017426 000207

MOV SP,CTLKVEC ;SAVE VECTOR IN CASE OF 'K' L156:::;
SUB #2,CTLKVEC
CALL @MJPAT(RO) ;INDEX OFF TABLE
CLR NOPAR ;INDICATE PARITY ACTION
RETURN

7176

;WARNING IF YOU CHANGE THIS TABLE ALSO
;CHANGE '\$DDW0' - '\$DDW5' (THE PATTERN BIT MAP)

7177

7178

7179

7180

MJPAT: ;PAT TIME DISCRPTION
;NOTE MT0034 MUST BE FIRST & LAST
MT0034 ;<1 SEC ;SOFT ERROR - BACKGROUND PATTERN TEST
MT0006 ;<1 SEC ;INITIAL DATA TEST
MT0017 ;<1 SEC ;HOLDING 1'S & 0'S TEST
MT0007 ;<1 SEC ;ADDRESS BIT 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
MT0021 ; 1 SEC ;MARCHING 0'S & 1'S TEST
MT0035 ;<1 SEC ;WORSE CASE NOISE PARITY TEST
MT0022 ;10 SEC ;REFRESH TEST
MT0023 ;10 SEC ;SHIFTING DIAGONAL TEST
MT0026 ;<1 SEC ;RANDOM DATA TEST
MT0024 ;20 SEC ;FAST GALLOPING PATTERN 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 - BACKGROUND PATTERN TEST
;NOTE MT0034 MUST BE FIRST & LAST
MT0999 ; 0 SEC ;NULL TEST
MT0999 ; 0 SEC ;NULL TEST
MT0999 ; 0 SEC ;NULL TEST
MT0999 ; 0 SEC ;NULL TEST
MT0999 ; 0 SEC ;NULL TEST

7181 017430
7182 017430 023346
7183 017432 020222
7184 017434 020434
7185 017436 020256
7186 017440 017544
7187 017442 017640
7188 017444 017754
7189 017446 020070
7190 017450 020140
7191 017452 020536
7192 017454 023446
7193 017456 021026
7194 017460 021060
7195 017462 021332
7196 017464 021124
7197 017466 022454
7198 017470 022644
7199 017472 023160
7200 017474 023346
7201
7202 017476 024220
7203 017500 024220
7204 017502 024220
7205 017504 024220
7206 017506 024220

7208
7209
7210
7211 017510

.SBTTL PATTERNS

.SBTTL MEMORY TEST SETUP ROUTINES

```

MT0000: SUBTST <<MT0000      SETUP DATA PATTERN TEST>>
;*****
;*SUBTEST      MT0000  SETUP DATA PATTERN TEST
;*****
          CLR      REALPAT          ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
          MOV      #FIRST,R0
          MOV      #SIZE,R1
          CALL     REGCOPY
          MOV      #MTP000,SUPDOADD ;ELSE DO PATTERN IN MAIN MEMORY
          CALL     SUPD03
          RETURN

```

7212 017510 005037 002300
7213 017514 012700 060000
7214 017520 012701 040000
7215 017524 004737 032470
7216 017530 012737 024640 002262
7217 017536 004737 024446
7218 017542 000207
7219 017544

```

MT0001: SUBTST <<MT0001      SETUP ADDRESS TEST>>
;*****
;*SUBTEST      MT0001  SETUP ADDRESS TEST
;*****

```

7220 017544 012737 000001 002300
7221 017552 012700 060000
7222 017556 012701 040000
7223 017562 005737 002456
7224 017566 001005
7225 017570 023737 172252 172254
7226 017576 001007
7227 017600 000404
7228 017602 023737 177652 177654 2\$:
7229 017610 001002
7230 017612 012701 030000 3\$:
7231 017616 005002 4\$:
7232 017620 004737 032470
7233 017624 012737 024664 002262
7234 017632 004737 024446
7235 017636 000207

```

          MOV      #1,REALPAT          ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
          MOV      #FIRST,R0
          MOV      #SIZE,R1
          TST      NOSUPER
          BNE      2$
          CMP      SIPAR5,SIPAR6
          BNE      4$
          BR       3$
          CMP      UIPAR5,UIPAR6
          BNE      4$
          MOV      #30000,R1
          CLR      R2
          CALL     REGCOPY
          MOV      #MTP001,SUPDOADD ;SET UP CALLING ADDRESS
          CALL     SUPD03
          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	017736	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

IF EQFLAG IS TRUE THEN \$RETURN

TST EQFLAG
BEQ L157
RTS PC

L157:;:;:;:

7260 017754 005737 002132
017754 001401
017760 000207
017762
017764

7261 017764 012737 000003 002300

7262 017772 005037 002326

7263 017776 004737 032500

7264 020002 012701 060000

7265 020006 012703 020000

7266 020012 072327 177770

7267 020016 012702 000004

7268 020022 012705 000100

7269 020026 104415

7270 020030 012737 024750 002262

7271 020036 004737 024446

7272 020042 104416

7273 020044 012737 025010 002262

7274 020052 004737 024462

7275 020056 022737 000003 002616

7276 020064 001344

7277 020066 000207

7279

7280 020070

1\$:
2\$:

MOV #3,REALPAT
CLR PCBUMP
CALL FLIPWARN
MOV #FIRST,R1
MOV #20000,R3
ASH #-8.,R3
MOV #4,R2
MOV #64.,R5
SAVREG
MOV #MTPA03,SUPDOADD
CALL SUPD03
RESREG
MOV #MTPB03,SUPDOADD
CALL SUPD04
CMP #3,FLIPLC
BNE 1\$
RETURN

;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
;TRAPS DO NOT ADD TO PC
;SETUP WARNING CONSTANTS & R2
;R1 --- STARTING ADDRESS
;R3 --- R3 / 256.
;SMALL LOOP SIZE
;MEDIUM LOOP SIZE
;DO IT IN MAIN MEMORY
;DONE WITH 4 PATTERNS
;[(0,177777):(177777,0):(401,177777):(177777,401)]?
;NO - LOOP

MT0004: SUBTST <<MT0004 SETUP ROTATING ZEROS TEST>>

;SUBTEST MT0004 SETUP ROTATING ZEROS TEST

7281 020070 012737 000004 002300

7282 020076 012737 000004 002326

7283 020104 013702 002614

7284 020110 004737 032630

7285 020114 012700 060000

7286 020120 012701 040000

7287 020124 012737 025106 002262

7288 020132 004737 024462

7289 020136 000207

7290 020140

MOV #4,REALPAT
MOV #4,PCBUMP
MOV ONES,R2
CALL BACKGND
MOV #FIRST,R0
MOV #SIZE,R1
MOV #MTPA04,SUPDOADD
CALL SUPD04
RETURN

;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
;TRAPS ADD 4 TO PC
;WRITE BACKGROUND OF ONES
;SET UP LINKS

MT0005: SUBTST <<MT0005 SETUP ROTATING ONES TEST>>

;SUBTEST MT0005 SETUP ROTATING ONES TEST

7291 020140 012737 000005 002300

7292 020146 012737 000004 002326

7293 020154 005002

7294 020156 004737 032630

7295 020162 012700 060000

7296 020166 012701 040000

7297 020172 012737 025162 002262

7298 020200 012737 025176 025160

7299 020206 004737 024462

7300 020212 012737 025122 025160

7301 020220 000207

MOV #5,REALPAT
MOV #4,PCBUMP
CLR R2
CALL BACKGND
MOV #FIRST,R0
MOV #SIZE,R1
MOV #MTP005,SUPDOADD
MOV #MTP005*14,MTPB04*16
CALL SUPD04
MOV #MTPA04*14,MTPB04*16
RETURN

;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
;TRAPS ADD 4 TO PC
;WRITE BACKGROUND OF ZEROS
;SET UP LINKS
;RESET TEST'S ORIGINAL VALUE

7304 020222

```

MT0006: SUBTST <<MT0006      SETUP INITIAL DATA TEST>>
;*****
;*SUBTEST      MT0006  SETUP INITIAL DATA TEST
;*****
MOV      #6,REALPAT      ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
MOV      #4,PCBUMP      ;TRAPS ADD 4 TO PC
MOV      #TESTADD,R1
MOV      #MTPO06,SUPDOADD
CALL     SUPD03          ;DO IT IN SUPERVISOR MODE
RETURN

```

7305 020222 012737 000006 002300
7306 020230 012737 000004 002326
7307 020236 012701 002412
7308 020242 012737 025216 002262
7309 020250 004737 024446
7310 020254 000207
7311 020256

```

MT0007: SUBTST <<MT0007      SETUP ADDRESS BIT TEST>>
;*****
;*SUBTEST      MT0007  SETUP ADDRESS BIT TEST
;*****
MOV      #7,REALPAT      ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
CLR      R2
CALL     BACKGND        ;OF ZEROS
MOV      #FIRST,R1
MOV      #1,R2
BIS     R2,R1
MOV      #MTPO07,SUPDOADD
CALL     SUPD03          ;DO IT IN SUPERVISOR MODE
RETURN

```

7312 020256 012737 000007 002300
7313 020264 005002
7314 020266 004737 032630
7315 020272 012701 060000
7316 020276 012702 000001
7317 020302 050201
7318 020304 012737 025416 002262
7319 020312 004737 024446
7320 020316 000207
7321 020320

```

MT0010: SUBTST <<MT0010      SETUP BYTE ADDRESSING TEST>>
;*****
;*SUBTEST      MT0010  SETUP BYTE ADDRESSING TEST
;*****
MOV      #10,REALPAT     ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
MOV      #4,PCBUMP      ;TRAPS ADD 4 TO PC
MOV      TESTADD,R4
MOV      #MTPO10,SUPDOADD
CALL     SUPD03          ;DO IT IN SUPERVISOR MODE
RETURN

```

7322 020320 012737 000010 002300
7323 020326 012737 000004 002326
7324 020334 013704 002412
7325 020340 012737 025516 002262
7326 020346 004737 024446
7327 020352 000207

7330 020354

MT0014: SUBTST <<MT0014 SETUP BASIC DOUBLE BIT ERROR TEST>>
;*****
;SUBTEST MT0014 SETUP BASIC DOUBLE BIT ERROR TEST
;*****
IF ACTFLAG IS TRUE OR APTFLAG IS TRUE

7331 020354 005737 002350
020360 001003
020362 005737 002352
020366 001404
020370

TST ACTFLAG
BNE L160
TST APTFLAG
BEQ L161
L160:::;;

7332 020370 005737 056654
020370 005737 056654
020374 001401
020376 000207
020400

IF \$PASS NE #0 THEN \$RETURN

TST \$PASS
BEQ L162
RTS PC
L162:::;;

7333 020400 012737 000014 002300
020400

END; OF IF ACTFLAG

L161:::;;

7334 020400 012737 000014 002300
7335 020406 004737 037740

MOV #14,REALPAT
CALL MAPKERNAL
LET R1 := #100000

;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
;MAP KERNAL SPACE
;SETUP TEST ADDRESS

7336 020412 012701 100000
020412 004737 032674
7337 020416 004737 032674
7338 020422 004737 025624
7339 020426 004737 040026
7340 020432 000207

CALL GETCSR
CALL MTP014
CALL UNMAP
RETURN

MOV #100000,R1
;GET CSR INFO FROM CONFIGURATION TABLE
;DO BASIC DOUBLE BIT ERROR TEST
;UNMAP KERNAL SPACE

7343
7344 020434

```

MT0017: SUBST <<MT0017      SETUP HOLDING 1'S & 0'S>>
;*****
;*SUBTEST      MT0017 SETUP HOLDING 1'S & 0'S
;*****
MOV      #17,REALPAT      ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
MOV      #MTP017,SUPDOADD
CALL     SUPD03           ;DO IT IN SUPERVISOR MODE
RETURN

```

7345	020434	012737	000017	002300
7346	020442	012737	026050	002262
7347	020450	004737	024446	
7348	020454	000207		

7351 020456

MT0020: SUBTST <<MT0020 SETUP SYNDROMES TO CSR ON SINGLE BIT ERROR>>
:*****
:SUBTEST MT0020 SETUP SYNDROMES TO CSR ON SINGLE BIT ERROR
:*****
IF ACTFLAG IS TRUE OR APTFLAG IS TRUE

7352 020456

020456 005737 002350
020462 001003
020464 005737 002352
020470 001404
020472

TST ACTFLAG
BNE L163
TST APTFLAG
BEQ L164
L163:::~::~

7353 020472

020472 005737 056654
020476 001401
020500 000207
020502

IF \$PASS NE #0 THEN \$RETURN

TST \$PASS
BEQ L165
RTS PC
L165:::~::~

7354 020502

020502

END; OF IF ACTFLAG

L164:::~::~

7355 020502

012737 000020 002300

MOV #20,REALPAT
CALL MAPKERNAL
LET R1 := #100000

;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
;MAP KERNAL SPACE
;SETUP TEST ADDRESS

7356 020510

004737 037740

7357 020514

020514 012701 100000

7358 020520

004737 032674

7359 020524

004737 026126

7360 020530

004737 040026

7361 020534

000207

CALL GETCSR
CALL MTPO20
CALL UNMAP
RETURN

MOV #100000,R1
;GET CSR INFO FROM CONFIGURATION TABLE
;DO SYNDROMES TO CSR ON SINGLE ERROR TEST
;UNMAP KERNAL SPACE

7363 020536

MT0021: SUBTST <<MT0021 SETUP MARCHING 0'S & 1'S TEST>>

;*****
;*SUBTEST MT0021 SETUP MARCHING 0'S & 1'S TEST
;*****

SET NOSCOPE

MOV #-1,NOSCOPE

;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY

7364 020536 012737 177777 002440
7365 020536 012737 000021 002300
7366 020544 012737 000021 002300
7367 020552 013702 002632
7368 020556 004737 032630
7369 020562 010203
7370 020564 000303
7371 020566 012701 160000
7372 020572 010105
7373 020574 012704 060000
7374 020600 022737 000005 004010
7375 02^606 001450
7376 020610 022737 000003 004010
7377 020616 001407
7378 020620 022737 000007 002102
7379 020626 001003
7380 020630 012701 140000
7381 020634 010105
7382 020636 022737 000177 002102 3\$:
7383 020644 001003
7384 020646 012701 140000
7385 020652 010105
7386 020654 012737 026442 002262 5\$:
7387 020662 004737 024446
7388 020666 012737 026472 002262
7389 020674 004737 024462
7390 020700 010401
7391 020702 012737 026526 002262
7392 020710 004737 024462
7393 020714 012737 026562 002262
7394 020722 004737 024462
7395 020726 000434
7396 020730 022737 000177 002102 1\$:
7397 020736 001003
7398 020740 012701 140000
7399 020744 010105
7400 020746 012737 026442 002262 4\$:
7401 020754 004737 024446
7402 020760 012737 026472 002262
7403 020766 004737 024462
7404 020772 010401
7405 020774 012737 026526 002262
7406 021002 004737 024462
7407 021006 012737 026562 002262
7408 021014 004737 024462
7409 021020 005037 002440 2\$:
7409 021024 000207

MOV #21,REALPAT
MOV BAKPAT,R2
CALL BACKGND
MOV R2,R3
SWAB R3
MOV #LAST+2,R1
MOV R1,R5
MOV #FIRST,R4
CMP #5,PROTYP
BEQ 1\$
CMP #3,PROTYP
BEQ 3\$
CMP #7,BANK
BNE 3\$
MOV #140000,R1
MOV R1,R5
CMP #177 BANK
BNE 5\$
MOV #140000,R1
MOV R1,R5
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\$
CMP #177,BANK
BNE 4\$
MOV #140000,R1
MOV R1,R5
MOV #MTPA21,SUPDOADD
CALL SUPD03
MOV #MTPB21,SUPDOADD
CALL SUPD04
MOV R4,R1
MOV #MTPC21,SUPDOADD
CALL SUPD04
MOV #MTPD21,SUPDOADD
CALL SUPD04
CLR NOSCOPE
RETURN

;IS THIS AN 11/83
;BRANCH IF IT IS
;IS THIS AN 11/24?
;BRANCH IF SO

7411 021026

MT0022: SUBTST <<MT0022 SETUP REFRESH & SHIFTING DIAGONAL TEST>>
;*****
;*SUBTEST MT0022 SETUP REFRESH & SHIFTING DIAGONAL TEST
;*****

7412 021026 004737 024234

7413 021032

021032 103001

021034 000207

021036

7414 021036 012737 000022 002300

7415 021044 012737 026612 002262

7416 021052 004737 024446

7417 021056 000207

7418

7419 021060

CALL KAMITEST ;CHECK FOR KAMIKAZE MODE
ON.ERROR THEN \$RETURN ;IF NOT IN KAMIKAZE MODE RETURN
BCC L166
RTS PC
L166:::;;
MOV #22,REALPAT ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
MOV #MTP022,SUPDOADD
CALL SUPD03 ;DO IT IN SUPERVISOR MODE
RETURN

MT0023: SUBTST <<MT0023 SHIFTING DIAGONAL TEST>>
;*****
;*SUBTEST MT0023 SHIFTING DIAGONAL TEST
;*****

7420 021060 004737 024234

7421 021064

021064 103001

021066 000207

021070

7422 021070 012737 000023 002300

7423 021076 012737 026612 002262

7424 021104 012737 177777 002004

7425 021112 004737 024446

7426 021116 005037 002004

7427 021122 000207

CALL KAMITEST ;CHECK FOR KAMIKAZE MODE
ON.ERROR THEN \$RETURN ;IF NOT IN KAMIKAZE MODE RETURN
BCC L167
RTS PC
L167:::;;
MOV #23,REALPAT ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
MOV #MTP022,SUPDOADD
SET DIAGFLAG ;IDENTIFY DIAGONAL TEST TO MTP022
MOV #-1,DIAGFLAG
CALL SUPD03 ;DO IT IN SUPERVISOR MODE
CLR DIAGFLAG
RETURN

7429 021124

```

MT0024: SUBTST <<MT0024          SETUP FAST GALLOPING PATTERN TEST>>
;*****
;*SUBTEST      MT0024  SETUP FAST GALLOPING PATTERN TEST
;*****
CALL      KAMITEST          ;CHECK FOR KAMIKAZE MODE
ON.ERROR THEN $RETURN      ;IF NOT IN KAMIKAZE MODE RETURN
                                BCC L170
                                RTS PC
                                L170:;;;;;

SET      NOSCOPE

MOV      #24,REALPAT        ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
MOV      BAKPAT,R2
CALL     BACKGND
MOV      R2,R3
MOV      R3,R4
SWAB     R4
MOV      #FIRST,R1
MOV      #LAST,R5
CMP      #5,PROTYP
BEQ      1$
CMP      #3,PROTYP
BEQ      3$
CMP      #7,BANK
BNE      3$
MOV      #137776,R5
CMP      #177,BANK
BNE      7$
MOV      #137776,R1
MOV      R1,R5
7$:     SAVREG
MOV      #MTPB24,SUPDOADD
BR       2$
1$:     CMP      #177,LASTBANK
BNE      4$
MOV      #137776,R5
4$:     SAVREG
MOV      #MTPB24,SUPDOADD
2$:     CALL     SUPD04
;DO IT AGAIN FOR COMPLEMENT DATA
RESREG
SWAB     R2
SWAB     R3
CALL     SUPD04
CLR      NOSCOPE
RETURN
    
```

```

7430 021124 004737 024234
7431 021130
    021130 103001
    021132 000207
    021134
7432 021134
    021134 012737 177777 002440
7433 021142 012737 000024 002300
7434 021150 013702 002632
7435 021154 004737 032630
7436 021160 010203
7437 021162 010304
7438 021164 000304
7439 021166 012701 060000
7440 021172 012705 157776
7441 021176 022737 000005 004010
7442 021204 001426
7443 021206 022737 000003 004010
7444 021214 001406
7445 021216 022737 000007 002102
7446 021224 001002
7447 021226 012705 137776
7448 021232 022737 000177 002102 3$:
7449 021240 001003
7450 021242 012701 137776
7451 021246 010105
7452 021250 104415 7$:
7453 021252 012737 027326 002262
7454 021260 000412
7455 021262 022737 000177 002556 1$:
7456 021270 001002
7457 021272 012705 137776
7458 021276 104415 4$:
7459 021300 012737 027326 002262
7460 021306 004737 024462 2$:
7461
7462 021312 104416
7463 021314 000302
7464 021316 000303
7465 021320 004737 024462
7466 021324 005037 002440
7467 021330 000207
    
```

```

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          SAVREG          7$:
7490 021442  012737  027364  027464          MOV      #MTPA26+4,MTPD26+14
7491 021450  012737  027360  002262          MOV      #MTPA26,SUPDOADD
7492 021456  004737  024446          CALL     SUPD03
7493 021462  005037  027410          CLR      RANODD          ;FOR ERROR REPORTING
7494 021466  012737  027400  027464          MOV      #MTPB26+4,MTPD26+14 ;SET UP NEXT LINK
7495 021474  012737  027374  002262          MOV      #MTPB26,SUPDOADD
7496 021502  104416          RESREG
7497 021504  004737  024446          CALL     SUPD03
7498 021510  000432          BR       2$
7499 021512  022737  000177  002102  1$:          CMP      #177,BANK
7500 021520  001002          BNE      4$
7501 021522  012700  014000          MOV      #14000,R0
7502 021526  104415          SAVREG          4$:
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          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
7518
7519 021610 012737 000027 002300
7520 021616 104502
7521 021620 012737 024446 002522
7522 021626
021626 012737 177777 002426
7523 021634
021634 012737 000001 002452
021642
7524 021642
021642 005037 002102
021646
7525 021646 004737 040052
7526 021652
021652 005737 002116
021656 001436
021660 005737 002124
021664 001033
7527 021666 104511
7528 021670
021670 013702 002102
7529 021674 012700 060000
7530 021700 010004
7531 021702 012701 040000
7532 021706 010103
7533 021710
021710 023727 002452 000001
021716 001005
7534 021720 012737 027704 002262
7535 021726 004777 160570
7536 021732
021732
7537 021732
021732 023727 002452 000002
021740 001005
7538 021742 012737 027712 002262
7539 021750 004737 024446
7540 021754
021754
7541 021754
021754
7542 021754
021754 005237 002102
021760 023737 002102 002556
021766 003727
021770
7543 021770
021770 005237 002452
021774 023727 002452 000002
022002 003717
022004
7544 022004

;MAKE SURE THAT EACH BANK CAN HAVE UNIQUE DATA
;WRITE AND READ THE BANK NUMBER IN EACH BANK (EXCEPT WHERE THE PROGRAM IS)
MOV #27,REALPAT ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
CLRCSR ;CLEAR CSRS
MOV #SUPD03,LINK1 ;SET UP LINK
SET NOFSMODE
STAR27: FOR I := #1 TO #2
FOR BANK := #0 TO LASTBANK
CALL EXBANK
IF ACFLAG IS TRUE AND RRFLAG IS FALSE
INVALIDATE ;INVALIDATE BACKGROUND PATTERN ON "BANK"
LET R2 := BANK
MOV #FIRST,R0
MOV R0,R4
MOV #SIZE,R1
MOV R1,R3
IF I EQ #1
CMP I,#1
BNE L172
MOV #MTP034,SUPDOADD
CALL @LINK1
END ;OF IF
IF I EQ #2
CMP I,#2
BNE L173
MOV #MTP034+6,SUPDOADD
CALL SUPD03
END ;OF IF
END ;OF FOR BANK
END ;OF FOR I
IF FS7FLAG IS TRUE
MOV #-1,NOFSMODE
MOV #1,I
B24:;;;;;
CLR BANK
B25:;;;;;
TST ACFLAG
BEQ L171
TST RRFLAG
BNE L171
MOV BANK,R2
L172:;;;;;
L173:;;;;;
L171:;;;;;
INC BANK
CMP BANK, LASTBANK
BLE B25
E25:;;;;;
INC I
CMP I,#2
BLE B24
E24:;;;;;

022004	005737	002446					TST FS7FLAG
022010	001403						BEQ L174
7545	022012	005037	002426				
7546	022016	000207					
7547	022020						
	022020						L174:::~::~
7548	022020						
	022020	012737	000001	002452			MOV #1,I
	022026						B26:::~::~
7549	022026						
	022026	013737	002556	002102			MOV LASTBANK,BANK
	022034						B27:::~::~
7550	022034	004737	040052				
7551	022040						
	022040	005737	002116				TST ACFLAG
	022044	001436					BEQ L175
	022046	005737	002124				TST RRFLAG
	022052	001033					BNE L175
7552	022054						
	022054	013702	002102				MOV BANK,R2
7553	022060	005102					
7554	022062	012700	060000				
7555	022066	010004					
7556	022070	012701	040000				
7557	022074	010103					
7558	022076						
	022076	023727	002452	000001			CMP I,#1
	022104	001005					BNE L176
7559	022106	012737	027704	002262			
7560	022114	004777	160402				
7561	022120						
	022120						L176:::~::~
7562	022120						
	022120	023727	002452	000002			CMP I,#2
	022126	001005					BNE L177
7563	022130	012737	027712	002262			
7564	022136	004737	024446				
7565	022142						
	022142						L177:::~::~
7566	022142						
	022142						L175:::~::~
7567	022142						
	022142	005337	002102				DEC BANK
	022146	023727	002102	000000			CMP BANK,#0
	022154	002327					BGE B27
	022156						E27:::~::~
7568	022156						
	022156	005237	002452				INC I
	022162	023727	002452	000002			CMP I,#2
	022170	003716					BLE B26
	022172						E26:::~::~
7569	022172	005037	002426				
7570	022176	000207					

```

CLR NOFSMODE
RETURN
END ;OF IF FS7FLAG

FOR I := #1 TO #2

FOR BANK := LASTBANK DOWNT0 #0

CALL EXBANK
IF ACFLAG IS TRUE AND RRFLAG IS FALSE

LET R2 := BANK

COM      R2
MOV      #FIRST,R0
MOV      R0,R4
MOV      #SIZE,R1
MOV      R1,R3
IF I EQ #1

MOV      #MTP034,SUPDOADD
CALL     @LINK1
END ;OF IF

IF I EQ #2

MOV      #MTP034+6,SUPDOADD
CALL     SUPD03
END ;OF IF

END ;OF IF

END ;OF FOR BANK

END ;OF FOR I

CLR NOFSMODE
RETURN

```

```

7573 022200
7574 022200 005037 002264
7575 022204 012737 177777 002542
7576 022212 012737 000030 002300
7577 022220 012737 000001 002076
7578 022226 012737 024446 002522
7579 022234 012737 027466 002262
7580 022242 104470
7581 022244 012737 177777 002426
7582 022260 012737 177777 002440
7583 022264 005037 002102
7584 022270 004737 040052
7585 022276 005737 002120
7586 022312 012701 040000
7587 022316 012700 060000
7588 022322 004777 160174
7589 022326
7590 022326
7591 022326 005237 002102
7592 022342 005737 002264
7593 022350 012737 177777 002264
7594 022356 104502
7595 022360 004737 036402
7596 022364 103010
7597 022366 104472
7598 022370 005037 002426
7599 022404 000207
7600 022406
7601 022406 013737 002310 002102

```

```

MT0030: SUBTST <<MT0030      SETUP FLUSH OUT DBE'S TEST>>
;*****
;*SUBTEST      MT0030      SETUP FLUSH OUT DBE'S TEST
;*****
      CLR      PASFLG
      SET      FULLREL
MTA030: MOV      #30,REALPAT      ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
      MOV      #1,NOPAR          ;INDICATE COUNT PARITY ERRORS
      MOV      #SUPD03,LINK1
      MOV      #MTPO30,SUPDOADD
      ECCDIS                    ;DISABLE ERROR CORRECTION
      SET      NOFSMODE,NOSCOPE
      MOV      #-1,NOFSMODE
      MOV      #-1,NOSCOPE
      FOR BANK := #0 TO LASTBANK
      CLR BANK
      B30:;;;;;
      CALL EXBANK
      IF MKFLAG IS TRUE
      TST MKFLAG
      BEQ L200
      IF ACFLAG IS TRUE AND RRFLAG IS FALSE
      TST ACFLAG
      BEQ L201
      TST RRFLAG
      BNE L201
      MOV      #SIZE,R1
      MOV      #FIRST,R0
      CALL    @LINK1
      END ;OF IF ACFLAG
      L201:;;;;;
      END ;OF IF MKFLAG
      L200:;;;;;
      END ;OF FOR
      INC BANK
      CMP BANK, LASTBANK
      BLE B30
      E30:;;;;;
      IF PASFLG IS FALSE
      TST PASFLG
      BNE L202
      SET PASFLG
      MOV      #-1,PASFLG
      CLRCR          ;CLEAR CSRS
      CALL RELOCATE
      ON.ERROR
      BCC L203
      ECCINIT                    ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
      CLEAR          NOFSMODE,NOSCOPE,FULLREL
      CLR NOFSMODE
      CLR NOSCOPE
      CLR FULLREL
      RETURN
      END ;OF ON.ERROR
      L203:;;;;;
      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          GN.ERROR THEN $RETURN          ;IF NOT IN KAMIKAZE MODE RETURN
          022460 103001          BCC L204
          022462 000207          RTS PC
          022464          L204:::~::~
7616 022464          SET NOSCOPE
          022464 012737 177777 002440          MOV 0-1,NOSCOPE
7617 022472 012737 000031 002300          MOV #31,REALPAT          ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
7618 022500 005037 002076          CLR NOPAR          ;SETUP PARITY ACTION
7619 022504          MAP BANK          ;MAP FIRST SO BLOCK MOVE WORKS
          022504 010346          MOV R3,-(SP)
          022506 013703 002102          MOV BANK,R3
          022512 004737 035716          CALL MAPPER
          .DSABL CRF
7620 022516 012603          MOV (SP)+,R3
7620 022520          TESTAREA          ;ENTER TEST MODE
7620 022520 053737 002552 177776          BIS TESTMODE,PSW          ;GO TO SYSTEM TEST MODE
          .DSABL CRF
7621 022526          BMOV MTP031,FIRST,SOBLENGTH/2
7621 022526 004537 041024          JSR R5,BLOCK3
7621 022532 000027          SOBLENGTH/2
7621 022534 060000          FIRST
7621 022536 027476          MTP031
          .DSABL CRF
7622 022540 104417          KERNEL          ;ENTER KERNEL MODE
7623 022542 013702 002572          MOV SOBK,R2
7624 022546 010200          MOV R2,R0
7625 022550 012701 100776          MOV #100776,R1          ;COMPLEMENT OF INSTRUCTION "SOB R0,DOT"
7626 022554 012705 060056          MOV #FIRST+SOBLENGTH,R5
7627 022560 012737 060002 002262          MOV #FIRST+2,SUPDOADD
7628 022566 012737 160000 002522          MOV #LAST+2,LINK1
7629 022574 005737 002456          TST NOSUPER
7630 022600 001005          BNE 1$
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
7644 022650
022650 103001
022652 000207
022654

CALL KAMITEST ;CHECK FOR KAMIKAZE MODE
ON.ERROR THEN \$RETURN ;IF NOT IN KAMIKAZE MODE RETURN
BCC L205
RTS PC
L205:::~::~

7645 022654
022654 012737 177777 002440
7646 022662 012737 000032 002300
7647 022670 005037 002076
7648 022674

SET NOSCOPE
MOV #32,REALPAT ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY
CLR NOPAR ;SETUP PARITY ACTION
MAP BANK ;MAP FIRST SO THAT THE BLOCK MOVE WORKS
MOV R3,-(SP)

022674 010346
022676 013703 002102
022702 004737 035716

MOV BANK,R3
CALL MAPPER
.DSABL CRF

022706 012603
7649 022710 012700 010247
7650 022714 012701 177667
7651 022720 012702 020000
7652 022724 010237 002522
7653 022730 012703 060000
7654 022734 012704 160000
7655 022740 005037 002524
7656 022744 005737 002456
7657 022750 001005

MOV (SP)+,R3
MOV #10247,R0 ;OP CODE OF INSTRUCTION "MOV R2,-(PC)"
MOV #177667,R1 ;OP CODE OF COMPLEMENT OF INSTRUCTION "JMP (R0)"
MOV #SIZE/2,R2 ;USED FOR 1/2 BANK LOOP
MOV R2,LINK1
MOV #FIRST,R3
MOV #LAST+2,R4
CLR LINK2
TST NOSUPER
BNE 1\$

7658 022752 023737 172252 172254
7659 022760 001405
7660 022762 000415
7661 022764 023737 177652 177654 1\$:
7662 022772 001011
7663 022774 012704 140000 2\$:
7664 023000 012702 014000
7665 023004 010237 002522
7666 023010 012737 000001 002524

CMP SIPAR5,SIPAR6
BEQ 2\$
BR 3\$
CMP UIPAR5,UIPAR6
BNE 3\$
MOV #140000,R4
MOV #14000,R2
MOV R2,LINK1
MOV #1,LINK2

7667
7668 023016
023016 053737 002552 177776 3\$:

TESTAREA ;ENTER TEST MODE
BIS TESTMODE,PSW ;GO TO SYSTEM TEST MODE
.DSABL CRF

7669
7670 023024 010023 4\$:
7671 023026 010144
7672 023030 077203
7673

;MOVE TEST TO MEMORY UNDER TEST
MOV R0,(R3)+
MOV R1,-(R4)
SOB R2,4\$

7674 023032 022737 000005 004010
7675 023040 001003
7676

CMP #5,PROTYP
BNE 5\$
;MOVE LAST PART OF TEST TO FASTCITY
BMOV MTP032

7677 023042
023042 004537 040770
023046 027554

JSR R5,BLOCK1
MTP032
.DSABL CRF

7678 023050 104417 5\$:

KERNEL ;ENTER KERNEL MODE

7679
7680 023052 012702 005141
7681 023056 012700 023156

MOV #5141,R2 ;OP CODE OF INSTRUCTION "COM (R1)"
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			
7698									
7699									

;THIS RETURN ACTS AS A NORMAL RETURN FROM MT0032
;ALSO A RETURN FROM THE "CALL SUPD04" ABOVE

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
ON.ERROR THEN \$RETURN ;IF NOT IN KAMIKAZE MODE RETURN
BCC L206
RTS PC
L206:::~::~

7704 023164 103001
023166 000207
023170

7705 023170 SET NOSCOPE

7706 023176 012737 177777 002440

MOV #33,REALPAT ;SETUP PATTERN NUMBER FOR TYPEOUT & DISPLAY

7707 023176 012737 000033 002300

CLR NOPAR ;SETUP PARITY ACTION

7708 023204 005037 002076

MAP BANK ;MAP FIRST SO THAT BLOCK MOVE WORKS

7708 023210 010346

MOV R3,-(SP)

023212 013703 002102

MOV BANK,R3

023216 004737 035716

CALL MAPPER

023222 012603

.DSABL CRF
MOV (SP)+,R3

7709

7710 023224 053737 002552 177776

TESTAREA ;ENTER TEST MODE
BIS TESTMODE,PSW ;GO TO SYSTEM TEST MODE
.DSABL CRF

7711 023232 004537 041024

BMOV MTP033,FIRST,GBLENGTH/2

023236 000037

JSR R5,BLOCK3

023240 060000

GBLENGTH/2

023242 027606

FIRST

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 SOFTPA^,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 BACKGROUND 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

```

7773 023560

MT0036: SUBTST <<MT0036 SETUP CORRECTION CODE TEST>>

;SUBTEST MT0036 SETUP CORRECTION CODE TEST

7774 023560 012737 000036 002300
7775 023566 004737 032674
7776 023572 005037 002264
7777 023576 005000
7778 023600 012701 100000
7779 023604 004737 037740
7780 023610 004737 030072
7781 023614 004737 040026
7782 023620 000207

MOV #36,REALPAT ;SET UP TEST NUMBER FOR TYPEOUT AND DISPLAY
CALL GETCSR ;GET CSR INFO FROM CONFIG TABLE
CLR PASFLG ;CLEAR LOOP COUNTER
CLR R0 ;GET TEST DATA
MOV #100000,R1 ;GET FIRST ADDRESS IN BANK
CALL MAPKERNAL ;MAP KIPARS AND 6 TO BANK
CALL MTP036 ;EXECUTE TEST
CALL UNMAP ;REMAP KERNAL SPACE
RETURN

7784 023622

MT0037: SUBTST <<MT0037 SETUP ECC DISABLE TEST>>

;*SUBTEST MT0037 SETUP ECC DISABLE TEST

7785 023622 012737 000037 002300
7786 023630 012701 100000
7787 023634 005000
7788 023636 004737 037740
7789 023642 004737 032674
7790 023646 004737 030316
7791 023652 004737 040026
7792 023656 000207

MOV #37,REALPAT ;SETUP PATTERN AND NUMBER FOR TYPEOUT AND DISPLAY
MOV #100000,R1 ;SET UP TEST ADDRESS
CLR R0 ;CLEAR DATA TO BE WRITTEN
CALL MAPKERNAL ;MAP THIS TEST TO KERNEL SPACE
CALL GETCSR ;GET CSRINFO FROM CONFIG TABLE
CALL MTP037 ;CHECK ECC DISABLE
CALL UNMAP ;REMAP KERNEL SPACE
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

BR L213

023722 000403

L212:::::;

7802 023724

LET PASCNT :- #16.

023724 012737 000020 002570

MOV #16.,PASCNT

7803 023732

END

L213:::::;

023732 004737 024446

7804 023736

CALL SUPD03 ;EXECUTE ADDRESS TO CSR TEST IN SUPVISIOR MODE

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
7809 023746 012701 100000
7810 023752 004737 037740
7811 023756 004737 032674
7812 023762 004737 030542
7813 023766 004737 040026
7814 023772 000207

MOV #42,REALPAT ;SETUP PATTERN AND NUMBER FOR TYPEOUT AND DISPLAY
MOV #100000,R1 ;SET UP TEST ADDRESS
CALL MAPKERNAL ;MAP TO KERNEL SPACE
CALL GETCSR ;SET UP CSRINFO FROM CONFIGURATION TABLE
CALL MTP042 ;CHECK EXTENDED Q-BUS ADDRESS TO CSR
CALL UNMAP ;REMAP KERNEL SPACE
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
      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
      MOV #MTP044,SUPDOADD
7827 024044      LET R1 := #FIRST ;SET UP FIRST ADDRESS ;:IL
      MOV #FIRST,R1
7828 024050      IF BANK EQ #177 ;ARE WE AT BANK 177?
      CMP BANK,#177
      BNE L214
7829 024060      LET ENDADD := #120000
      MOV #120000,ENDADD
7830 024066      ELSE
      BR L215
      L214:::;:;:;
7831 024070      LET ENDADD := #160000
      MOV #160000,ENDADD
7832 024076      END
      L215:::;:;:;
7833 024076 004737 024446      CALL SUPD03 ;EXECUTE ADDRESS 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
      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
      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

7853 024202

LET R2 := #120000 ; " " SECOND TEST ADDRESS

024202 012702 120000

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
024270 010346
024272 013703 002102
024276 004737 035716

MAP BANK ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
MOV R3,-(SP)

7874 024302 012603
7875 024304 004737 051430

SUPD02: CALL GETDIS
PUSH \$LPERR,\$LPADR

7876 024310 013746 002624
7877 024314 013746 002622
7878 024320 010037 002160
7879 024324 012700 002162

MOV (SP)+,R3
MOV \$LPERR,-(SP)
MOV \$LPADR,(SP)

7880 024330 010120
7881 024332 010220
7882 024334 010320
7883 024336 010420
7884 024340 010520
7885 024342 010620
7886 024344 013700 002160
7887 024350 012737 024364 002622
7888 024356 013737 002622 002624
7889 024364 012700 002176

MOV R0,SUPDRO
MOV #SUPDR1,R0
MOV R1,(R0)+
MOV R2,(R0)+
MOV R3,(R0)+
MOV R4,(R0)+
MOV R5,(R0)+
MOV SP,(R0)+
MOV SUPDRO,R0
MOV #TAG4\$, \$LPADR
TAG4\$: MOV \$LPADR,\$LPERR
MOV #SUPDR6+2,R0

7890 024370 014006
7891 024372 014005
7892 024374 014004
7893 024376 014003
7894 024400 014002
7895 024402 014001
7896 024404 014000
7897 024406 052737 040000 177776

MOV -(R0),SP
MOV -(R0),R5
MOV -(R0),R4
MOV -(R0),R3
MOV -(R0),R2
MOV -(R0),R1
MOV -(R0),R0
SUPERVISOR ;ENTER SUPERVISOR MODE
BIS #BIT14,PSW ;GO TO SUPERVISOR MODE
.DSABL CRF

7898 024414 012706 000740
7899 024420 104424
7900 024422 004737 177640
7901 024426 104423
7902 024430 104417
7903 024432 000004

MOV #SUPSTK,SSP
CACHOFF ;TURN CACHE OFF
CALL FASTCITY ;CALL TO THE USER INSTRUCTION PAR'S
CACHON ;TURN CACHE ON
KERNEL ;ENTER KERNEL MODE
SCOPE
POP \$LPADR,\$LPERR

7904 024434 012637 002622
7905 024440 012637 002624
7906 024444 000207

MOV (SP)+,\$LPADR
MOV (SP)+,\$LPERR
RETURN

```

7906 024446          SUPD03: MAP      BANK      ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
      024446 010346          ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
      024450 013703 002102          MOV      BANK,R3
      024454 004737 035716          CALL     MAPPER
      .DSABL CRF
      MOV (SP)+,R3
7907 024460 012603          SUPD04: CALL     GETDIS
      024462 004737 051430          PUSH    $LPERR,$LPADR
7908 024466          ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
      024466 013746 002624          MOV $LPERR, (SP)
      024472 013746 002622          MOV $LPADR, -(SP)
7909 024476 010037 002160          MOV      R0,SUPDRO
7910 024502 012700 002162          MOV      #SUPDR1,R0
7911 024506 010120          MOV      R1,(R0)+
7912 024510 010220          MOV      R2,(R0)+
7913 024512 010320          MOV      R3,(R0)+
7914 024514 010420          MOV      R4,(R0)+
7915 024516 010520          MOV      R5,(R0)+
7916 024520 010620          MOV      SP,(R0)+
7917 024522 013700 002160          MOV      SUPDRO,R0
7918 024526 012737 024542 002622          MOV      #TBG4$, $LPADR
7919 024534 013737 002622 002624          MOV      $LPADR,$LPERR
7920 024542 012700 002176          TBG4$: MOV      #SUPDR6+2,R0
7921 024546 014006          MOV      -(R0),SP
7922 024550 014005          MOV      -(R0),R5
7923 024552 014004          MOV      -(R0),R4
7924 024554 014003          MOV      -(R0),R3
7925 024556 014002          MOV      -(R0),R2
7926 024560 014001          MOV      -(R0),R1
7927 024562 014000          MOV      -(R0),R0
7928 024564          TESTAREA          ;ENTER SUPERVISOR MODE
      024564 053737 002552 177776          BIS      TESTMODE,PSW
      .DSABL CRF          ;GO TO SYSTEM TEST MODE
7929 024572 005737 002456          TST      NOSUPER
7930 024576 001403          BEQ      1$
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 J12637 002622          MOV (SP)+,$LPADR
      024632 012637 002624          MOV (SP)+,$LPERR
7940 024636 000207          RETURN

```

```

7943
7944
7945
7946
7947
7948
7949
7950
7951
7952
7953 024640

7954 024640 010220
7955 024642 077102
7956 024644 000240
7957 024646 012401
7958 024650 020102
7959 024652 001402
7960 024654 104430
7961 024656 000240
7962 024660 077306
7963 024662 000207
7964 024664

7965 024664 010220
7966 024666 062702 000002
7967 024672 077104
7968 024674 000240
7969 024676 012400
7970 024700 020005
7971 024702 001401
7972 024704 104427
7973 024706 062705 000002
7974 024712 077307
7975 024714 000207
7976 024716

7977 024716 010540
7978 024720 062705 000002
7979 024724 077104
7980 024726 000240
7981 024730 162702 000002
7982 024734 012401
7983 024736 020102
7984 024740 001401
7985 024742 104430
7986 024744 077307
7987 024746 000207

```

```

.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)
;*****
MTP000: SUBTST <<MTP000 BASIC DATA TEST>>
;*****
; *SUBTEST MTP000 BASIC DATA TEST
;*****
1$: MOV R2, (R0)+ ;V177640
SOB R1, MTP000 ;V177642
NOP ;V177644
2$: MOV (R4)+, R1 ;V177646
CMP R1, R2 ;V177650
BEQ 3$ ;V177652
PERR02 ;V177654
NOP ;V177656
3$: SOB R3, 2$ ;V177660
RETURN ;V177662
MTP001: SUBTST <<MTP001 ADDRESS TEST>>
;*****
; *SUBTEST MTP001 ADDRESS TEST
;*****
3$: MOV R2, (R0)+ ;V177640
ADD #2, R2 ;V177642
SOB R1, 3$ ;V177646
NOP ;V177650
1$: MOV (R4)+, R0 ;V177652
CMP R0, R5 ;V177654
BEQ 2$ ;V177656
PERR01 ;V177660
2$: ADD #2, R5 ;V177662
SOB R3, 1$ ;V177666
RETURN ;V177672
MTP002: SUBTST <<MTP002 COMPLEMENT ADDRESS TEST (WRITE DOWN, READ UP)>>
;*****
; *SUBTEST MTP002 COMPLEMENT ADDRESS TEST (WRITE DOWN, READ UP)
;*****
3$: MOV R5, -(R0) ;V177640
ADD #2, R5 ;V177642
SOB R1, 3$ ;V177646
NOP ;V177650
1$: SUB #2, R2 ;V177652
MOV (R4)+, R1 ;V177656
CMP R1, R2 ;V177660
BEQ 2$ ;V177662
PERR02 ;V177664
2$: SOB R3, 1$ ;V177666
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
7992
7993
7994
7995
7996
7997 024750 010421
7998 024752 010421
7999 024754 077203
8000 024756 005104
8001 024760 052704
8002 024762 000401
8003 024764 012702 000004
8004 024770 077511
8005 024772 005104
8006 024774 052704
8007 024776 000401
8008 025000 012705 000100
8009 025004 077317
8010 025006 000207
8011
8012
8013 025010

;R1 = ADDRESS
;R2 = SMALL LOOP CONSTANT
;R3 = NUM OF ADD TO TEST (LARGE LOOP)
;R4 = GOOD DATA
;R5 = MEDIUM LOOP CONSTANT
.ENABL LSB
1\$: MOV R4,(R1)+ ;V177640
MOV R4,(R1)+ ;V177642
SOB R2,1\$;V177644
COM R4 ;V177646
BIS (PC)+,R4 ;V177650
WARN2: 401 ;V177652 WARNING LOCATION IS MODIFIED BEFORE LOADING
MOV #4,R2 ;V177654
SOB R5,1\$;V177660
COM R4 ;V177662
BIS (PC)+,R4 ;V177664
WARN3: 401 ;V177666 WARNING LOCATION IS MODIFIED BEFORE LOADING
MOV #64,R5 ;V177670
SOB R3,1\$;V177674
RETURN ;V177676
.DSABL LSB

MTPB03: SUBTST <<MTPB03 3 XOR 9 WORST CASE NOISE TEST (READ)>>
;*****
;*SUBTEST MTPB03 3 XOR 9 WORST CASE NOISE TEST (READ)
;*****

8014
8015 025010 000137 025050
8016 025014 077203
8017 025016 005104
8018 025020 052704
8019 025022 000401
8020 025024 012702 000004
8021 025030 077511
8022 025032 005104
8023 025034 052704
8024 025036 000401
8025 025040 012705 000100
8026 025044 077317
8027 025046 000207
8028

.ENABL LSB
1\$: JMP @MTPC03 ;V177640 GO TO V172360
SOB R2,1\$;V177644
COM R4 ;V177646
BIS (PC)+,R4 ;V177650
WARN4: 401 ;V177652 WARNING LOCATION IS MODIFIED BEFORE LOADING
MOV #4,R2 ;V177654
SOB R5,1\$;V177660
COM R4 ;V177662
BIS (PC)+,R4 ;V177664
WARN5: 401 ;V177666 WARNING LOCATION IS MODIFIED BEFORE LOADING
MOV #64,R5 ;V177670
SOB R3,1\$;V177674
RETURN ;V177676
.DSABL LSB

8031 025050

MTPC03: SUBTST <<MTPC03 TEST DATA SUBPROGRAM>>
;*****
;*SUBTEST MTPC03 TEST DATA SUBPROGRAM
;*****

8032 025050 020421
8033 025052 001401
8034 025054 104431
8035 025056 005141
8036 025060 005111
8037 025062 000137 025066
8038
8039 025066

1\$: CMP R4,(R1)+ ;V172360
BEQ 1\$;V172362
PERR03 ;V172364
COM -(R1) ;V172366
COM (R1) ;V172370
JMP @#MTPD03 ;V172372 GO TO V172260

MTPD03: SUBTST <<MTPD03 TEST DATA SUBSUBPROGRAM>>
;*****
;*SUBTEST MTPD03 TEST DATA SUBSUBPROGRAM
;*****

8040 025066 020421
8041 025070 001401
8042 025072 104431
8043 025074 005127
8044 025076 000000
8045 025100 001363
8046 025102 000137 025014

1\$: CMP R4,(R1)+ ;V172260
BEQ 1\$;V172262
PERR03 ;V172264
COM (PC)+ ;V172266
0 ;V172270
BNE MTPC03 ;V172272 GO TO V172360
JMP @#MTPB03+4 ;V172274 GO TO V177644

8049 025106

MTPA04: SUBTST <<MTPA04 ROTATING ZEROS TEST>>
;*****
;*SUBTEST MTPA04 ROTATING ZEROS TEST
;*****

8050 025106 012705 000010
8051 025112 010504
8052 025114 000241
8053 025116 000137 025142
8054 025122 016004 177776
8055 025126 103402
8056 025130 020204
8057 025132 001401
8058 025134 104432
8059 025136 077115
8060 025140 000207
8061
8062 025142

1\$: MOV #8.,R5 ;V177640
MOV R5,R4 ;V177644
CLC ;V177646
JMP @#MTPB04 ;V177650
MOV -2(R0),R4 ;V177654
BCS 2\$;V177660
CMP R2,R4 ;V177662
BEQ 3\$;V177664
2\$: PERR04 ;V177666
3\$: SOB R1,1\$;V177670
RETURN ;V177672

MTPB04: SUBTST <<MTPB04 SUBR ROTATING BIT>>
;*****
;*SUBTEST MTPB04 SUBR ROTATING BIT
;*****

8063 025142 106110
8064 025144 077502
8065 025146 106120
8066 025150 106110
8067 025152 077402
8068 025154 106120
8069 025156 000137 025122
8070
8071 025162

1\$: ROLB (R0) ;V172360
SOB R5,1\$;V172362
ROLB (R0)+ ;V172364
2\$: ROLB (R0) ;V172366
SOB R4,2\$;V172370
ROLB (R0)+ ;V172372
JMP @#MTPA04+14 ;V172374

MTP005: SUBTST <<MTP005 ROTATION ONES TEST>>
;*****
;*SUBTEST MTP005 ROTATION ONES TEST
;*****

8072 025162 012705 000010
8073 025166 010504
8074 025170 000261
8075 025172 000137 025142
8076 025176 016004 177776
8077 025202 103002
8078 025204 020204
8079 025206 001401
8080 025210 104432
8081 025212 077115
8082 025214 000207

1\$: MOV #8.,R5 ;V177640
MOV R5,R4 ;V177644
SEC ;V177646
JMP @#MTPB04 ;V177650
MOV 2(R0),R4 ;V177654
BCC 2\$;V177660 IF THIS HAPPENS THE GOOD & BAD MATCH
CMP R2,R4 ;V177662
BEQ 3\$;V177664
2\$: PERR04 ;V177666
3\$: SOB R1,1\$;V177670
RETURN ;V177672

8085 025216

MTP006: SUBTST <<MTP006 INITIAL DATA TEST>>

;SUBTEST MTP006 INITIAL DATA TEST

```

8086
8087
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
8107 025314 012737 177776 002242 4$:  MOV #177776,DATBUF ;NOW GOING TO SHIFT A 0 IN DATA DIRECTION
8108 025322 012737 177777 002244      MOV #-1,DATBUF+2  ;PUT A 0 IN BIT 0
8109 025330 013771 002242 000000 5$:  MOV DATBUF,@(R1)  ;AND 1'S IN ALL OTHERS
8110 025336 013771 002244 000002      MOV DATBUF+2,@2(R1) ;WRITE THE DATA
8111 025344 017102 000000              MOV @2(R1),R2     ;2 WORDS WORTH
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                      BR 8$             ;KEEP GOING
      RETURN

```

8128 025416

MTP007: SUBTST <<MTP007 ADDRESS BIT TEST>>
;*****
;*SUBTEST MTP007 ADDRESS BIT TEST
;*****

8129
8130
8131
8132
8133 025416 111100
8134 025420 105700
8135 025422 001401
8136 025424 104435
8137
8138 025426 105111
8139 025430 111100
8140 025432 105700
8141 025434 001001
8142 025436 104436
8143
8144 025440 040201
8145 025442 006302
8146 025444 050201
8147 025446 011100
8148 025450 005700
8149 025452 001401
8150 025454 104437
8151
8152 025456 005111
8153 025460 011100
8154 025462 005700
8155 025464 001001
8156 025466 104440
8157
8158 025470 022702 100000
8159 025474 001407
8160 025476 022702 010000
8161 025502 001356
8162 025504 006302
8163 025506 012701 160000
8164 025512 000752
8165 025514 000207

;
; THIS TEST CHECKS TO SEE THAT EACH ADDRESS
; BIT IN EACH 16K BANK CAN BE ASSERTED UNIQUELY.
; IT CHECKS FOR ADDRESS BITS THAT MAY BE STUCK
; HIGH, STUCK LOW OR STUCK TOGETHER.
; MOVB (R1),R0
; TSTB R0 ;READ AND COMPARE FOR ZEROS
; BEQ 1\$;BR IF OK
; PERR11
1\$: ; COMB (R1) ;COMPLEMENT THE BYTE
; MOVB (R1),R0
; TSTB R0 ;READ FOR NON ZEROS
; BNE 2\$;BR IF OK
; PERR12
2\$: ; BIC R2,R1 ;MASK OFF THE ASSERTED BIT
; ASL R2 ;SHIFT R2 FOR NEXT BIT
; BIS R2,R1 ;SET THE NEW BIT INTO R1
; MOV (R1),R0
; TST R0 ;READ THE NEW ADDRESS
; BEQ 3\$;READ FOR ZEROS
; PERR13
3\$: ; COM (R1) ;COMPL THE WORD
; MOV (R1),R0
; TST R0 ;READ IT AGAIN
; BNE 4\$
; PERR14
4\$: ; CMP #100000,R2
; BEQ 5\$
; CMP #10000,R2 ;CHECK FOR MSB IN 4K BANK
; BNE 2\$;NOT LAST BIT, BRANCH
; ASL R2
; MOV #160000,R1
; BR 2\$
5\$: ; RETURN

8168 025516

MTP010: SUBTST <<MTP010 BYTE ADDRESSING TEST>>
;*****
;*SUBTEST MTP010 BYTE ADDRESSING TEST
;*****

8169
8170
8171 025516 010402
8172 025520 010403
8173 025522 062702 000004
8174 025526 012713 177777
8175 025532 012763 177777 000002
8176 025540 105013
8177 025542 010401
8178 025544 020201
8179 025546 001420
8180 025550 020301
8181 025552 001007
8182 025554 111100
8183
8184 025556 022700 000000
8185 025562 001401
8186 025564 104435
8187
8188 025566 005201
8189 025570 000765
8190 025572 111100
8191 025574 122700 177777
8192 025600 001401
8193 025602 104436
8194
8195 025604 005201
8196 025606 000756
8197 025610 112713 177777
8198 025614 005203
8199 025616 020302
8200 025620 001347
8201 025622 000207
8202

;TEST 3 TH'S TEST CHECKS FOR PROPER
; BYTE ADDRESSING WITH ECC DISABLED
; R4 HAS LOWEST ADDRESS
; PUT IT IN R3 ALSO
; POINT R2 TO LAST BYTE +1
; WRITE ALL ONES IN
; THE 4 TEST BYTES
1\$: CLR B (R3) ; CLEAR A BYTE
; INITIALIZE R1 FOR EACH PASS
2\$: CMP R4,R1 ; IF EQUAL, JUST READ LAST BYTE
BEQ 6\$; BR IF EQUAL
CMP R3,R1 ; IS THIS THE BYTE OF ZEROS
BNE 4\$; BR IF NOT
;WARNING IF YOU OPTOMIZE CHANGE THE PCBUMP FOR THIS ERROR INCASE OF TRAPS
CMP #0,R0 ; IT IS, COMPARE FOR ZEROS
BEQ 3\$
PERR11
3\$: INC R1 ;NEXT BYTE
BR 2\$;RETURN
4\$: MOV B (R1),R0
CMPB #-1,R0 ;ITS NOT THE BYTE OF 0'S, READ 1'S
BEQ 5\$
PERR12
5\$: INC R1 ;MOVE TO NEXT BYTE
BR 2\$
6\$: MOV B #-1,(R3) ;RESTORE 1'S TO BYTE JUST TESTED
INC R3 ;INC TO NEXT BYTE
CMP R3,R2 ;WAS THAT JUST THE LAST ONE?
BNE 1\$;BR IF NO
RETURN

8205 025624

MTP014: SUBST <<MTP014 BASIC DOUBLE BIT ERROR TEST>>
;*****
;*SUBTEST MTP014 BASIC DOUBLE BIT ERROR TEST
;*****

8206
8207
8208
8209
8210

; THIS TEST CHECKS THAT A DOUBLE ERROR WILL BE DETECTED
; A BYTE WRITE WITH A DOUBLE ERROR ON A MSV11-P
; WILL BE ABOTRED.

8211 025624 104424
8212 025626 005037 002072
8213 025632 012737 000001 002076
8214 025640 012737 060000 002034
8215 025646 104513
8216 025650 012737 003145 002150
8217 025656 104425
8218 025660 012737 103145 002044
8219 025666 005011
8220 025670 005711
8221 025672 023727 002072 000001
8222 025700 001401
8223 025702 104055
8224 025704 104426
8225 025706 042737 020000 002150
8226 025714 023737 002150 002044
8227 025722 001407
8228 025724 012737 177777 002612
8229 025732 013737 002150 002052
8230 025740 104065
8231 025742 104473
8232 025744 005037 002266
8233 025750
8234 025750 104473
8235 025752 005237 002266
8236 025756 005037 002072
8237 025762 112711 000377
8238 025766 105711
8239 025770 023727 002072 000001
8240 026000

; CACHOFF ;TURN OFF CACHE
LET PARCNT := #0 ;CLEAR PARCNT
; CLR PARCNT
LET NOPAR := #1 ;SET PARITY ACTION
; MOV #1,NOPAR
LET ADDRESS := #FIRST ;SET ADDRESS FOR ERROR REPORT
; MOV #FIRST,ADDRESS
CBREG ;ENABLE CHECK/SYNDROME BIT REGISTER
LET CSR := #3145 ;DBE CHECK BITS FOR CSR
; MOV #3145,CSR
LOADCSR ;WRITE DBE CHECK BITS TO CSR
LET GOOD := #103145 ;GOOD DATA
; MOV #103145,GOOD
LET (R1) := #0 ;WRITE ZEROS AND DBL ERROR CHK BITS A=0
; CLR (R1)
TST (R1) ;READ A=0 TO GET DOUBLE BIT ERROR
IF PARCNT NE #1 ;WAS BUSPBL ASSERTED???
; CMP PARCNT,#1
; BEQ L221
ERROR +55 ;ERROR CALL ;MISSED EXPECTED TRAP
END ;
; L221:::;
READCSR ;READ CSR FOR CORRECT CHECK BITS AND DBE INDICATOR
BIC #BIT13,CSR ;CLEAR INHIBIT MODE POINTER FROM DATA IF IT EXISTS1
IF CSR NE GOOD THEN ;CHECK IF DOUBLE ERROR BIT IS SET
; CMP CSR,GOOD
; BEQ L222
SET HEADER ;
; MOV #-1,HEADER
LET BAD := CSR ;BAD DATA
; MOV CSR,BAD
ERROR +65 ;
END ;
; L222:::;
ECC1INIT ;ENABLE BUSPBL
CLR PASSNO ;CLEAR LOOP COUNTER
REPEAT ;
; B31:::;
ECC1INIT ;ENABLE BUSPBL
INC PASSNO ;INCREMENT LOOP COUNTER
CLR PARCNT ;CLEAR PARITY ACTION COUNTER
LET (R1) :B= #377 ;WRITE BYTE SHOULD BE ABORTED
; MOV #377,(R1)
TSTB (R1) ;READ R1 TO SEE IF IT IS STILL 0
IF PARCNT NE #1 ;WAS WRITE ABORTED???
; CMP PARCNT,#1
; BEQ L223
SET HEADER ;

```

8241 026000 012737 177777 002612          LET GOOD := #0      ;GOOD DATA      MOV #-1,HEADER
      026006 005037 002044          LET BAD := #377    ;BAD DATA      CLR GOOD
8242 026012 012737 000377 002052          ERROR +56        ;
      026012 104056          END                ;
8243 026020 005201          INC R1            ;AND REPEAT ON HIGH BYTE L223:::::
8244 026022 002266 000002          UNTIL PASSNO EQ #2 ;
      026024 023727 001346          ;                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
;*****
;*(1)  THIS TEST CHECKS THE MEMORY FOR THE CAPABILITY
;*      OF HOLDING 1'S AND 0'S BY WRITING A BACKGROUND
;*      OF 000377 AND READING IT
;*(2)  MEMORY IS WRITTEN USING A BYTE AT A TIME
;*(3)  STEPS 1 & 2 ARE REPEATED WITH A SWAPPED BACKGROUND PATTERN
;NOTE:  THIS TEST WRITES BYTES & READS WORDS
MOV     #FIRST,R1
MOV     R1,R4
MOV     #LAST+2,R5
MOV     #377,R0      ;GET THE PATTERN INTO R0
MOV     R0,R3
SWAB   R3
1$:    MOVB  RO,(R1)+  ;WRITE A BYTE
        MOVB  R3,(R1)+ ;WRITE THE MEMORY WITH THE BYTE STORED IN BAKPAT.1
        CMP   R1,R5    ;COMPARE TEST LOC TO TOP + 2
        BLO  1$       ;BRANCH IF LOWER
2$:    MOV   -(R1),R2
        CMP  R0,R2    ;TEST THE MEMORY TO SEE IF IT CONTAINS
                        ;THE WORD STORED IN BAKPAT
        BEQ  3$
        PERR2
3$:    CMP   R1,R4    ;KEEP ON TESTII , THE MEMORY UNTIL
        BHI  2$     ;R1 EQUALS THE LOWEST ADDRESS
        SWAB R3     ;CHANGE THE DATA PATTERN
        SWAB R0
        BEQ  1$     ;IF THE DATA PATTERN DOES NOT HAVE LOW
                        ;BYTE =0 THEN FALL THRU
RETURN

```

```

8256
8257
8258
8259
8260
8261
8262 026050 012701 060000
8263 026054 010104
8264 026056 012705 160000
8265 026062 012700 000377
8266 026066 010003
8267 026070 000303
8268 026072 110021
8269 026074 110321
8270 026076 020105
8271 026100 103774
8272
8273 026102 014102
8274 026104 020002
8275
8276 026106 001401
8277 026110 104446
8278
8279 026112 020104
8280 026114 101372
8281 026116 000303
8282 026120 000300
8283 026122 001763
8284
8285 026124 000207
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
8292
8293
8294
8295 026126 104424
8296 026130 005000
8297 026132 105037 002264
8298 026136 104513
8299 026140
      026140
8300 026140
      026140 105237 002264
8301 026144
      026144 012704 177777
8302 026150
      026150 005037 002324
8303 026154
      026154 123727 002264 000001
      026162 001003
8304 026164
      026164 012705 000001
8305 026170
      026170 000402
      026172
8306 026172
      026172 012705 177776
8307 026176
      026176
8308 026176
      026176
8309 026176 005237 002324
8310 026202
      026202 005204
8311 026204
      026204 116402 030276
8312 026210 072227 000005
8313 026214 052702 000004
8314 026220
      026220 010237 002150
8315 026224 104425
8316 026226
      026226 010011
8317 026230 104503
8318 026232 005711
8319 026234 104426
8320 026236 042737 177757 002150
8321 026244
      026244 023727 002150 000020
      026252 001407
8322 026254
      026254 012737 000020 002044
8323 026262
```

```
;
; THIS TEST CHECKS TO SEE IF THE SINGLE BIT ERRORS CAUSE THE SBE
; BIT IN THE CSR TO BE SET AND CORRECT SYNDROME BITS ARE GENERATED FOR
; ALL 16 DATA BITS.
;
CACHOFF ;TURN OFF CACHE
CLR RO ;CLEAR DATA
CLRB PASFLG ;CLEAR PASFLG
CBREG ;ENABLE CHECK/SYNDROME BIT REGISTER
REPEAT ;
;
; B32:::;
LET PASFLG :B- PASFLG + #1 ;INCREMENT LOOP COUNTER
; INCB PASFLG
LET R4 := #-1 ;INDEX TO SINGLE BIT ERROR TABLE
; MOV #-1,R4
LET BITNO := #0 ;CLEAR INNER LOOP COUNTER
; CLR BITNO
IFB PASFLG EQ #1 ;SELECT DATA TO BE CORRECTED BY PASSNO
; CMPB PASFLG,#1
; BNE L225
LET R5 := #1 ;DATA=;BIT TO BE CORRECTED IS A ONE
; MOV #1,R5
ELSE ;
; BR L226
; L225:::;
LET R5 := #177776 ;DATA=177776;BIT TO BE CORRECTED IS A ZERO
; MOV #177776,R5
END ;
; L226:::;
; B33:::;
REPEAT ;INCREMENT BIT POINTER
; POINT TO NEXT SET OF CHECK BITS
; INC R4
LET R2 :B= PTABLE(R4) ;GET NEXT SET OF CHECK BITS
; MOV B PTABLE(R4),R2
ASH #5,R2 ;SHIFT TO LINE UP IN CSR
BIS #BIT2,R2 ;ENABLE DIAG MODE
LET CSR := R2 ;GET CHECK BITS TO BE WRITTEN
; MOV R2,CSR
LOADCSR ;LOAD CSR WITH DATA
LET (R1) := R0 ;WRITE DATA TO TEST ADDRESS
; MOV R0,(R1)
CLR1CSR ;CLEAR CSR
TST (R1) ;CORRECT SBE
READCSR ;READ CSR FOR CORRECT SBE BIT AND SYNDROMES
BIC #C20,CSR ;CLEAR ALL BUT SBE INDICATOR
IF CSR NE #20 ;WAS DATA CORRECTED???
; CMP CSR,#20
; BEQ L227
LET GOOD := #20 ;
; MOV #20,GOOD
LET BAD := CSR ;
```

```

      026262 013737 002150 002052
8324 026270 104060
8325 026272
      026272
8326 026272 104514
8327 026274 104426
8328 026276 042737 174033 002150
8329 026304
      026304 116403 026422
8330 026310 072327 000005
8331 026314 052703 000004
8332 026320
      026320 020337 002150
      026324 001411
8333 026326
      026326 012737 177777 002612
8334 026334
      026334 010337 002044
8335 026340
      026340 013737 002150 002052
8336 026346 104042
8337 026350
      026350
8338 026350 005011
8339 026352
      026352 123727 002264 000001
      026360 001002
8340 026362 006305
8341 026364
      026364 000402
      026366
8342 026366 000261
8343 026370 006105
8344 026372
      026372
8345 026372
      026372 023727 002324 000020
      026400 001276
      026402
8346 026402 005100
8347 026404
      026404 123727 002264 000002
      026412 001252
      026414
8348 026414 104503
8349 026416 104423
8350 026420 000207
8351
8352
8353
8354 026422 016 013 023
      026425 025 026 031
      026430 032 034 043
      026433 045 046 051
      026436 052 054 061
      026441 064
8355

```

```

      MOV CSR,BAD
      ERROR +60 ;NO ERROR
      END ;
      SYNREG ;L227:;;;;;
      READCSR ;ENABLE SYNDROME BIT REGISTER
      BIC #1C3744,CSR ;GET SYNDROMES FROM CSR
      LET R3 :B= SBESYN(R4) ;MASK SYNDROME BITS
      ;GET GOOD SYNDROMES
      MOVB SBESYN(R4),R3
      ASH #5,R3 ;SHIFT INTO POSITION
      BIS #BIT2,R3 ;SET DIAG MODE IN DATA
      IF R3 NE CSR ;DO SYNDROME BITS AGREE
      CMP R3,CSR
      BEQ L230
      SET HEADER ;
      LET GOOD := R3 ;
      LET BAD := CSR ;
      MOV #1,HEADER
      MOV R3,GOOD
      MOV CSR,BAD
      ERROR +42 ;
      END ;
      CLR (R1) ;L230:;;;;;
      IFB PASFLG EQ #1 ;CLEAR LUT
      ;SHIFT NEW DATA DEPENDING ON PASFLG
      CMPB PASFLG,#1
      BNE L231
      ASL R5 ;SHIFT BITNO TO THE LEFT
      ELSE ;
      BR L232
      SEC ;L231:;;;;;
      ROL R5 ;SET CARRY BIT AND.....
      END ;ROTATE LEFT
      UNTIL BITNO EQ #16. ;L232:;;;;;
      ;UNTIL ALL BITS ARE DONE
      CMP BITNO,#16.
      BNE B33
      COM R0 ;E33:;;;;;
      UNTILB PASFLG EQ #2 ;COMPLEMENT DATA AND REPEAT
      ;UNTIL 2 PASSES ARE COMPLETE!
      CMPB PASFLG,#2
      BNE B32
      CLR1CSR ;E32:;;;;;
      CACHON ;CLEAR CSR
      RETURN ;TURN CACHE

```

```

;
; MSV11-P SINGLE BIT ERROR SYNDROME BIT TABLE
;
SBESYN: .BYTE 16,13,23,25,26,31,32,34,43,45,46,51,52,54,61,64

```

8357 026442

MTPA21: SUBTST <<MTPA21 MARCHING 1'S & 0'S PATTERN TEST>>
;*****
;*SUBTEST MTPA21 MARCHING 1'S & 0'S PATTERN TEST
;*****

8358
8359 026442 014100
8360 026444 020200
8361 026446 001401
8362 026450 104443

;READ,BYTESWAP-MODIFY,READ,DOWN
1\$: MOV -(R1),R0 ;V177640
CMP R2,R0 ;V177642
BEQ 2\$;V177644
PERR17 ;V177646

8363
8364 026452 000311
8365 026454 011100
8366 026456 020300
8367 026460 001401
8368 026462 104444

2\$: SWAB (R1) ;V177650
MOV (R1),R0 ;V177652
CMP R3,R0 ;V177654
BEQ 3\$;V177656
PERR20 ;V177660

8369
8370 026464 020401
8371 026466 001365
8372 026470 000207

3\$: CMP R4,R1 ;V177662 ;DONE?
BNE 1\$;V177664 ;NO - LOOP
RETURN ;V177666 ;YES - RETURN

8373
8374 026472
8375 026472 011100
8376 026474 020300
8377 026476 001401
8378 026500 104444

MTPB21: ;READ,BYTESWAP-MODIFY,READ,UP
1\$: MOV (R1),R0 ;V177640
CMP R3,R0 ;V177642
BEQ 2\$;V177644
PERR20 ;V177646

8379
8380 026502 000311
8381 026504 011100
8382 026506 020200
8383 026510 001401
8384 026512 104443

2\$: SWAB (R1) ;V177650
MOV (R1),R0 ;V177652
CMP R2,R0 ;V177654
BEQ 3\$;V177656
PERR17 ;V177660

8385
8386 026514 062701 000002
8387 026520 020501
8388 026522 001363
8389 026524 000207

3\$: ADD #2,R1 ;V177662
CMP R5,R1 ;V177666 ;DONE?
BNE 1\$;V177670 ;NO - LOOP
RETURN ;V177672 ;YES - RETURN

8390
8391 026526
8392 026526 011100
8393 026530 020200
8394 026532 001401
8395 026534 104443

MTPC21: ;READ,BYTESWAP-MODIFY,READ,UP
1\$: MOV (R1),R0 ;V177640
CMP R2,R0 ;V177642
BEQ 2\$;V177644
PERR17 ;V177646

8396
8397 026536 000311
8398 026540 011100
8399 026542 020300
8400 026544 001401
8401 026546 104444

2\$: SWAB (R1) ;V177650
MOV (R1),R0 ;V177652
CMP R3,R0 ;V177654
BEQ 3\$;V177656
PERR20 ;V177660

8402
8403 026550 062701 000002
8404 026554 020501
8405 026556 001363
8406 026560 000207

3\$: ADD #2,R1 ;V177662
CMP R5,R1 ;V177666 ;DONE?
BNE 1\$;V177670 ;NO - LOOP
RETURN ;V177672 ;YES - RETURN

```

8409 026562
8410 026562 014100
8411 026564 020300
8412 026566 001401
8413 026570 104444
8414
8415 026572 000311
8416 026574 011100
8417 026576 020200
8418 026600 001401
8419 026602 104443
8420
8421 026604 020401
8422 026606 001365
8423 026610 000207
8424

MTPD21: ;READ,BYTESWAP-MODIFY,READ,DOWN
1$: MOV -(R1),R0;V177640
CMP R3,R0 ;V177642
BEQ 2$ ;V177644
PERR20 ;V177646

2$: SWAB (R1) ;V177650
MOV (R1),R0 ;V177652
CMP R2,R0 ;V177654
BEQ 3$ ;V177656
PERR17 ;V177660

3$: CMP R4,R1 ;V177662 ;DONE?
BNE 1$ ;V177664 ;NO - LOOP
RETURN ;V177666 ;YES - RETURN

```

```

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              KDIAG=8.      ;HOW OFTEN A DIAGONAL STRIPE OCCURS (MUST BE A POWER OF 2)
8433 026612      000010      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      MOV ZEROS,R2
      026630      013702      002336      LET R3 := ONES      MOV ONES,R3
8436 026634      013703      002614      ELSE      MOV ONES,R3
8437 026640      000404      BR L236
      026642      L235:;;;;;
8438 026642      LET R2 := ONES      MOV ONES,R2
      026642      013702      002614      LET R3 := ZEROS      MOV ZEROS,R3
8439 026646      013703      002336      END ;OF IF EVEN
8440 026652      FOR STRIPES := #0 TO #KDIAG 1      ;FOR THE NUMBER OF STRIPES
      026652      005037      002366      L236:;;;;;
      026656      CLR STRIPES
      B35:;;;;;
8442
8443              ;WRITE LOOP
8444 026656      104423      CACHON      ;TURN CACHE ON
8445 026660      LET COUNT := STRIPES
8446 026660      013737      002366      002370      MOV STRIPES,COUNT
      026666      012701      060000      LET R1 := #FIRST      MOV #FIRST,R1
8447 026672      WHILE R1 LOS #LAST
      026672      020127      157776      B36:;;;;;
      026676      101032      CMP R1,#LAST
      8448 026700      IF COUNT LT #0 THEN LET COUNT := #KDIAG-1      BHI L237
      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          LET 2(R1) := R2
      026736 010261 000002
8453 026742          ELSE
      026742 000403
      026744
8454 026744          LET (R1) := R3
      026744 010311
8455 026746          LET 2(R1) := R3
      026746 010361 000002
8456 026752          END ;OF IF COUNT
      026752
8457 026752          LET COUNT := COUNT - #1
      026752 005337 002370
8458 026756          LET R1 := R1 + #4
      026756 062701 000004
8459 026762          END ;OF WHILE
      026762 000743
      026764
8460          ;END OF WRITE LOOP
8461
8462 026764          IF DIAGFLAG IS FALSE THEN $CALL REFRESH
      026764 005737 002004
      026770 001002
      026772 004737 027166
      026776
8463          ;READ LOOP
8464 026776          LET COUNT := STRIPES
      026776 013737 002366 002370
8465 027004          LET R1 := #FIRST
      027004 012701 060000
8466 027010          CACHOFF          ;TURN CACHE OFF
      104424

```

```

          MOV R2,2(R1)
          BR L243
L242:::
          MOV R3,(R1)
          MOV R3,2(R1)
L243:::
          DEC COUNT
          ADD #4,R1
          BR B36
L237:::
E36:::
          TST DIAGFLAG
          BNE L244
          JSR PC,REFRESH
L244:::
          MOV STRIPES,COUNT
          MOV #FIRST,R1

```

8468	027012			WHILE R1 LOS #LAST	
	027012				B37: :::::
	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	

```

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

```


8521 027266

```

MTPA24: SUBST <<MTPA24 FAST GALLOPING PATTERN TEST>>
;*****
;*SUBTEST MTPA24 FAST GALLOPING PATTERN TEST
;*****
;THE TOTAL TEST (INCLUDING SETUP) IS AS FOLLOWS
;*(1) THIS TEST WRITES THE MEMORY WITH A BACK GROUND PATTERN
;* STORED AT LOCATION BAKPAT
;*(2) TEST BEGINS AT LOWEST LOCATION BEING TESTED
;* (LETS NAME IT 'A')
;*(3) LETS NAME THE 1ST LOCATION IN THE ROW/COLUMN UNDER TEST AS 'B'.
;*(4) SWAPS BYTES FOR LOCATION 'A'.
;*(5) READS 'A', READS 'B'
;*(6) 'B' = 'B'+400 (ADDS 64 DOUBLE WORDS TO 'B')
;*(7) REPEATS STEPS 5 AND 6 UNTIL 'B' IS GREATER THAN THE
;*(8) END OF THE BANK A+2
;*(9) REPEATS STEPS 3-8 UNTILL 'A' REACHES THE END OF THE BANK
;*(10) AFTER EXECUTING THE TEST DATA IS COMPLEMENTED
;* AND STEPS 1-9 ARE REPEATED
;REGISTERS ARE USED AS FOLLOWS
;R0 TEST DATA
;R1 'A'
;R2 'B'
;R3 BAKPAT
;R4 SWAPAT
;R5 LAST

```

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8546

;NOTE THE PATTERN STARTS AT MTPB24!!!!!!!!!!!!!!!!!!!!

```

8547 027266 011100
8548 027270 020004
8549 027272 001401
8550 027274 104447
8551
8552 027276 011200
8553 027300 020003
8554 027302 001401
8555 027304 104450
8556
8557 027306 062702 000400
8558 027312 020205
8559 027314 101764
8560
8561 027316 062701 000002
8562 027322 000137 027326

```

```

;UIPAR'S
1$: MOV (R1),R0 ;V177640 ;READ 'A'
CMP R0,R4 ;V177642 ;CHECK 'A'
BEQ 2$ ;V177644 ;BR IF OK
PERR23 ;V177646 ;REPORT ERROR

2$: MOV (R2),R0 ;V177650 ;READ 'B'
CMP R0,R3 ;V177652 ;CHECK 'B'
BEQ 3$ ;V177654 ;BR IF OK
PERR24 ;V177656 ;REPORT ERROR

3$: ADD #400,R2 ;V177660 ;BUMP 'B'
CMP R2,R5 ;V177664 ;AT END YET?
BLOS 1$ ;V177666 ;BR IF NO

ADD #2,R1 ;V177670 ;BUMP 'A'
JMP @#MTPB24 ;V177674 ;GOTO V177260

```

8565 027326

MTPB24: SUBTST <<MTPB24 FAST GALLOP PART B>>
;*****
;*SUBTEST MTPB24 FAST GALLOP PART B
;*****

8566
8567 027326 010411
8568 027330 020105
8569 027332 001001
8570 027334 000207
8571 027336 000137 027342
8572
8573 027342

;SDPAR'S
MOV R4,(R1) ;V172260 ;WRITE 'A'
CMP R1,R5 ;V172262 ;DONE?
BNE 1\$;V172264 ;BR IF NO
RETURN ;V172266 ;YES RETURN
1\$: JMP @#MTPC24 ;V172270 ;GOTO V172360

MTPC24: SUBTST <<MTPC24 FAST GALLOP PART C>>
;*****
;*SUBTEST MTPC24 FAST GALLOP PART C
;*****

8574
8575 027342 010102
8576 027344 011100
8577 027346 020004
8578 027350 001401
8579 027352 104447
8580 027354 000137 027306
8581

;KDPAR'S
MOV R1,R2 ;V172360 ;RESET 'B' <- 'A'
MOV (R1),R0 ;V172362 ;READ 'A'
CMP R0,R4 ;V172364 ;CHECK 'A'
BEQ 1\$;V172366 ;BR IF OK
PERR23 ;V172370 ;REPORT ERROR
1\$: JMP @#MTPA24+20 ;V172372 ;GOTO V177660

3584 027360

```

MTPA26: SUBTST <<MTPA26      RANDOM DATA (WRITE)>>
;*****
;*SUBTEST      MTPA26  RANDOM DATA (WRITE)
;*****
1$:      JMP      @#MTPC26      ;V177640      GOTO V172360
        MOV      R2,(R1)+      ;V177644
        MOV      R3,(R1)+      ;V177646
        SOB      R0,1$         ;V177650
        RETURN                     ;V177652

```

8585 027360 000137 027430
8586 027364 010221
8587 027366 010321
8588 027370 077005
8589 027372 000207
8590
8591 027374

```

MTPB26: SUBTST <<MTPB26      RANDOM DATA (READ)>>
;*****
;*SUBTEST      MTPB26  RANDOM DATA (READ)
;*****
        .DSABL  AMA
        .ENABL  LSB
1$:      JMP      @#MTPC26      ;V177640      GOTO V172360
        CMP      R2,(R1)+      ;V177644
        BEQ      2$           ;V177646
        PERR25                     ;V177650
2$:      COM      (PC)+         ;V177652
RANODD: 0                          ;V177654      FOR ERROR REPORTING
        CMP      R3,(R1)+      ;V177656
        BEQ      3$           ;V177660
        PERR25                     ;V177662
3$:      COM      RANODD        ;V177664
        SOB      R0,1$         ;V177670
        RETURN                     ;V177672
        .DSABL  LSB
        .ENABL  AMA

```

8592
8593
8594 027374 000137 027430
8595 027400 020221
8596 027402 001401
8597 027404 104451
8598 027406 005127
8599 027410 000000
8600 027412 020321
8601 027414 001401
8602 027416 104451
8603 027420 005167 177764
8604 027424 077015
8605 027426 000207
8606
8607
8608
8609 027430

```

MTPC26: SUBTST <<RANDOM NUMBER SUBPROGRAM>>
;*****
;*SUBTEST      RANDOM NUMBER SUBPROGRAM
;*****
;CALLER MUST SETUP
;      MOV      SEEDLO,R3
;      MOV      SEEDHI,R2
;      MOV      R3,R5
;      MOV      R2,R4
ASHC    #7,R4      ;V172360
ADD     R3,R5      ;V172364
ADC     R4          ;V172366
ADD     R2,R4      ;V172370
ADD     #1057,R5   ;V172372
NOP     ;V172376      GOTO V172260

```

8610
8611
8612
8613
8614
8615 027430 073427 000007
8616 027434 060305
8617 027436 005504
8618 027440 060204
8619 027442 062705 001057
8620 027446 000240
8621
8622 027450

```

MTPD26: SUBTST <<RANDOM NUMBER SUBSUBPROGRAM>>
;*****
;*SUBTEST      RANDOM NUMBER SUBSUBPROGRAM
;*****
ADC     R4          ;V172260
ADD     #47401,R4  ;V172262
MOV     R5,R3      ;V172266
MOV     R4,R2      ;V172270
JMP     @#MTPA26+4 ;V172272      GOTO V177644

```

8623 027450 005504
8624 027452 062704 047401
8625 027456 010503
8626 027460 010402
8627 027462 000137 027364

8630 027466

```

MTP030: SUBTST <<MT0030      FLUSH OUT DBE'S>>
;*****
;*SUBTEST      MT0030  FLUSH OUT DBE'S
;*****
1$:  MOV      (R0),R2      ;V177640
     MOV      R2,(R0)+    ;V177642
     SOB      R1,1$      ;V177644
     RETURN                      ;V177646
    
```

8631 027466 011002
8632 027470 010220
8633 027472 077103
8634 027474 000207
8635
8636 027476

```

MTP031: SUBTST <<MTP031      SOB-A-LONG TEST>>
;*****
;*SUBTEST      MTP031  SOB-A-LONG TEST
;*****
     .DSABL  AMA
0      ;MOVE TERMINATOR
1$:  SOB      R0,1$      ;SOB TILL RO UNDERFLOWS
     COM      1$        ;WRITE COMPLEMENT OF SOB
     CMP      R1,1$     ;READ & CHECK FOR NOT "SOB RO, DOT"
     BEQ      2$        ;OK - SKIP
     PERR30
     MOV      R1,1$
2$:  COM      1$        ;CORRECT SOB INSTRUCTION
     MOV      R2,R0     ;REINITIALIZE SOB CONSTANT
     ;UPDATE MOVE REGISTERS
     MOV      R5,R3
     TST      (R5)+    ;BUMP (SAFELY) BY 2
     MOV      R5,R4
     CMP      R5,@LINK1 ;DONE?
     BNE      3$        ;NO - SKIP
     RETURN                      ;YES
3$:  MOV      -(R3),-(R4)
     BNE      3$
     BR       1$
SOBLENGTH=.-MTP031
     .ENABL  AMA
    
```

8637
8638 027476 000000
8639 027500 077001
8640 027502 005167 177772
8641 027506 020167 177766
8642 027512 001403
8643 027514 104454
8644 027516 010167 177756
8645 027522 005167 177752
8646 027526 010200
8647
8648 027530 010503
8649 027532 005725
8650 027534 010504
8651 027536 020537 002522
8652 027542 001001
8653 027544 000207
8654
8655 027546 014344
8656 027550 001376
8657 027552 000752
8658 000056
8659

8687 027554

MTP032: SUBST <<MTP032 WRITE RECOVERY TEST>>
;*****
;*SUBTEST MTP032 WRITE RECOVERY TEST
;*****

8688
8689
8690
8691
8692
8693 027554 012401
8694 027556 020102
8695 027560 001401
8696 027562 104430
8697 027564 077305
8698 027566 013703 002522
8699 027572 012400
8700 027574 020005
8701 027576 001401
8702 027600 104427
8703 027602 077305
8704 027604 000207

;THE TEST ACTUALLY EXECUTED ALREADY IN THE MEMORY UNDER TEST.
;THIS CODE INSURES THAT IT CHANGED MEMORY TO HAVE
;1/2 BANK OF #5141 WHICH IS A "COM -(R1)" INSTRUCTION AND
;1/2 BANK OF #110 WHICH IS A "JMP (R0)" INSTRUCTION.
1\$: MOV (R4)+,R1 ;V177640 ;GET DATA FROM LOWER 1/2 BANK
CMP R1,R2 ;V177642 ;IS IT #5141?
BEQ 2\$;V177644 ;YES - SKIP
PERR02 ;V177646 ;NO - TAKE ERROR TRAP
2\$: SOB R3,1\$;V177650 ;LOOP FOR 1/2 BANK
MOV @LINK1,R3 ;V177652 ;RESTORE LOOP SIZE
3\$: MOV (R4)+,R0 ;V177656 ;GET DATA FROM UPPER 1/2 BANK
CMP R0,R5 ;V177660 ;IS IT #110?
BEQ 4\$;V177662 ;YES - SKIP
PERR01 ;V177664 ;NO- TAKE ERROR TRAP
4\$: SOB R3,3\$;V177666 ;LOOP FOR 1/2 BANK
RETURN

8707 027606

```

MTP033: SUBTST <<MTP033          BRANCH COBBLE TEST>>
;*****
;*SUBTEST      MTP033  BRANCH GOBBLE TEST
;*****
      .DSABL  AMA
      0          ;MOVE TERMINATOR
BGTEST. 0          ;TEST WORD (TWO BYTES)
BRGOBB: SEC          ;SET CARRY (TO BE ADDED TO "BGTEST")
      ADCB      (R1) ;INCREMENT LOW BYTE OF "BGTEST"
      BMI       1$   ;BRANCH WHEN BIT7 IS SET
      INCB      (R2) ;INCREMENT HIGH BYTE OF "BGTEST"
      BR        BRGOBB ;LOOP 128 TIMES

      ;NOW CHECK FOR CORRECT CONDITION CODES
1$:   BVS       2$   ;BR IF V-BIT SET (SHOULD BE)
      PERR35      ;NO - REPORT ERROR AND ABORT TEST
      ;COND CODES NOT EQUAL TO 1010
2$:   CLV
      INCB      (R2) ;INCREMENT HIGH BYTE OF "BGTEST" ONCE MORE
      BCS       3$   ;BR IF C-BIT SET (SHOULD NOT BE)
      BVC       3$   ;BR IF V-BIT CLEAR (SHOULD NOT BE)
      BMI       4$   ;BR IF N-BIT SET (SHOULD BE)
3$:   PERR35      ;NO - REPORT ERROR AND ABORT TEST
      ;COND CODES NOT EQUAL TO 1010

      ;UPDATE TEST POINTERS
4$:   MOV       PC,R1
5$:   SUB       #5$-BGTEST,R1
      MOV       R1,R2
      INC       R2

      ;UPDATE MOVE REGISTERS
      MOV       R5,R3
      TST       (R5)+ ;BUMP (SAFELY) BY 2
      MOV       R5,R4

      ;DONE?
8741: CMP       R5,#LINK1 ;DONE?
      BNE       6$   ;NO - SKIP
      RETURN      ;YES - RETURN

      ;MOVE CODE 1 LOCATION
6$:   MOV       -(R3),-(R4)
      BNE       6$
      CLR       (R1) ;CLEAR TEST WORD "BGTEST"
      BR        BRGOBB ;RUN MOVED CODE AGAIN

GBLENGTH=.-MTP033
      .ENABL  AMA

```

```

8708
8709 027606 000000
8710 027610 000000
8711 027612 000261
8712 027614 105511
8713 027616 100402
8714 027620 105212
8715 027622 000773
8716
8717
8718 027624 102401
8719 027626 104461
8720
8721 027630 000242
8722 027632 105212
8723 027634 103402
8724 027636 102001
8725 027640 100401
8726 027642 104461
8727
8728
8729
8730 027644 010701
8731 027646 162701 000036
8732 027652 010102
8733 027654 005202
8734
8735
8736 027656 010503
8737 027660 005725
8738 027662 010504
8739
8740
8741 027664 020537 002522
8742 027670 001001
8743 027672 000207
8744
8745
8746 027674 014344
8747 027676 001376
8748 027700 005011
8749 027702 000743
8750 000076
8751

```

8753 027704

```

MTP034: SUBST <<MTP034          SOFT ERROR - BACKGROUND PATTERN TEST>>
;*****
;*SUBTEST      MTP034  SOFT ERROR - BACKGROUND PATTERN TEST
;*****
1$:      MOV      R2,(R0)+      ;V177640
         SOB      R1,MTP034     ;V177642
         RETURN   ;V177644
2$:      MOV      (R4)+,R1      ;V177646
         CMP      R1,R2         ;V177650
         BEQ      3$           ;V177652
         PERR02  ;V177654
         NOP      ;V177656
3$:      SOB      R3,2$         ;V177660
         RETURN   ;V177662

```

```

8754 027704 010220
8755 027706 077102
8756 027710 000207
8757 027712 012401
8758 027714 020102
8759 027716 001402
8760 027720 104430
8761 027722 000240
8762 027724 077306
8763 027726 000207

```

8765 027730

MTP035:SUBTST <<MTP035 WORST CASE NOISE PARITY TEST>>
;*****
;*SUBTEST MTP035 WORST CASE NOISE PARITY TEST
;*****

8766 027730 012737 000003 002076
8767

MOV #3,NOPAR ;SET PARITY TRAPS TO RETURN TO 'PARTHERE'

8768 027736 012700 060000
027742

FOR RO := #FIRST TO #LAST BY #4000

MOV #FIRST,RO

8769 027742 012737 000005 002150

MOV #BIT2!BIT0,CSR ;SET WRITE WRONG PARITY & PAR. TRAPS INTO CSR
B42:::; ;

8770 027750 104425

LOADCSR

8771 027752 012737 030006 002304

MOV #1\$,PARTHERE

8772 027760 011010

MOV (RO),(RO) ;WWP TEST LOCATION

8773 027762 005710

TST (RO)

8774 027764 010037 002034

MOV RO,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 (RO),(RO)

;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 (RO)

8788 030036 000405

BR 4\$

8789 030040 010037 002034

3\$: MOV RO,ADDRESS

8790 030044 104050

ERROR +50

8791 030046 004737 050446

CALL PERBNK

8792 030052

4\$: END; OF FOR

ADD #4000,RO

CMP RO,#LAST

BLE B42

030052 062700 004000

030056 020027 157776

030062 003727

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
;*****

; THIS TEST CHECKS TO SEE THAT EACH BIT OF A DATA WORD
; CAN BE CORRECTED INDIVIDUALLY FROM A ZERO TO A ONE AND
; VISA VERSA.
CACHOFF ;TURN OFF CACHE
CLRB PASFLG ;CLEAR PASFLG
CBREG ;ENABLE CHECK/SYNDROME BIT REGISTER
REPEAT ;
; B43:::;;
LET PASFLG :B= PASFLG + #1 ;INCREMENT LOOP COUNTER
; INCB PASFLG
LET R4 := #-1 ;INDEX TO SINGLE BIT ERROR TABLE
; MOV #-1,R4
LET BITNO := #0 ;CLEAR INNER LOOP COUNTER
; CLR BITNO
IFB PASFLG EQ #1 ;SELECT DATA TO BE CORRECTED BY PASSNO
; CMPB PASFLG,#1
; BNE L257
LET R5 := #1 ;DATA=0;BIT TO BE CORRECTED IS A ONE
; MOV #1,R5
ELSE ;
; BR L260
; L257:::;;
LET R5 := #177776 ;DATA=177776;BIT TO BE CORRECTED IS A ZERO
; MOV #177776,R5
ENC ;
; L260:::;;
REPEAT ;
; B44:::;;
INC BITNO ;INCREMENT BIT POINTER
LET R4 := R4 + #1 ;POINT TO NEXT SET OF CHECK BITS
; INC R4
LET R2 :B= PTABLE(R4) ;GET NEXT SET OF CHECK BITS
; MOVB PTABLE(R4),R2
ASH #5,R2 ;SHIFT TO LINE UP IN CSR
BIS #BIT2,R2 ;ENABLE DIAG MODE
LET CSR := R2 ;GET CHECK BITS TO BE WRITTEN
; MOV R2,CSR
LOADCSR ;LOAD CSR WITH DATA
LET (R1) := R0 ;WRITE DATA TO TEST ADDRESS
; MOV R0,(R1)
TST (R1) ;CORRECT 3BE
IF (R1) NE R5 ;WAS DATA CORRECTED???
; CMP (R1),R5
; BEQ L261
LET ADDRESS := #60000 ;MOV ERROR INFORMATION IN
; MOV #60000,ADDRESS
LET CHECK := R2 ;
; MOV R2,CHECK
LET TSTDAT := R5 ;
; MOV R5,TSTDAT
LET TSTDAT+2 := (R1) ;

8798
8799
8800
8801
8802 030072 104424
8803 030074 105037 002264
8804 030100 104513
8805 030102
8806 030102 105237 002264
8807 030106 012704 177777
8808 030112 005037 002324
8809 030116 123727 002264 000001
8810 030126 012705 000001
8811 030132 000402
8812 030134 012705 177776
8813 030140
8814 030140
8815
8816 030140 005237 002324
8817 030144 005204
8818 030146 116402 030276
8819 030152 072227 000005
8820 030156 052702 000004
8821 030162 010237 002150
8822 030166 104425
8823 030170 010011
8824 030172 005711
8825 030174 021105
8826 030200 001412
8827 030200 012737 060000 002034
8828 030206 010237 002314
8829 030212 010537 002246
8829 030216

```

      030216 011137 002250
8830 030222 104052          ERROR +52          ;NO ERROR          MOV (R1),TSTDAT.2
8831 030224          END                      ;
      030224          CLR (R1)                ;CLEAR LUT          L261:;;;;;;
8832 030224 005011          IFB PASFLG EQ #1      ;SHIFT NEW DATA DEPENDING ON PASFLG
8833 030226          123727 002264 000001      ;SHIFT NEW DATA DEPENDING ON PASFLG
      030226          001002          CMPB PASFLG,#1
      030234          006305          BNE L262
8834 030236          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          UNTIL BITNO EQ #16.      ;UNTIL ALL BITS ARE DONE
8839 030246          023727 002324 000020      ;UNTIL ALL BITS ARE DONE
      030246          001331          CMP BITNO,#16.
      030254          005100          BNE B44
8840 030256          COM R0                    ;COMPLEMENT DATA AND REPEAT
8841 030260          UNTILB PASFLG EQ #2      ;UNTIL 2 PASSES ARE COMPLETE!
      030260          123727 002264 000002      ;UNTIL 2 PASSES ARE COMPLETE!
      030266          001305          CMPB PASFLG,#2
      030270          104503          BNE B43
8842 030270          CLR1CSR                  ;CLEAR CSR          E43:;;;;;;
8843 030272          CACHON                   ;TURN CACHE
8844 030274          000207          RETURN
8845
8846          ;
8847          ;
8848 030276          002          007          037          ;MSV11-P SINGLE BIT ERROR CHECK BIT TABLE
      030301          031          032          025
      030304          026          020          057
      030307          051          052          045
      030312          046          040          075
      030315          070

```

```

:
:
:PTABLE: .BYTE 2,7,37,31,32,25,26,20,57,51,52,45,46,40,75,70

```

8850 030316

MTP037: SUBTST <<MTP037 CHECK ECC DISABLE TEST>>
:*****
:*SUBTEST MTP037 CHECK ECC DISABLE TEST
:*****

8851
8852
8853
8854
8855 030316 104424
8856 030320 005037 002044
8857 030324 005037 002314
8858 030330 104475
8859 030332 012737 000100 002314
8860 030340 104475
8861 030342 005011
8862 030344 005711
030346 001406
8863 030350 011137 002052
8864 030354 012737 060000 002034
8865 030362 104037
8866 030364
030364
8867 030364 104423
8868 030366 000207

: THIS TEST CHECKS THAT ECC CAN BE DISABLED AND THAT
: NO CORRECTION TAKES PLACE WITH ECC DISABLED.
: CACHOFF ;TURN OFF CACHE
LET GOOD := #0 ;GOOD DATA FOR ERROR PRINT OUT CLR GOOD
LET CHECK := #0 ;CLEAR CHECK BIT FIELD CLR CHECK
CB1CSR ;ENABLE SYNDROME/CHECK BIT REGISTER
LET CHECK := #100 ;SBE CHECK BITS MOV #100,CHECK
CB1CSR ;WRITE CHECK BITS TO CB REGISTER
LET (R1) := #0 ;WRITE CHECK BITS TO MEMORY CLR (R1)
IF (R1) NE #0 ;WAS CORRECTION MADE???? TST (R1)
BEQ L266
LET BAD := (R1) ;YES IT WAS.....ERROR MOV (R1),BAD
LET ADDRESS := #60000 ; MOV #60000,ADDRESS
ERROR +37 ;
END ;
CACHON ;TURN ON CACHE L266:::~::~
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
8874
8875

; THIS TEST CHECKS TO SEE IF THE CORRECT ADDRESS APPEARS
; IN CSR BITS 5-11 ON A DOUBLE ERROR.

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 #1C7740,R4

;CLEAR OFF EXTRANEIOUS BITS

8879 030404 012700 177740

LET R0 := #-40

;INIT CSR ADDRESS TO 0 - 1K (BIT 5 = 1K ADD.)

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

B45:::~::~

8885 030432 105237 002264

INCB PASFLG

;INC LOOP COUNTER

8886 030436 062700 000040

LET R0 := R0 + #40

;INC CSR ADDRESS TO BE EXPECTED

ADD #40,R0

8887 030442 062701 004000

LET R1 := R1 + #4000

ADD #4000,R1

8888 030446 012737 001340 002314

LET CHECK := #1340

;DOUBLE ERROR CHECK BITS

MOV #1340,CHECK

8889 030454 104475

CB1CSR

;WRITE DOUBLE ERROR CHECK BITS

8890 030456 005011

LET (R1) := #0

;WRITE DATA AND D.E. CHK BITS AT A=0

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 013705 002150

LET R5 := CSR

MOV CSR,R5

8895 030472 042705 170037

BIC #1C7740,R5

;

8896 030476 010002

LET R2 := R0

;GET CORRECT ADDRESS

MOV R0,R2

8897 030500 060402

ADD R4,R2

;ADD STARTING BANK TO DOUBLE BIT ADDRESS

8898 030502 000240

NOP

;DEBUG AIDE

8899 030504 020205

IF R2 NE R5

;DO ADDRESSES AGREE?

CMP R2,R5

8900 030510 010237 002052

LET BAD := R2

;

BEQ L267

8901 030514 010537 002044

LET GOOD := R5

;

MOV R2,BAD

8902 030520 104455

PERR31

;NO ERROR

MOV R5,GOOD

8903 030522

END

;

L267:::~::~

8904 030522 005011

LET (R1) := #0

;

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
030534 001336
030536
8907 030536 104503
8908 030540 000207
8909

CLR1CSR
RETURN ;
;

CMPB PASFLG,PASCNT
BNE B45
E45:::::

```

8912 030542 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.
;
8913
8914
8915
8916
8917
8918 030542 104424 CACHOFF ;TURN OFF CACHE MEMORY
8919 030544 013704 002102 LET R4 := BANK ;GET BANK NUMBER TO FIGURE OUT EXTENDED ADDRESS
; MOV BANK,R4
8920 030550 023727 002102 000177 IF BANK EQ #177
; CMP BANK,#177
; BNE L271
8921 030560 012737 000001 002570 LET PASCNT := #1 ;DO ONCE IN LAST BANK
; MOV #1,PASCNT
8922 030566 000403 ELSE
; BR L272
; L271:::
8923 030570 012737 000002 002570 LET PASCNT := #2
; MOV #2,PASCNT
8924 030576 END
; L272:::
8925 030576 042704 177607 BIC #+C170,R4 ;CLEAR OFF LOWER BITS
8926 030602 072427 000002 ASH #2,R4 ;SHIFT TO LINE UP WITH CSR
8927 030606 052704 040000 BIS #BIT14,R4 ;SET EXTENDED ADDRESS BIT
8928 030612 062737 000400 172352 ADD #400,KIPAR5 ;SET UP PAR TO POINT TO TOP OF A BANK
8929 030620 105037 002264 LET PASFLG := #0 ;INIT LOOP COUNTER
; CLR8 PASFLG
8930 030624 013705 002102 LET R5 := BANK ;R5 GETS THE BANK NUMBER
; MOV BANK,R5
8931 030630 042705 177770 BIC #+C7,R5 ;CLEAR ALL BUT THE LOWER BITS
8932 030634 072527 000011 ASH #9.,R5 ;ROTATE INTO POSTION
8933 030640 052705 000020 BIS #BIT4,R5 ;SET UP SBE INDICATOR ;;DATA TO BE EXPECTED
8934 030644 104513 CBREG ;ENABLE CHECK/SYNDROME BIT REGISTER
8935 030646 REPEAT
; B46:::
8936 030646 105237 002264 INCB PASFLG ;INCR LOOP COUNTER
8937 030652 012737 000104 002150 LET CSR := #104 ;WRITE CHECK BITS TO CSR WITH DIAG MODE
; MOV #104,CSR
8938 030660 104425 LOADCSR ;LOAD CSR WITH DATA
8939 030662 005011 LET (R1) := #0 ;WRT ZEROS AT A=0 AND SINGLE ERROR BITS
; CLR (R1)
8940 030664 104503 CLR1CSR ;CLEAR CSR
8941 030666 005711 TST (R1) ;READ A=0;DATA BIT 0 SHOULD BE CORRECTED TO A 1
8942 030670 104426 READCSR ;READ CSR FOR DATA
8943 030672 042737 020000 002150 BIC #BIT13,CSR ;CLEAR POSSIBLE INHIBIT MODE IN DATA "CSR"
8944 030700 023705 002150 IF CSR NE R5 THEN ;HAS SINGLE ERROR BITS SET IN CSR?
; CMP CSR,R5
; BEQ L273
8945 030706 013737 002150 002052 LET BAD := CSR ;
; MOV CSR,BAD
8946 030714 010537 002044 LET GOOD := R5 ;
; MOV R5,GOOD
8947 030720 104023 ERROR +23 ;
8948 030722 END ;
  
```

```

      030722
8949 030722      012737 040000 002150      LET CSR := #40000 ;WRITE EQB BIT TO CSR      L273:;;;;;
      030722      104425      MOV #40000,CSR
8950 030730      104426      LOADCSR ;
8951 030732      042737 020000 002150      READCSR ;READ FOR CORRECT EXTENDED Q-BUS ADDRESS
8952 030734      023704 002150      BIC #BIT13,CSR ;CLEAR INHIBIT MODE POINTER IN DATA
8953 030742      001411      IF CSR NE R4 THEN ;READ EQB ADDRESS
      030742      013737 002150 002052      CMP CSR,R4
      030746      010437 002044      BEQ L274
8954 030750      012737 177777 002612      LET BAD : CSR ;
      030750      104023      MOV CSR,BAD
8955 030756      012737 177777 002612      LET GOOD :- R4 ;
      030762      012737 177777 002612      SET HEADER ;
      030762      104023      MOV R4,GOOD
8956 030762      012737 177777 002612      ERROR +23 ;
8957 030770      104023      END ;
8958 030772
      030772      005011      LET (R1) := #0 ;CLEAR LUT      L274:;;;;;
8959 030772      012701 137776      CLR (R1)
8960 030774      062705 000740      LET R1 := #137776 ;SET UP NEW ADDRESS      MOV #137776,R1
      030774      052704 001000      ADD #740,R5 ;ADD TO GET NEW ADDRESS
8961 031000      104513      BIS #BIT9,R4 ;SET BIT 9 SINCE WE ARE ASSERTING A1 ON PASS2
8962 031004      123737 002264 002570      CBREG ;ENABLE CHECK/SYNDROME BIT REGISTER
8963 031010      001312      UNTILB PASFLG EQ PASCNT ;LOOP 2 TIMES
8964 031012      104503      CMPB PASFLG,PASCNT
      031012      000207      BNE B46
      031022
8965 031022      104503      CLR1CSR ;CLEAR CSR      E46:;;;;;
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
8972
8973
8974
8975 031030 104424
8976 031032 104513
8977 031034 105037 002264
8978 031040
031040 010102
031042 005202
8979 031044
031044 012704 000001
8980 031050
031050
8981 031050 105237 002264
8982 031054
031054 012737 000604 002150
8983 031062 104425
8984 031064
031064 010411
8985 031066 104503
8986 031070
031070 112712 000377
8987 031074 104426
8988 031076 042737 177757 002150
8989 031104
031104 023727 002150 000020
031112 001407
8990 031114
031114 012737 000020 002044
8991 031122
031122 013737 002150 002052
8992 031130 104060
8993 031132
031132
8994 031132 104513
8995 031134 005711
8996 031136 104426
8997 031140 042737 174037 002150
8998 031146
031146 023727 002150 000300
031154 001412
8999 031156
031156 012737 177777 002612
9000 031164
031164 012737 000300 002044
9001 031172
031172 013737 002150 002052
9002 031200 104061
9003 031202
031202
9004 031202 005302

;
; THIS TEST CHECKS TO SEE IF A SINGLE BIT ERROR WILL BE CORRECTED DURING
; THE READ PORTION OF A WRITE BYTE AND THAT THE CORRECT CHECK BITS WILL
; BE GENERATED ON A WRITE.
;
CACHOFF ;TURN OFF CACHE
CBREG ;ENABLE CHECK/SYNDROME BIT REGISTER
CLRB PASFLG ;CLEAR LOOP COUNTER
LET R2 := R1 + #1 ;R2 POINTS TO HIGH BYTE
;
MOV R1,R2
INC R2
;
LET R4 := #1 ;INITIAL DATA = 1
MOV #1,R4
;
REPEAT ;
; B47:::;;
INCB PASFLG ;INCREMENT LOOP COUNTER
LET CSR := #604 ;WRITE CHECK BITS CORRESPONDING TO DATA OF 0
MOV #604,CSR
LOADCSR ;WRITE CSR
LET (R1) := R4 ;WRITE DATA OF 1 CREATING A SINGLE BIT ERROR
MOV R4,(R1)
CLR1CSR ;WRITE CSR TO NORMAL MODE
LET (R2) :B= #377 ;WRITE BYTE OF WORD
MOVB #377,(R2)
READCSR ;READ CSR
BIC #+C20,CSR ;SEE IF SBE INDICATOR IS SET
IF CSR NE #20 ;IS SBE SET????
CMP CSR,#20
BEQ L276
LET GOOD := #20 ;
MOV #20,GOOD
LET BAD := CSR ;
MOV CSR,BAD
ERROR +60 ;
END ;
; L276:::;;
CBREG ;WRITE CSR TO DIAG MODE
TST (R1) ;READ SAO FOR CORRECT CHECK BITS
READCSR ;READ CSR
BIC #+C3740,CSR ;MASK OUT CHECK BIT FIELD
IF CSR NE #300 ;WERE CORRECT CHECK BITS GENERATED????
CMP CSR,#300
BEQ L277
SET HEADER ;
MOV #-1,HEADER
LET GOOD := #300 ;
MOV #300,GOOD
LET BAD := CSR ;
MOV CSR,BAD
ERROR +61 ;
END ;
; L277:::;;
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			CMPB PASFLG,#2
	031216	001314				BNE B47
	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
;*****
; THIS TEST CHECKS THE ABILITY TO READ AND WRITE CHECKBITS INTO MEMORY
; BY SHIFTING A ONE BIT THROUGH A FIELD OF ZEROS. THE CSR IS READ FOR THE
; CORRECT PATTERNS. THE TEST IS THEN REPEATED ON A ZERO BIT THROUGH A
; FIELD OF ALL ONES.
;
; REPEAT ;ILC;;REV B
;*****
9011
9012
9013
9014
9015
9016
9017 031224 REPEAT ;ILC;;REV B
031224 ;TURN OFF CACHE B50:::;;
9018 031224 104424 CACHOFF ;TURN OFF CACHE
9019 031226 105037 002264 LET PASFLG :B= #0 ;INIT PASFLG
031226 105037 002264 ;CHECK BIT MASK FOR CSR CLR8 PASFLG
9020 031232 LET R5 := #174037 ;CHECK BIT MASK FOR CSR MOV #174037,R5
031232 012705 174037 ;ENABLE CHECK/SYNDROME BIT REGISTER
9021 031236 104475 CB1CSR ;SET UP INITIAL CSR DATA
9022 031240 LET R2 := #46 ;SET UP INITIAL CSR DATA MOV #46,R2
031240 012702 000046 REPEAT
9023 031244 REPEAT
031244 ;*****
9024 031244 105237 002264 LET PASFLG :B= PASFLG + #1 ;INC LOOP COUNTER B51:::;;
031244 105237 002264 ;CHK BITS = 1 INCB PASFLG
9025
9026 ;DISABLE ECC;DIAG CHK SET
9027 031250 LET PASSNO := #0 ;INIT PASSNO(INNER LOOP COUNTER) CLR PASSNO
031250 005037 002266 REPEAT
9028 031254 REPEAT
031254 ;*****
9029 031254 LET PASSNO := PASSNO + #1 ;INC LOOP COUNTER B52:::;;
031254 005237 002266 LET R4 := R2 ;COPY R2 TO R4 INC PASSNO
9030 031260 LET CSR := R2 ;GET CSR DATA TO BE WRITTEN MOV R2,R4
031260 010204 LET CSR := R2 ;WRITE SBE CHECK BITS TO CSR MOV R2,CSR
9031 031262 010237 002150 LOADCSR ;WRITE DATA AND CHECK BITS AT A=0 CLR (R1)
031262 010237 002150 LET (R1) := #0
9032 031266 104425 COM R5 ;COMPLEMENT MASK
9033 031270 005011 MOV R5,-(SP) ;SAVE R5 ON STACK
031270 005011 BIC R4,(SP) ;CREATE AN XOR FUNCTION
9034 031272 005105 BIC R5,R4
9035 031274 010546 BIS (SP)+,R4
9036 031276 040416 LET CSR := R4
9037 031300 040504
9038 031302 052604
9039 031304 010437 002150 LOADCSR ;LOAD CSR WITH COMPLEMENT CHECK BITS MOV R4,CSR
031304 010437 002150 READCSR ;READ CSR FOR COMPLEMENT CHECK BITS
9040 031310 104425 LET R3 := CSR ;COPY CSR DATA TO R3
031310 104425
9041 031312 104426 BIC #BIT13,R3 ;CLEAR ANY POSSIBLE INHIBIT MODE POINTER
9042 031314 013703 002150 IF R3 NE R4 THEN ;READ CSR FOR PROPER CHECK BITS
031314 013703 002150 MOV CSR,R3
9043 031320 042703 020000 BIC #BIT13,R3
031320 042703 020000 IF R3 NE R4 THEN ;READ CSR FOR PROPER CHECK BITS
9044 031324 020304 CMP R3,R4
031324 020304 BEQ L301
031326 001412
9045 031330 LET ADDRESS := R1 ;
031330 010137 002034 MOV R1,ADDRESS
9046 031334 LET GOOD := R4 ;

```

```

9047 031334 010437 002044          LET BAD := R3          ;          MOV R4,GOOD
9048 031340 010337 002052          SET HEADER            ;          MOV R3,BAD
9049 031344 012737 177777 002612  PERR37                ;          MOV #-1,HEADER
9050 031352 104463                PERR37                ;          ;:ILC::REVB
9051 031354 005105                END                    ;          L301:::::
9052 031354 005105                COM R5                ;          ;COMPLEMENT MASK
9053 031356 005711                TST (R1)              ;          ;READ CHECK BITS AT A=0 INTO CSR
9054 031360 000240                NOP                    ;          ;
9055 031362 104426                READCSR               ;          ;READ CSR FOR CORRECT CHECK BITS
9056 031364 040537 002150                BIC R5,CSR           ;          ;MASK OUT CHECK BIT FIELD
9057 031370 010204                LET R4 := R2          ;          ;GET CHECK BITS THAT WERE WRITTEN
9058 031372 040504                BIC R5,R4            ;          ;          MOV R2,R4
9059 031374 020437 002150                IF R4 NE CSR         ;          ;MASK OUT CHECK BIT FIELD
9060 031400 001413                LET GOOD := R4       ;          ;          BEQ L302
9061 031402 010437 002044          LET BAD := CSR       ;          ;          MOV R4,GOOD
9062 031406 013737 002150 002052    LET ADDRESS := R1     ;          ;          MOV CSR,BAD
9063 031414 010137 002034          SET HEADER            ;          ;          MOV R1,ADDRESS
9064 031420 012737 177777 002612  PERR40                ;          ;          MOV #-1,HEADER
9065 031426 104464                PERR40                ;          ;          ;:ILC::REVB
9066 031430 040502                END                    ;          ;          L302:::::
9067 031430 040502                BIC R5,R2            ;          ;SHIFT CHECK BITS AND CREATE NEW DATA FOR CSR
9068 031432 123727 002264 000001    IFB PASFLG EQ #1     ;          ;SELECT FUNCTION
9069 031440 001002                ASL R2                ;          ;          CMPB PASFLG,#1
9070 031442 006302                ELSE                  ;          ;          BNE L303
9071 031444 000413                COM R5                ;          ;DO A FIELD OF ZEROS---->ONES
9072 031446 005105                MOV R5,-(SP)         ;          ;SHIFT CHECK BITS
9073 031450 010546                BIC R2,(SP)          ;          ;DO A FIELD OF ONES ---->ZEROS
9074 031452 040216                BIC R5,R2            ;          ;          BR L304
9075 031454 040502                BIS (SP)+,R2        ;          ;          L303:::::
9076 031456 052602                ASL R2                ;          ;          ;TAKE OUT CHECK BIT FIELD
9077 031460 006302                MOV R5,-(SP)         ;          ;          ;
9078 031462 010546                BIC R2,(SP)          ;          ;          ;
9079 031464 040216                BIC R5,R2            ;          ;          ;
9080 031466 040502                BIS (SP)+,R2        ;          ;          ;
9081 031470 052602                COM R5                ;          ;          ;COMPLEMENT DATA PATTERN
9082 031472 005105                END                    ;          ;          ;
9083 031474 062702 000006          LET R2 := R2 + #6    ;          ;          L304:::::
9084 031474 001262 002266 000006    UNTILB PASSNO EQ #6 ;          ;          ;ADD 6 SO THAT WRITE ON CSR WILL ENABLE DIAG MODE
9085 031500 123727 002266 000006    UNTILB PASSNO EQ #6 ;          ;          ADD #6,R2
9086 031506 001262                UNTILB PASSNO EQ #6 ;          ;          CMPB PASSNO,#6
9087 031506 001262                UNTILB PASSNO EQ #6 ;          ;          BNE B52

```

```

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
9089 031534          UNTIL R1 EQ ENDADD        ;
      031534 020137 002562            CMP R1,ENDADD
      031540 001231                                BNE B50
      031542          E50:::
9090 031542 104423    CACHON
9091 031544 000207    RETURN

```



9093 031546

MTP045: SUBST <<MTP045 SYNDROMES TO CSR ON DOUBLE BIT ERROR TEST>>
;*****
;*SUBTEST MTP045 SYNDROMES TO CSR ON DOUBLE BIT ERROR TEST
;*****

```

9094
9095
9096
9097
9098
9099 031546 104424
9100 031550 104513
9101 031552
9102 031552 005037 002266
9103 031556 012737 003744 002044
9104 031564 012737 003144 002150
9105 031572
9106 031572 005237 002266
9107 031576 104425
9108 031600 005011
9109 031602 104503
9110 031604 005711
9111 031606 104426
9112 031610
9113 031610 032737 100000 002150
9114 031616 001007
9115 031620
9116 031620 012737 177777 002612
9117 031626
9118 031626 013737 002150 002052
9119 031634 104063
9120 031636
9121 031636 104514
9122 031640 104426
9123 031642 000240
9124 031644 042737 174033 002150
9125 031652
9126 031652 023737 002150 002044
9127 031660 001407
9128 031662
9129 031662 013737 002150 002052
9130 031670
9131 031670 012737 177777 002612
9132 031676 104042
9133 031700
9134 031700
9135 031700
9136 031700 005011
9137 031702
9138 031702 012737 003604 002044
9139 031710
9140 031710 012737 003004 002150
9141 031716
9142 031716 023727 002266 000002

```

```

;
; THIS TEST CHECKS TO SEE IF THE DOUBLE BIT ERROR INDICATOR IS SET
; ON A DOUBLE BIT ERROR AND THE CORRECT SYNDROMES ARE LATCHED INTO THE
; CSR. THIS TEST IS THEN REPEATED WITH MULTIPLE ERROR CHECK/SYNDROME BITS
;
;CACHOFF ;TURN OFF CACHE
;CBREG ;ENABLE CHECK/SYNDROME BIT REGISTER
LET PASSNO := #0 ;CLEAR LOOP COUNTER CLR PASSNO
LET GOOD := #3744 ;GOOD DATA MOV #3744,GOOD
LET CSR := #3144 ;DBE CHECK BITS FOR CSR MOV #3144,CSR
REPEAT ;
; B53:;;;;;
INC PASSNO ;
LOADCSR ;WRITE DBE CHECK BITS TO CSR
LET (R1) := #0 ;WRITE ZEROS AND DBL ERROR CHK BITS A=0 CLR (R1)
CLR1CSR ;CLEAR CSR OUT
TST (R1) ;READ A=0 TO GET DOUBLE BIT ERROR
READCSR ;WAS UNCORRECTABLE ERROR BIT SET???
IF #BIT15 OFF.IN CSR ;
; BIT #BIT15,CSR
; BNE L310
SET HEADER ;
MOV #-1,HEADER
LET BAD := CSR ;
MOV CSR,BAD
ERROR +63 ;BIT NOT SET
END ;
; L310:;;;;;
SYNREG ;ENABLE SYNDROME BIT REGISTER
READCSR ;READ CSR FOR CORRECT SYNDROME BITS
NOP ;DEBUG AIDE
BIC #+C3744,CSR ;MASK SYNDROMES OUT
IF CSR NE GOOD THEN ;CHECK IF DOUBLE ERROR BIT IS SET
CMP CSR,GOOD
BEQ L311
LET BAD := CSR ;BAD DATA
MOV CSR,BAD
SET HEADER ;
MOV #-1,HEADER
ERROR +42 ;
END ;
; L311:;;;;;
CLR (R1) ;CLEAR LUT
LET GOOD := #3604 ;REPEAT WITH MULTIPLE ERROR SYNDROMES MOV #3604,GOOD
LET CSR := #3004 ;MULTIPLE ERROR CHECK BITS MOV #3004,CSR
UNTIL PASSNO EQ #2 ;
CMP PASSNO,#2

```

031724 001322
031726
9129 031726 104503
9130 031730 104423
9131 031732 000207

CLR1CSR
CACHON
RETURN

BNE B53
E53:::::

```

9133 031734 MTP046: SUBTST <<MTP046 CHECK SINGLE BIT ERRORS WITH ECC DISABLED>>
;*****
;*SUBTEST MTP046 CHECK SINGLE BIT ERRORS WITH ECC DISABLED
;*****
;
; THIS TEST CHECKS TO SEE THAT FOR EACH BIT OF A DATA WORD THAT A SBE
; IS TREATED LIKE A UNCORRECTABLE ERROR WITH ECC DISABLED AND TRAPS
; ARE DETECTED.
;
9134
9135
9136
9137
9138
9139 031734 005037 002266 CLR PASSNO ;CLEAR OUTER LOOP COUNTER
9140 031740 104424 CACHOFF ;TURN OFF CACHE
9141 031742 REPEAT ;
; B54:::::
9142 031742 LET PASSNO := PASSNO + #1 ; INC PASSNO
; 031742 005237 002266
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 ;
; 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
9154 032016 LET R5 := #177776 ;DATA=177776;BIT TO BE CORRECTED IS A ZERO
; 032016 012705 177776 MOV #177776,R5
9155 032022 END ;
; L313:::::
9156 032022 REPEAT ;
; L314:::::
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 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

```



```

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

```

```

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
9212
9213
9214

: THIS TEST CHECKS TO SEE THAT THE CSR CONTENTS WILL NOT CHANGE
: WITH A SINGLE BIT ERROR WHEN A DOUBLE BIT ERROR ALREADY
: EXISTS.

9215 032274 104424
9216 032276 013704 002102
9217 032302 072427 000011
9218 032306 042704 170037
9219 032312 052704 100000
9220 032316 104513
9221 032320 012737 003144 002150
9222 032326 104425
9223 032330 005011
9224 032332 012737 000104 002150
9225 032340 104425
9226 032342 005012
9227 032344 104503
9228 032346 005711
9229 032350 104426
9230 032352 042737 020000 002150
9231 032360 023704 002150
9232 032366 013737 002150 002052
9233 032374 010437 002044
9234 032400 012737 177777 002612
9235 032406 104063
9236 032410 052704 000020
9237 032410 005712
9238 032414 104426
9239 032416 042737 020000 002150
9240 032420 023704 002150
9241 032426 001411
9242 032434 013737 002150 002052
9243 032442 010437 002044
9244 032446 012737 177777 002612
9245 032454 104051
9246 032456

: CACHOFF ;TURN OFF CACHE
LET R4 := BANK ;GET BANK NUMBER
MOV BANK,R4
ASH #9,R4 ;SHIFT INTO PLACE
BIC #+C7740,R4 ;MASK OUT UNWANTED BITS
BIS #BIT15,R4 ;SET UP GOOD DATA
CBREG ;ENABLE CHECK/SYNDROME BIT REGISTER
LET CSR := #3144 ;CHECK BITS FOR DOUBLE BIT ERROR
MOV #3144,CSR
LOADCSR ;
LET (R1) := #0 ;WRITE DBE CHECK BITS
CLR (R1)
LET CSR := #104 ;WRITE SBE CHECK BITS
MOV #104,CSR
LOADCSR ;
LET (R2) := #0 ;WRITE SBE CHECK BITS AT ADDRESS + 4K
CLR (R2)
CLR1CSR ;CLEAR CSR
TST (R1) ;READ DBE LOCATION
READCSR ;READ FOR CSR DBE INDICATOR
BIC #BIT13,CSR ;CLEAR INHIBIT MODE POINTER
IF CSR NE R4 ;
CMP CSR,R4
BEQ L331
LET BAD := CSR ;
MOV CSR,BAD
LET GOOD := R4 ;
MOV R4,GOOD
SET HEADER ;
MOV #-1,HEADER
ERROR +63 ;
END ;
BIS #20,R4 ;SET BIT IN GOOD DATA L331:::;;
TST (R2) ;READ SBE
READCSR ;READ CSR FOR NO CHANGE
BIC #BIT13,CSR ;CLEAR INHIBIT MODE POINTER
IF CSR NE R4 ;
CMP CSR,R4
BEQ L332
LET BAD := CSR ;
MOV CSR,BAD
LET GOOD := R4 ;
MOV R4,GOOD
SET HEADER ;
MOV #-1,HEADER
ERROR +51 ;
END ;

032456
9247 032456 104503
9248 032460 005011
9249 032462 005012
9250 032464 104423
9251 032466 000207

CLR1CSR
CLR (R1)
CLR (R2)
CACHON
RETURN

:CLEAR 1 CSR
:
:
:TURN ON CACHE

L332:~::~~::~

.SBTTL MISC SUBROUTINES

9253
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
9257 032472 010103
9258 032474 010205
9259 032476 000207
9260
9261 032500

MOV R0,R4
MOV R1,R3
MOV R2,R5
RETURN

FLIPWARN:SUBTST <<FLIP WARNING CONSTANTS IN WORST CASE NOISE TESTS>>
;*****
;*SUBTEST FLIP WARNING CONSTANTS IN WORST CASE NOISE TESTS
;*****

9262 032500
032500 010046
9263 032502 005237 002616
9264 032506 042737 177774 002616
9265 032514 022737 000001 002616
9266 032522 001414
9267 032524 022737 000002 002616
9268 032532 001413
9269 032534 022737 000003 002616
9270 032542 001414
9271 032544 005000
9272 032546 013704 002614
9273 032552 000414
9274 032554
032554 005000
032556 005004
9275 032560 000411
9276 032562 012700 000401
9277 032566 013704 002614
9278 032572 000404
9279 032574 012700 000401
9280 032600 012704 000401
9281 032604 010037 024762
9282 032610 010037 024776
9283 032614 010037 025022
9284 032620 010037 025036
9285 032624
032624 012600
9286 032626 000207

PUSH R0
MOV R0, (SP)
INC FLIPLOC
BIC #C3,FLIPLOC
CMP #1,FLIPLOC
BEQ 1\$
CMP #2,FLIPLOC
BEQ 2\$
CMP #3,FLIPLOC
BEQ 3\$
CLR R0
MOV ONES,R4
BR 4\$
1\$: CLEAR R0,R4
CLR R0
CLR R4
BR 4\$
2\$: MOV #401,R0
MOV ONES,R4
BR 4\$
3\$: MOV #401,R0
MOV #401,R4
4\$: MOV R0,WARN2
MOV R0,WARN3
MOV R0,WARN4
MOV R0,WARN5
POP R0
MOV (SP)+,R0
RETURN

9288 032630

```

BACKGND:SUBTST <<SUBR WRITE BACKGROUND>>
;*****
;*SUBTEST      SUBR      WRITE BACKGROUND
;*****

```

```

9289
9290 032630 104415
9291 032632 012700 060000
9292 032636 012701 040000
9293 032642 012737 000207 024644
9294 032650 012737 024640 002262
9295 032656 004737 024446
9296 032662 012737 000240 024644
9297 032670 104416
9298 032672 000207
9299

```

```

;WRITES DATA FROM R2
SAVREG
MOV #FIRST,R0
MOV #SIZE,R1
MOV #207,MTP000+4 ;WARNING PUTTING "RETURN;" AFTER WRITE
MOV #MTP000,SUPDOADD
CALL SUPD03
MOV #240,MTP000+4 ;RESTORE 'NOP' AFTER WRITE
RESREG
RETURN

```

9301 032674

```

GETCSR: SUBST <<SUBR GET CSR INFORMATION FROM CONFIGURATION TABLE>>
;*****
;*SUBTEST SUBR GET CSR INFORMATION FROM CONFIGURATION TABLE
;*****

```

```

9302
9303
9304
9305
9306 032674 013702 002104
9307 032700 016203 002664
9308 032704 000303
9309 032706 006303
9310 032710 042703 177741
9311 032714 010337 002152
9312 032720 000207

```

```

;INPUTS : NONE
;
;OUTPUT : CSRNO = CSR NUMBER
;
MOV BANKINDEX,R2 ;GET INDEX INTO CONFIG TABLE
MOV CONFIG(R2),R3 ;MOV IT INTO R3
SWAB R3
ASL R3
BIC #+C36,R3 ;CLEAR OFF SOME BITS
MOV R3,CSRNO ;SAVE CSR NUMBER
RETURN

```

```

9315 032722          PCONFIG:SUBTST <<SUBR PRINT CONFIGURATION MAP>>
;*****
;*SUBTEST          SUBR PRINT CONFIGURATION MAP
;*****
          PUSH      TKVEC,TKVEC+2,R0
9316 032722          MOV      TKVEC,-(SP)
          032722 013746 000060          MOV      TKVEC+2,-(SP)
          032726 013746 000062          MOV      RO,-(SP)
          032732 010046
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 CPJ 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
9330 033020          ;IF FAT PAPER ON TERMINAL GOTO 1$
          033020 032777 000020 147610          IF #SW4 SET.IN @SWR THEN JUMPTO PCONF1
          033026 001402          BIT      #SW4,@SWR
          033030 000137 033242          BEQ     L333
          033034          JMP     PCONF1
          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          CLP    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
    
```

9343	033112				.DSABL	CRF		
	033112	104401	065656		TYPE	MSG011		
					TYPEIT	,MSG011		
9344	033116				.DSABL	CRF		
	033116	104401	002660		TYPE	\$CRLF		
					TYPEIT	,\$CRLF		
9345	033122				.DSABL	CRF		
	033122	104401	066076		TYPE	MSG017		;PRINT SPACE(S)
					TYPEIT	,MSG017		
9346	033126				.DSABL	CRF		
	033126	104401	065744		TYPE	MSG012		
					TYPEIT	,MSG012		
9347	033132	012701	000360		.DSABL	CRF		
9348	033136	010103			MOV	#60.*2*2,R1		
9349	033140	004737	033336		MOV	R1,R3		
9350	033144	022737	000170	002556	CALL	TCONFIG		
9351	033152	002053		N00J1:	CMP	#170, LASTBANK		
9352	033154				BGE	PCONF2		
	033154	104401	002660		TYPE	\$CRLF		
					TYPEIT	,\$CRLF		
9353	033160				.DSABL	CRF		
	033160	104401	066076		TYPE	MSG017		;PRINT SPACE(S)
					TYPEIT	,MSG017		
9354	033164				.DSABL	CRF		
	033164	104401	066041		TYPE	MSG11B		
					TYPEIT	,MSG11B		
9355	033170				.DSABL	CRF		
	033170	104401	002660		TYPE	\$CRLF		
					TYPEIT	,\$CRLF		
9356	033174				.DSABL	CRF		
	033174	104401	066076		TYPE	MSG017		;PRINT SPACE(S)
					TYPEIT	,MSG017		
9357	033200				.DSABL	CRF		
	033200	104401	066043		TYPE	MSG11C		
					TYPEIT	,MSG11C		
9358	033204				.DSABL	CRF		
	033204	104401	002660		TYPE	\$CRLF		
					TYPEIT	,\$CRLF		
9359	033210				.DSABL	CRF		
	033210	104401	066076		TYPE	MSG017		;PRINT SPACE(S)
					TYPEIT	,MSG017		
9360	033214				.DSABL	CRF		
	033214	104401	066045		TYPE	MSG11D		
					TYPEIT	,MSG11D		
9361	033220	012701	000740		.DSABL	CRF		
9362	033224	010103			MOV	#740,R1		
9363	033226	012700	000010		MOV	R1,R3		
9364	033232	010004			MOV	#8.,R0		
9365	033234	004737	033336		MOV	R0,R4		
9366	033240	000420			CALL	TCONFIG		
9367					BR	PCONF2		
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,RO          ;READ CHAR TO KILL FLAG
9381 033320          POP      RO,TKVEC+2,TKVEC
      033320 012600
      033322 012637 000062      MOV (SP)+,RO
      033326 012637 000060      MOV (SP)+,TKVEC+2
      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
;*****
;CALL: MOV #N,R0 ;N=NUMBER OF CHARACTERS
; MOV R0,R4 ;BACKUP
; MOV #K,R1 ;INDEX CONSTANT
; MOV R1,R3 ;BACKUP
; CALL TCONFIG ;ACTUAL CALL
; RETURN ;ONLY RETURN
;*****

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9400 033336 012737 000340 177776 TCONFIG:MOV #340,PSW ;DISABLE INTERUPTS
9401 033344 104401 065475 TYPE MSG005
033344 .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 104401 066056 TYPE MSG013 ;PRINT "X"
033360 .DSABL CRF
TYPEIT ,MSG013
9405 033364 000402 BR 3$
9406 033366 104401 066060 2$: TYPE MSG014 ;PRINT SPACE
033366 .DSABL CRF
TYPEIT ,MSG014
9407 033372 062701 000004 3$: 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 TCFG1: MOV #340,PSW ;DISABLE INTERRUPTS
9418 033412 112737 000040 066062 MOVB #' ,MSG015 ;MOVE A BLANK IN TO BE PRINTED
9419 033420 104401 066062 TYPE MSG015
TYPEIT ,MSG015
.DSABL CRF
IF NOTAB NE #0 THEN $RETURN
9420 033424 005737 002372 TST NOTAB
033424 001401 BEQ L334
033430 000207 RTS PC
033434 L334:;;;;;
9421 033434 010400 MOV R4,R0
9422 033436 010301 MOV R3,R1
9423
9424 ;*****
9425 ;** MEMORY TYPE **
9426 ;*****
9427 .ENABL LSB
9428 033440 104401 065544 TYPE MSG009
TYPEIT ,MSG009
.DSABL CRF
9429 033444 033761 002106 002664 TCFG2: BIT CPUBIT,CONFIG(R1)
9430 033452 001432 BEQ 17$
9431 033454 016105 002666 MOV CONFIG+2(R1),R5
9432 033460 000305 SWAB R5 ;GET MEMORY TYPE
9433 033462 042705 177770 BIC #1C7,R5 ;CLEAR NON INTERESTING BITS
9434 033466 020527 000003 CMP R5,#3 ;IS IT A LEGAL MEMORY TYPE
9435 033472 003022 BGT 17$ ;IF IF SO BRANCH!!!!!!
9436 033474 032705 000001 IF #BIT0 SET.IN R5 ;IS IT AN ECC MEMORY????
033474 001413 BIT #BIT0,R5
033500 001413 BEQ L335
9437 033502 032705 000002 IF #BIT1 SET.IN R5 ;IS IT A MSV11-P OR A MSV11-J???
033506 001404 BIT #BIT1,R5
9438 033510 112737 000120 066062 MOVB #'P,MSG015 ;IT IS A MSV11-P
9439 033516 000403 ELSE ;
033520 BR L337
9440 033520 112737 000105 066062 MOVB #'E,MSG015 ;IT IS A MSV11-J
9441 033526 END ;
033526 L336:;;;;;
9442 033526 000403 ELSE ;
033530 BR L340
9443 033530 112737 000120 066062 MOVB #'P,MSG015 ;IT IS A MSV11-L/P
9444 033536 END ;
033536 L335:;;;;;
9445 033536 000403 BR 8$ L340:;;;;;
9446 033540 112737 000040 066062 17$: MOVB #' ,MSG015
9447 033546 104401 066062 8$: TYPE MSG015
TYPEIT ,MSG015
.DSABL CRF
IF NOTAB NE #0 THEN $RETURN
9448 033552 005737 002372 TST NOTAB
033552

```

```

033556 001401
033560 000207
033562
9449 033562 062701 000004
9450 033566 077052
9451 033570 010400
9452 033572 010301
9453
9454
9455
9456
9457
9458 033574
033574 104401 066064
9459 033600 112737 000040 066062 TCFIG3:
9460 033606 016105 002664
9461 033612 032705 000002
9462 033616 001414
9463 033620 042705 170377
9464 033624 000305
9465 033626 022705 000011
9466 033632 100002
9467 033634 062705 000007
9468 033640 062705 000060
9469 033644 110537 066062
9470 033650
033650 104401 066062
9471 033654
033654 005737 002372
033660 001401
033662 000207
033664
9472 033664 062701 000004
9473 033670 077035
9474 033672 010400
9475 033674 010301
9476
9477
9478
9479
9480 033676
033676 104401 065556
9481 033702 105761 002664 11$:
9482 033706 100006
9483 033710 112737 000120 066062
9484 033716
033716 104401 066062
9485 033722 000402
9486 033724
033724 104401 066060
9487 033730 062701 000004 15$:
9488 033734 077016

```

```

                                BEQ L341
                                RTS PC
                                L341:::
ADD #4,R1 ;BUMP POINTER
SOB R0,TCFIG2 ;LOOP UNTIL DONE
MOV R4,R0
MOV R3,R1
.DSABL LSB
;*****
; ** CSR **
;*****
TYPE MSG016
TYPEIT ,MSG016
.DSABL CRF
MOV #',MSG015
MOV CONFIG(R1),R5
BIT #BIT1,R5
BEQ 16$
BIC #C7400,R5
SWAB R5
CMP #9.,R5
BPL 10$
ADD #7,R5
10$: ADD #60,R5 ;MAKE ASCII
MOV R5,MSG015 ;PLUG INTO MEMORY
16$: TYPE MSG015
TYPEIT ,MSG015
.DSABL CRF
IF NOTAB NE #0 THEN $RETURN
                                TST NOTAB
                                BEQ L342
                                RTS PC
                                L342:::
ADD #4,R1 ;BUMP POINTER
SOB R0,TCFIG3
MOV R4,R0
MOV R3,R1
;*****
; ** PROTECTED **
;*****
TYPE MSG010
TYPEIT ,MSG010
.DSABL CRF
11$: TSTB CONFIG(R1) ;BANK PROTECTED?
BPL 14$ ;NO - SKIP
13$: MOV #P,MSG015
TYPE MSG015
TYPEIT ,MSG015
.DSABL CRF
BR 15$
14$: TYPE MSG014 ;PRINT SPACE
TYPEIT ,MSG014
.DSABL CRF
15$: ADD #4,R1 ;BUMP POINTER
SOB R0,11$ ;LOOP UNTIL DONE

```

C6

CVMJAAO MSV11-J MEMORY DIAG.
SUBR TYPE CONFIGURATION

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SEQ 0274

9489 033736 010400
9490 033740 010301
9491 033742 000207

MOV R4,R0
MOV R3,R1
RETURN

9494
9495
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033744 022737 000001 002076
033752 001003
033754 005237 002072
033760 000002
033762 022737 000002 002076
033770 001013
033772 012737 177777 002144
034000 004737 034152
034004 063716 002326
034010 042766 000004 000002
034016 000002
034020 022737 000003 002076
034026 001003
034030 013716 002304
034034 000002
034036 004737 034152
034042 005237 002064
034046 104032

```

.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"
;
PARITY: CMP #1,NOPAR ;COUNTING PARITY ERRORS?
BNE 1$ ;NO - SKIP
INC PARCNT ;PARITY ERROR COUNTER + 1
RTI
1$: CMP #2,NOPAR ;ACTION CODE = 2 ?
BNE 2$ ;NO SKIP
SET ABORTFLAG ;YES
MOV #-1,ABORTFLAG
CALL BADSTACK ;FIND BAD SP,PC,PSW OFF STACK
ADD PCBUMP,(SP) ;UPDATE RETURN PC
BIC #BIT2,2(SP) ;SHOW FAILURE BY .NE.
RTI
2$: CMP #3,NOPAR ;ACTION CODE - 3 ?
BNE 3$ ;NO - SKIP
MOV PARTHERE,(SP)
3$: CALL BADSTACK ;FIND BAD SP,PC,PSW OFF STACK
FATAL 32
INC FATAL$ ;SET FATAL INDICATOR
ERROR +32
.DSABL CRF

```

```

9526 .SBTTL TRAP NON-EXISTANT MEMORY (HOLES) HANDLER
9527 ;*****
9528 ;VECTOR TO HERE (SOMETIMES) FROM TRAPS TO 4
9529 ;
9530 ; CODE IN NONEM DETERMINES ACTION AS FOLLOWS:
9531 ; 1) IGNORE ERRORS BUT COUNT IF NONEM (NO NON-EXISTANT MEMORY) FLAG = 1.
9532 ; 2) TO EXIT PATTERN 0 DURING SIZING IF NON-EXIST MEM ERROR
9533 ;*****
9534 034050 022737 000001 002100 NONEXIST: CMP #1,NONEM ;COUNTING NON EXISTANT MEMORY ERRORS?
9535 034056 001011 BNE 2$ ;NO - SKIP
9536 034060 005237 002070 INC NEMCNT ;BUMP NON-EXISTANT MEMORY COUNTER
9537 034064 022737 000001 002070 CMP #1,NEMCNT ;FIRST ERROR?
9538 034072 001002 BNE 1$ ;NO - SKIP
9539 034074 010037 002034 MOV RO,ADDRESS ;ASSUME RO CONTAINS THE ADDRESS ACCESSED
9540 034100 000002 1$: RTI
9541 034102 005237 002070 2$: INC NEMCNT ;BUMP NON-EXISTANT MEMORY COUNTER
9542 034106 012701 000001 MOV #1,R1 ;DUMMY UP R1 FOR A FORCED SOB EXIT
9543 034112 000002 RTI
9544
9545 ;*****
9546 .SBTTL TRAP TIMEOUT (TRAP TO 4) HANDLER
9547 034114 004737 034152 TIMEOUT: CALL BADSTACK ;FIND BAD SP,PC,PSW OFF STACK
9548 034120 FATAL 6
9549 034120 005237 002064 INC FATAL$ ;SET FATAL INDICATOR
9550 034124 104006 ERROR +6
9551 .DSABL CRF
9552 ;*****
9553 .SBTTL TRAP MEMORY MANAGEMENT (TRAP TO 250) HANDLER
9554 034126 004737 034152 MMTRAP: CALL BADSTACK ;FIND BAD SP,PC,PSW OFF STACK
9555 034132 FATAL 7
9556 034132 005237 002064 INC FATAL$ ;SET FATAL INDICATOR
9557 034136 104007 ERROR +7
9558 .DSABL CRF
9559 .SBTTL TRAP RESERVED INSTRUCTION HANDLER
9560 034140 004737 034152 PDP1105: CALL BADSTACK ;FIND BAD SP,PC,PSW OFF STACK
9561 034144 FATAL 5
9562 034144 005237 002064 INC FATAL$ ;SET FATAL INDICATOR
9563 034150 104005 ERROR +5
9564 .DSABL CRF
9565
9566 BADSTACK: SUBTST <<FIND BAD SP, PC, & PSW FROM STACK>>
9567 ;*****
9568 ;*SUBTEST FIND BAD SP, PC, & PSW FROM STACK
9569 ;*****
9570 MOV SP,BADSP
9571 ADD #2,BADSP
9572 MOV 2(SP),BADPC
9573 MOV 4(SP),BADPSW
9574 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,MMRO
9581 034220 000002 RTI
9582 ;*****
9583 .SBTTL TRAP DEENERGIZE TRAP HANDLER
9584 034222 042737 000001 177572 $DEENERGIZE:BIC #BIT0,MMRO
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

```



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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    $LOADC: PUSH  RO,R1          ;SAVE REGISTERS
          034274 010046
          034276 010146
9606 034300 013700 002152      MOV  CSRNO,R0          ;CREATE CSR ADDRESS
9607 034304          IF INHECC IS TRUE THEN GOTO 3$ ;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
          034364 012600
9619 034366 000002          RTI
9620
9621          .SBTTL TRAP READ CSR TRAP HANDLER
9622          ;READ THE CORRECT CSR INTO LOCATIONS CSR
9623 034370    $READC: PUSH  RO
          034370 010046
          034372 013700 002152      MOV  CSRNO,R0
9624 034372 013700 002152      MOV  CSRNO,R0
9625 034376 016037 172100 002150      MOV  CSRADD(R0),CSR ;READ IT
9626 034404          POP  RO
          034404 012600
9627 034406 000002          RTI
          MOV (SP)+,R1
          MOV (SP)+,RO
          MOV (SP)+,R0
          MOV (SP)+,RO

```

```

9629
9630 034410          $TSTRD: .SBTTL TRAP TEST (R1) & READ CSR CAREFULLY
      034410 010046
      034412 010246
      034414 010346
9631 034416 012700 172100          MOV #CSRADD,R0          ;CREATE CSR ADDRESS
9632 034422 063700 002152          ADD CSRNO,R0
9633 034426 005002          CLR R2
9634 034430 005737 002532          TST PGMCSR
9635 034434 100007          BPL 1$
9636 034436 113703 002533          MOV# PGMCSR+1,R3
9637 034442 042703 000200          BIC #BIT7,R3
9638 034446 020337 002152          CMP R3,CSRNO
9639 034452 001404          BEQ 2$
9640 034454 123737 002532 002152 1$: CMPB PGMCSR,CSRNO
9641 034462 001002          BNE 3$
9642 034464 012702 020000          2$: MOV #BIT13,R2
9643 034470 004737 034542          3$: CALL TSTRD1
9644
9645 034474          5$: ;IF SINGLE BIT ERROR ONLY - SET CARRY BIT
      034474 012603          POP R3,R2,R0
      034476 012602
      034500 012600
9646 034502          IF #BIT4 SET.IN CSR AND #BIT15 OFF.IN CSR
      034502 032737 000020 002150
      034510 001410
      034512 032737 100000 002150
      034520 001004
9647 034522 052766 000001 000002          BIS #BIT0,2(SP)
9648 034530          ELSE
      034530 000403
      034532
9649 034532 042766 000001 000002          BIC #BIT0,2(SP)
9650 034540          END ;OF IF #BIT4
      034540
9651 034540 000002          RTI
9652
9653 034542 010210          TSTRD1: MOV R2,(R0)
9654 034544          TESTAREA
      034544 053737 002552 177776          BIS TESTMODE,PSW          ;GO TO SYSTEM TEST MODE
      .DSABL CRF
      TSTB (R1)
9655 034552 105711          BIC #BIT15!BIT14,PSW
9656 034554 042737 140000 177776          MOV (R0),CSR
9657 034562 011037 002150          RETURN
9658 034566 000207

```

MOV R0, (SP)
MOV R2, -(SP)
MOV R3, -(SP)

MOV (SP)+,R3
MOV (SP)+,R2
MOV (SP)+,R0

BIT #BIT4,CSR
BEQ L343
BIT #BIT15,CSR
BNE L343

BR L344
L343:::~::~

L344:::~::~

```

9661          .SBTTL TRAP ECC DISABLE ALL CSR'S TRAP HANDLER
9662 034570 012737 000002 002150 $ECCDIS:MOV #BIT1,CSR
9663 034576 004737 035314          CALL CSRROUT
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 CSRROUT
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 CSRROUT
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 CSRROUT
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
          MOV R1,-(SP)
          MOV R4,-(SP)
9699 034734 010146
9699 034736 010446
9699 034740 013701 002224    MOV TOTCSRS,R1 ;GET CSR'S BYTE
9700 034744 005004          CLR R4
9701 034746          BEGIN LWSBE
          B57:::
9702 034746          FOR CSRNO := #0 TO #36 BY #2
          CLR CSRNO
          B60:::
9702 034746 005037 002152
9702 034752 006301          ASL R1
9703 034752 006301          ON.ERROR
9704 034754 103010          READCSR
9704 034754 104426          IF #BIT4 SET.IN CSR
          BCC L345
9705 034756 104426
9706 034760 032737 000020 002150    BIT #BIT4,CSR
9706 034760 001403          BEQ L346
9707 034770          SET R4
          MOV #-1,R4
9707 034770 012704 177777          LEAVE LWSBE
          BR E57
9708 034774 000411          END ;OF IF #BIT4
          L346:::
9709 034776          END ;OF ON.ERROR
          L345:::
9710 034776          IF R1 EQ #0 THEN LEAVE LWSBE
          TST R1
9711 034776 005701          END ;OF FOR CSRNO
          BEQ E57
9711 034776 001407
9712 035002 062737 000002 002152    ADD #2,CSRNO
9712 035002 062737 000002 002152    CMP CSRNO,#36
9712 035010 023727 002152 000036    BLE B60
9712 035016 003755
9712 035020          E60:::
9713 035020          END LWSBE
          E57:::
9714 035020 006004          ROR R4 ;SET C BIT FOR ERROR
9715 035022 012604          POP R4,R1
          MOV (SP),R4
9716 035026 103004          ON.ERROR          MOV (SP),R1
          BCC L347
9717 035030 052766 000001 000002    BIS #BIT0,2(SP)
9718 035036 000403          ELSE
          BR L350
9718 035040          L347:::
9719 035040 042766 000001 000002    BIC #BIT0,2(SP)
9720 035046          END ;OF ON.ERROR
          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

```

K6

CVMJAAO MSV11-J MEMORY DIAG. MACRO V05.01b Friday 15-Feb 85 16:10 Page 309 1
TRAP WAS THERE A SBE IN 1 SELECTED CSR TRAP HANDLER

SEQ 0282

9729 035076 000002

14: RTI

```

9732          .SBTTL TRAP WAS THERE A DBE ON ANY CSR TRAP HANDLER
9733 $WASDBE: PUSH R1,R4
          MOV R1, (SP)
          MOV R4, -(SP)
9734 035100 010146
9735 035102 010446
9734 035104 013701 602224      MOV TOTCSRS,R1 ;GET CSR'S BYTE
9735 035110 005004      CLR R4
9736 035112      BEGIN LWDBE
          B61:;;;;;;;;
9737 035112      FOR CSRNO := #0 TO #36 BY #2
          CLR CSRNO
          B62:;;;;;;;;
9738 035116 006301      ASL R1
9739 035120      ON.ERROR
          BCC L351
9740 035120 103010
9741 035122 104426      READCSR
          IF #BIT15 SET.IN CSR
9742 035124 032737 100000 002150      SET R4
          MOV #-1,R4
9743 035134 012704 177777      LEAVE LWDBE
          BR E61
9744 035140 000411      END ;OF IF #BIT4
          L352:;;;;;;;;
9745 035142      END ;OF ON.ERROR
          L351:;;;;;;;;
9746 035142      IF R1 EQ #0 THEN LEAVE LWDBE
          TST R1
          BEQ E61
9747 035142 005701
9748 035144 001407      END ;OF FOR CSRNO
          ADD #2,CSRNO
          CMP CSRNO,#36
          BLE B62
          E62:;;;;;;;;
9749 035146 062737 000002 002152
9750 035154 023727 002152 000036
          ROR R4 ;SET C BIT FOR ERROR
          POP R4,R1
          MOV (SP)+,R4
          MOV (SP)+,R1
9751 035166 012604
9752 035170 012601      ON.ERROR
          BCC L353
9753 035172 103004
9754 035174 052766 000001 000002      BIS #BIT0,2(SP)
9755 035202      ELSE
          BR L354
          L353:;;;;;;;;
9756 035202 000403
9757 035204 042766 000001 000002      BIC #BIT0,2(SP)
9758 035212      END ;OF ON.ERROR
          L354:;;;;;;;;
9759 035212 000002      RTI
9759 $WAS1DBE: READCSR
          TST CSR ;DBE?
          BPL 3$ ;NO - SKIP
9760 035214 104426
9761 035216 005737 002150      BIS #BIT0,2(SP) ;SET C BIT ON STACK
9762 035222 100004
9763 035224 052766 000001 000002      RTI
9763 035232 000002

```

9764 035234 042766 000001 000002 34: 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 CLR CSR
      035244 005037 002150
9770 035250 CALL CSROUT
9771 035254 004737 035314 RTI
9772 .SBTTL TRAP CLEAR 1 SELECTED CSR TRAP HANDLER
9773 035256 $CLR1CSR: CLEAR CSR CLR CSR
      035256 005037 002150
9774 035262 LOADCSR
9775 035264 104425 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: B.S #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
  
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9788 035314          CSROUT: SUBTST <<SUBR WRITE IN ALL CSR'S>>
;*****
;*SUBTEST          SUBR   WRITE IN ALL CSR'S
;*****
9789 035314          PUSH   R1
035314 010146          MOV    TOTCSRS,R1      ;GET CSR'S BYTE
9790 035316 013701 002224  BEGIN LCSROUT
9791 035322          FOR CSRNO := #0 TO #36 BY #2
035322          B63:;;;;;
9792 035322 005037 002152  ASL     R1
035326          CLR   CSRNO
9793 035326 006301          ON.ERROR
035330          B64:;;;;;
9794 035330 103001          LOADCSR
035332 104425          END ;OF ON.ERROR
9795 035332          IF R1 EQ #0 THEN LEAVE LCSROUT
9796 035334          L355:;;;;;
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
9799 035356          E64:;;;;;
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   RO,R1
035362 010046          MOV   RO,-(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

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9812 035412          $ERRGEN:          SUBTST<<TRAP  GENERATE AND TEST ERROR ADDRESS>>
;*****
;*SUBTEST          TRAP  GENERATE AND TEST ERROR ADDRESS
;*****
9813 035412          PUSH          RO,R1,R2,R3
035412 010046                                MOV RO,-(SP)
035414 010146                                MOV R1,-(SP)
035416 010246                                MOV R2,-(SP)
035420 010346                                MOV R3,-(SP)
9814 035422 013703 002104          MOV          BANKINDEX,R3
9815 035426 005737 002456          TST          NOSUPER
9816 035432 001003                    BNE          6$
9817 035434 013700 172246          MOV          SIPAR3,RO          ;GENERATE WHAT ERRCR ADDR SHOULD BE
9818 035440 000402                    BR           7$
9819 035442 013700 177646          6$: MOV          UIPAR3,RO
9820 035446 072027 177773          7$: ASH          #-5,RO
9821 035452 005737 002132          TST          EQFLAG
9822 035456 001002                    BNE          1$
9823 035460 042700 177600          BIC          #C177,RO
9824 035464 000301          1$: SWAB          R1          ;GET CURRENT ADDRESS BITS 11 AND 12
9825 035466 006201                    ASR          R1
9826 035470 006201                    ASR          R1
9827 035472 006201                    ASR          R1
9828 035474 042701 177775          BIC          #C2,R1
9829 035500 060100          ADD          R1,RO          ;ADD THEM TO THE ADJUSTED PAR VALUE
9830                    ;GET ERROR ADDRESS FROM CSR UNDER TEST
9831 035502 013701 002150          MOV          CSR,R1
9832 035506 072127 177773          ASH          #-5,R1
9833 035512 042701 177600          BIC          #C177,R1
9834 035516 005737 002454          TST          NO22BIT          ;IS THIS AN 11/83,11/23-B OR 11/23 ?
9835 035522 001024                    BNE          2$          ;BRANCH IF NOT NECESSARY
9836 035524 005737 002132          TST          EQFLAG          ;IS IT EQB?
9837 035530 001421                    BEQ          2$          ;BRANCH IF NOT
9838 035532          PUSH          RO          ;SAVE GENERATED ERROR ADDRESS
035532 010046                                MOV RO,-(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),RO ;GET CSR CONTENTS
9842 035552 042762 040000 172100        BIC          #BIT14,CSRADD(R2) ;TURN OFF EQB BIT CAREFULLY
9843 035560 042700 177037          BIC          #C740,RO          ;CLEAR EVERYTHING BUT ERROR ADDR
9844 035564 006300                    ASL          RO
9845 035566 006300                    ASL          RO          ;SHIFT ADDR BITS 18-21 INTO POSITION
9846 035570 060001          ADD          RO,R1          ;ADD TO CURRENT ERROR ADDRESS
9847 035572          POP          RO
035572 012600                                MOV (SP)+,RO
9848 035574 020001          2$: CMP          RO,R1          ;COMPARE REAL AND GENERATED ERR. ADDR.
9849 035576 001420                    BEQ          5$          ;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,RO
9853 035612 005737 002140          TST          INT64K          ;64K INTERLEAVED MEMORY?
9854 035616 001002                    BNE          4$
9855 035620 062700 000100          ADD          #100,RO
9856 035624 020001          4$: CMP          RO,R1
9857 035626 001404                    BEQ          5$
9858 035630 005737 002066          3$: TST          SKPERR          ;ARE WE SUPPOSED TO SKIP ERROR P.O.?
9859 035634 001001                    BNE          5$          ;YES - SKIP ERROR PRINTOUT

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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

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9880 035716

SUBTST<<SUBR MAPPER>>

;*SUBTEST SUBR MAPPER

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9890

;THIS SUBROUTINE MAPS THE MEMORY BANK (16K WORDS = 1 BANK)
;IN R3 TO THE TEST PATTERN AREA (SUPERVISOR VIRTUAL (60000 - 157777) FOR
;THE 11/83 ; USER VIRTUAL (60000 - 157777) FOR ALL OTHERS.

;CALL MOV BANKNO,R3 ;SET UP BANK ARGUMENT
;CALL MAPPER ;ACTUAL CALL
;RETURN ;ONLY RETURN

;SET SUPERVISOR/USER UP FOR 1 TO 1 MAP
MAPPER: PUSH RO,R1,R2,R4,R5

MOV RO,-(SP)
MOV R1,-(SP)
MOV R2,-(SP)
MOV R4,-(SP)
MOV R5,-(SP)

9892 035730 012700 172340
9893 035734 012701 172240
9894 035740 012704 172200
9895 035744 005737 002456
9896 035750 001404
9897 035752 012701 177640
9898 035756 012704 177600
9899 035762 012702 077406
9900 035766 012705 000010
9901 035772 012021
9902 035774 010224
9903 035776 077503
9904 036000 012741 177600
9905 036004 022737 000005 004010
9906 036012 001007
9907 036014 012704 172206
9908 036020 012705 000004
9909 036024 052724 100000
9910 036030 077503
9911
9912 036032 022703 000200
9913 036036 001516
9914 036040 072327 000011
9915
9916 036044 012701 172246
9917 036050 005737 002456
9918 036054 001402
9919 036056 012701 177646
9920 036062 012702 000004
9921 036066 010321
9922 036070 062703 000200
9923 036074 077204
9924 036076 005737 002240
9925 036102 001442
9926 036104 162701 000010
9927 036110 010102
9928 036112 062702 000004

MOV #KIPAR0,R0 ;FIRST AREA TO MAP TO
MOV #SIPAR0,R1 ;FIRST ADDRESS REGISTER
MOV #SIPDR0,R4 ;FIRST DESCRIPTOR REGISTER
TST NOSUPER ;CAN WE USE SUPERVISOR MODE?
BEQ 4\$;YES, BRANCH
MOV #UIPAR0,R1 ;FIRST ADDRESS REGISTER
MOV #UIPDR0,R4 ;FIRST DESCRIPTOR REGISTER
4\$: MOV #77406,R2 ;CONSTANT FOR 4K PAGE, UP, R/W
MOV #8.,R5 ;COUNTER
1\$: MOV (R0)+,(R1)+ ;PUT IN SUPERVISOR ADDRESS
MOV R2,(R4)+ ;PUT IN SUPERVISOR DESCRIPTOR
SOB R5,1\$;LOOP TILL DONE
MOV #177600,(R1) ;CORRECT LAST FIELD FOR PERIPHERALS PAGE
30\$: CMP #5,PROTYP ;IS THIS A 11/73?
BNE 40\$;BRANCH IF NOT
MOV #SIPDR0+6,R4 ;POINT TO PDR 3
MOV #4.,R5 ;COUNTER=4
35\$: BIS #BIT15,(R4)+ ;SET UNCONDITIONAL CACHE BYPASS IN PDR3-6
SOB R5,35\$
;SET UP SUPERVISOR/USER FOR TEST AREA
40\$: CMP #200,R3 ;MAP NOTHING (1 TO 1)?
BEQ 3\$;YES - SKIP
ASH #9.,R3 ;BANK 1 STARTS AT 100,000 LESS 6 LSB'S
;FOR MEMORY MANAGEMENT = 1000
MOV #SIPAR3,R1 ;SETUP FOR AUTO INCREMENTING
TST NOSUPER ;DO WE HAVE SUPERVISOR MODE?
BEQ 5\$;YES - BRANCH
MOV #UIPAR3,R1 ;SETUP FOR AUTO INCREMENTING
5\$: MOV #4,R2 ;COUNTER
2\$: MOV R3,(R1)+ ;PLUG IN PAR INFO
ADD #200,R3 ;BUMP ADDRESS 4K
SOB R2,2\$;LOOP TILL DONE
TST SPLTCSR
BEQ 9\$
SUB #10,R1
MOV R1,R2
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
                                MOV (SP)+,R5
                                MOV (SP)+,R4
                                MOV (SP)+,R2
                                MOV (SP)+,R1
                                MOV (SP)+,R0
                                036274 012605
                                036276 012604
                                036300 012602
                                036302 012601
                                036304 012600
9969 036306 000207                      RETURN
9970                                     .SBTTL  TRAP  MAP KERNEL (ALMOST 1 TO 1) TRAP HANDLER
9971 036310 3$KMAP:  PUSH  R0,R1,R2,R3,R4
                                MOV R0,-(SP)
                                MOV R1,-(SP)
                                MOV R2,-(SP)
                                MOV R3,-(SP)
                                MOV R4,-(SP)
                                036310 010046
                                036312 010146
                                036314 010246
                                036316 010346
                                036320 010446
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

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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

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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          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          MOV BANK,RO
10003 036504          MOV RO,LOADBANK
10004 036510          MOV LOADHOME,R1
10005 036514          CALL BANKMOV
10006 036520          CALL NEWLOAD ;MAP NEW LOADER BANK IN KERNEL
10007 036524          MOV BANKINDEX,R1
10008 036530          BIS #BIT15,CONFIG+2(R1) ;MARK LOADER
10009 036536          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

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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	ERROR		
	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
036730
10039 036730 IF FULLREL IS FALSE BLE B70
036730 005737 002542 E70:;;;;;;
036734 001012 TST FULLREL
10040 036736 IF INHECC IS TRUE BNE L371
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
10052 037012 .DSABL CRF
037012 END ;OF IF #SW13 L373:;;;;;;
10053 037012 SKUB: $RETURN ERROR
037012 000261 SEC
037014 000207 RTS PC
10054 037016 END FINDBANK
037016 CLEAR INHECC E67:;;;;;;
10055 037016 005037 002536 ;IF WE RELOCATED PROPERLY, THIS SHOULD BE OFF!
10056 037022 042761 020000 002666 RELENT1: BIC #BIT13,CONFIG+2(R1) CLR INHECC
10057 037030 005000 CLR RO ;INVALIDATE BACKGROUND PATTERN
10058 037032 071027 000004 DIV #4,RO
10059 037036 RELOC1: LET NEWBANK := RO
037036 010037 002310 MOV RO,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
10063 037062 .DSABL CRF
037062 004537 041024 BMOV 0,100000,SIZE ;MOVE PROGRAM
037066 040000 JSR R5,BLOCK3
037070 100000 SIZE
037072 000000 100000
0 .DSABL CRF
10064 037074 104417 KERNEL ;ENTER KERNEL MODE
10065 037076 042737 000001 177572 JMPRL1: BIC #BIT0,MMRO ;DEENERGIZE MEMORY MANAGEMENT
10066 037104 004737 037672 CALL NEWKERNEL
10067 037110 013700 002310 MOV NEWBANK,RO
10068 037114 006300 ASL RO
10069 037116 006300 ASL RO ;RO < RO * 4
10070 037120 016002 002664 MOV CONF1 RO),R2

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10071	037124	000302			SWAB	R2		
10072	037126	042702	177760		BIC	#+C17,R2		
10073	037132	006302			ASL	R2		
10074	037134	052737	000001	177572	BIS	#BIT0,MMRO	: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				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 010046 002432 002102      ;RESTORE LOADERS
                                PUSH    RO
                                MOV     RO, (SP)
10090 037216 013701 002432      MOV     LOADBANK,R1
10091 037222 013700 002576      MOV     LOADHOME,RO
10092 037226 004737 037442      CALL    BANKMOV
10093 037232 004737 037774      CALL    NEWLOAD      ;MAP NEW LOADER BANK IN KERNEL SPACE
10094 037236 013746 002102      PUSH    BANK
                                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 012637 002102      POP     BANK
                                MOV     (SP)+,BANK
10104 037316 005037 002536      CLEAR  INHECC          ;MAKE SURE ECC TESTS ARE NOT INHIBITED!
                                CLR     INHECC
10105
10106      ;RESTORE BANK 0
10107 037322 042737 020000 002666      BIC     #BIT13,CONFIG+2      ;INVALIDATE BACKGROUND PATTERN
10108 037330 005037 002310      LET     NEWBANK := #0
                                CLR     NEWBANK
10109 037334 004737 037610      CALL    USERMAP          ;MAP NEWBANK TO USER PAR
10110 037340 052737 140000 177776      USER
                                ;ENTER USER MODE
                                BIS     #BIT15!BIT14,PSW      ;GO TO USER MODE
                                .DSABL CRF
10111 037346 004537 041024      BMOV   0,100000,SIZE      ;MOVE PROGRAM
                                JSR    R5,BLOCK3
                                SIZE
                                100000
                                0
                                .DSABL CRF
10112 037360 104417      KERNEL                    ;ENTER KERNEL MODE
10113 037362 042737 000001 177572      BIC     #BIT0,MMRO        ;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,MMRO        ;ENERGIZE MEMORY MANAGEMENT
10117 037410 005037 002126      CLR     RLFLAG
10118 037414 012700 002666      MOV     #CONFIG+2,RO      ;MOVE 2ND WORD OF CONFIG TO RO
10119 037420 042710 020000      BIC     #BIT13,(RO)      ;CLEAR BACKGROUND VALID BIT
10120 037424 062700 000004      ADD     #4,RO            ;INCREMENT TO NEXT BANK
10121 037430 020027 003620      CMP     RO,#3620         ;DONE?
10122 037434 003771      BLE     2$              ;NO - BRANCH
10123 037436 012600      POP     RO
                                MOV     (SP)+,RO
10124 037440 000207      RETURN
10125

```

10128 037442

BANKMOV:SUBTST <<MOVE BANKS>>

;SUBTEST MOVE BANKS

10129
10130
10131
10132
10133 037442 104415
10134 037444 004737 037610
10135 037450 104416
10136 037452 104415
10137 037454 072027 000011
10138 037460 072127 000011
10139 037464 012702 177650
10140 037470 012703 000200
10141
10142 037474 010122
10143 037476 060301
10144 037500 010122
10145 037502 060301
10146
10147 037504 010022
10148 037506 060300
10149 037510 010022
10150 037512 060300
10151
10152 037514
037514 052737 140000 177776
10153 037522
037522 004537 041024
037526 020000
037530 140000
037532 100000
10154 037534 104417
10155
10156 037536 012702 177650
10157
10158 037542 010122
10159 037544 060301
10160 037546 010122
10161 037550 060301
10162
10163 037552 010022
10164 037554 060300
10165 037556 010022
10166 037560 060300
10167
10168 037562
037562 052737 140000 177776
10169 037570
037570 004537 041024
037574 010000
037576 140000

;MOVE 3/4 OF A BANK
;CALLING SEQUENCE
;R0 = DESTINATION BANK
;R1 = SOURCE BANK
SAVREG
CALL USERMAP
RESREG
SAVREG
ASH #9.,R0
ASH #9.,R1
MOV #UIPAR4,R2
MOV #200,R3

MOV R1,(R2)+ ;MAP 1ST HALF BANK
ADD R3,R1 ;BUMP BY 4K
MOV R1,(R2)+
ADD R3,R1

MOV R0,(R2)+
ADD R3,R0
MOV R0,(R2)+
ADD R3,R0

USER
BIS #BIT15!BIT14,PSW ;GO TO USER MODE
.DSABL CRF
BMOV 100000,140000,SIZE/2 ;MOV 1ST HALF BANK
JSR R5,BLOCK3
SIZE/2
140000
100000
.DSABL CRF
KERNEL ;ENTER KERNEL MODE

MOV #UIPAR4,R2

MOV R1,(R2)+ ;MAP 2ND HALF BANK
ADD R3,R1 ;BUMP BY 4K
MOV R1,(R2)+
ADD R3,R1

MOV R0,(R2)+
ADD R3,R0
MOV R0,(R2)+
ADD R3,R0

USER
BIS #BIT15!BIT14,PSW ;GO TO USER MODE
.DSABL CRF
BMOV 100000,140000,SIZE/4 ;MOV 3ND FOURTH OF BANK
JSR R5,BLOCK3
SIZE/4
140000

037600	100000	100000		
10170	037602	104417	KERNEL	CRF ;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
10178 037614 012702 172340
10179 037620 012703 177600
10180 037624 012704 172300
10181 037630 012705 000004
10182 037634 012221
10183 037636 011423
10184 037640 077503

MOV #UIPAR0,R1 ;COPY KERNEL PAR'S & PDR'S (0-3)
MOV #KIPAR0,R2
MOV #UIPDR0,R3
MOV #KIPDR0,R4
1\$: MOV #4,R5
MOV (R2)+,(R1)+
MOV (R4),(R3)+
SOB R5,1\$

10185
10186 037642 013700 002310
10187 037646 072027 000011
10188
10189 037652 012705 000004
10190 037656 010021
10191 037660 062700 000200
10192 037664 011423
10193 037666 077505
10194 037670 000207
10195

MOV NEWBANK,R0
ASH #9.,R0 ;BANK 1 STARTS AT 100,000 LESS 6 LSB'S
;FOR MEMORY MANAGEMENT = 1000
2\$: MOV #4,R5
MOV R0,(R1)+ ;SETUP UIPAR(4-7)
ADD #200,R0 ;BUMP ADDRESS 4K
MOV (R4),(R3)+ ;SETUP UIPDR(4-7)
SOB R5,2\$
RETURN

10196 037672

NEWKERNEL:SUBTST <<SUBR SETUP KERNEL PAR'S FOR NEW BANK>>
;*****
;*SUBTEST SUBR SETUP KERNEL PAR'S FOR NEW BANK
;*****

10197 037672
037672 010046
037674 010146
037676 010546
10198 037700 012700 172340
10199 037704 013701 002310
10200 037710 072127 000011
10201
10202 037714 012705 000004
10203 037720 010120
10204 037722 062701 000200
10205 037726 077504
10206 037730
037730 012605
037732 012601
037734 012600
10207 037736 000207
10208
10209 037740

PUSH R0,R1,R5
MOV R0,-(SP)
MOV R1,-(SP)
MOV R5,-(SP)
MOV #KIPAR0,R0
MOV NEWBANK,R1
ASH #9.,R1 ;BANK 1 STARTS AT 100,000 LESS 6 LSB'S
;FOR MEMORY MANAGEMENT = 1000
1\$: MOV #4,R5
MOV R1,(R0)+ ;SETUP KIPAR(0-3)
ADD #200,R1
SOB R5,1\$
POP R5,R1,R0
MOV (SP)+,R5
MOV (SP)+,R1
MOV (SP)+,R0
RETURN

10210

MAPKERNAL:SUBTST <<SUBR MAP KERNAL PARS 4 AND 5 TO A BANK>>
;*****
;*SUBTEST SUBR MAP KERNAL PARS 4 AND 5 TO A BANK
;*****

10211 037740 013705 002102
10212 037744 072527 000011
10213 037750 013737 172350 002272
10214 037756 010537 172350
10215 037762 062705 000200
10216 037766 010537 172352
10217 037772 000207

MOV BANK,R5 ;MOV BANK NUMBER TO R5
ASH #9.,R5 ;R5 ENTERS 100000 LESS SHIFT TO CREATE MAPPING
MOV KIPAR4,SAVPAR ;SAVE OLD PAR
MOV R5,KIPAR4 ;GET NEW PAR'S
ADD #200,R5
MOV R5,KIPAR5
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
10221 037774

;RO CONTAINS THE DESTINATION BANK
PUSH RO,R1

MOV RO,-(SP)
MOV R1,-(SP)

037774 010046
037776 010146
10222 040000 012701 172350
10223 040004 072027 000011
10224 040010 010021
10225 040012 062700 000200
10226 040016 010021
10227 040020
040020 012601
040022 012600
10228 040024 000207

MOV #KIPAR4,R1
ASH #9,R0
MOV RO,(R1)+
ADD #200,RO
MOV RO,(R1)+
POP R1,RO

;BANK 1 STARTS AT 100000 LESS 6 LSB'S (1000)
;SETUP KIPAR4
;SETUP KIPARS

MOV (SP)+,R1
MOV (SP)+,RO

RETURN

10229
10230 040026

UNMAP: SUBTST <<SUBR UNMAP KERNAL PAR'S 4 AND 5>>
;*****
;*SUBTEST SUBR UNMAP KERNAL PAR'S 4 AND 5
;*****

10231 040026 013737 002272 172350
10232 040034 062737 000200 002272
10233 040042 013737 002272 172352
10234 040050 000207

MOV SAVPAR,KIPAR4
ADD #200,SAVPAR
MOV SAVPAR,KIPARS
RETURN

;RESTORE KIPAR4
;ADD 200 FOR NEXT PAR
;RESTORE KIPARS
;

10237 040052

EXBANK: SUBTST <<SUBR EXAMINE BANK>>

;SUBTEST SUBR EXAMINE BANK

10238
10239
10240
10241
10242
10243
10244
10245
10246
10247
10248
10249
10250
10251
10252
10253
10254
10255
10256

;DOES THE FOLLOWING:
;(1) SETS UP "BANKINDEX" AND R1 BASED ON VALUE OF "BANK".
;(2) SETS THE "MKFLAG" IF THE BANK IS ECC.
;(3) SETS THE "KPFLAG" IF THE BANK IS THE PROTECTED REGION OF ECC MEMORY.
;(4) SETS THE "ACFLAG" IF THE BANK CAN BE ACCESSED BY THIS CPU.
;(5) SETS THE "PFLAG" IF THE BANK IS IN PROGRAM SPACE.
;(6) SETS THE "RRFLAG" IF RELOCATION IS REQUIRED TO TEST THIS BANK; HOWEVER,
; IT COMPLEMENTS THIS FLAG IF THE RELOCATION FLAG "RLFLAG" IS SET (THIS IS
; NECESSARY FOR THE USE OF THE RECURSIVE "MODE" SUBROUTINES). THE "RRFLAG"
; IS ALWAYS SET TO DISABLE TESTING IF FIELD SERVICE MODE "SELECTED BANKS"
; ARE BEING TESTED AND THIS BANK IS NOT SELECTED.
;(7) SETS THE "BMFLAG" IF THE BANK IS A BAD MEMORY; HOWEVER, IT COMPLEMENTS
; THIS FLAG IF THE "WORST" FLAG IS NOT SET (THIS IS NECESSARY FOR THE USE
; OF THE RECURSIVE "MODE" SUBROUTINES).
;(8) SETS THE "INTFLAG" IF THE BANK IS INTERLEAVED.
;(9) SETS THE "INT64K" FLAG IF THE BANK IS INTERLEAVED ON 64K WORD BOUNDS.
;(10) SETS THE "SKIPMK" FLAG IF THIS BANK IS INTERLEAVED, AND HAS ALREADY
; BEEN TESTED.

10257 040052

PUSH R0,R1,R2

MOV R0,-(SP)
MOV R1,-(SP)
MOV R2,-(SP)

040052 010046
040054 010146
040056 010246

10258 040060

CLEAR MKFLAG,KPFLAG

CLR MKFLAG
CLR KPFLAG

040060 005037 002120
040064 005037 002114

10259 040070

SET ACFLAG

MOV #-1,ACFLAG

040070 012737 177777 002116

10260 040076

CLEAR PFLAG,RRFLAG,BMFLAG

CLR PFLAG
CLR RRFLAG
CLR BMFLAG

040076 005037 002122
040102 005037 002124
040106 005037 002130

10261 040112

CLEAR INTFLAG,INT64K,SKIPMK

CLR INTFLAG
CLR INT64K
CLR SKIPMK

040112 005037 002136
040116 005037 002140
040122 005037 002342

10262 040126

MOV BANK,R1

040126 013701 002102

10263 040132

ASL R1

040132 006301

10264 040134

ASL R1 ;R1 <- R1 * 4

040134 006301

10265 040136

MOV R1,BANKINDEX

040136 010137 002104

10266 040142

BIT #BIT6,CONFIG(R1) ;PROTECTED REGION OF ECC MEMORY?

040142 032761 000100 002664

10267 040150

BEQ 1\$;NO - SKIP

040150 001403

10268 040152

SET KPFLAG

MOV #-1,KPFLAG

040152 012737 177777 002114

10269 040160

1\$. MOV #BIT1,R0

040160 012700 000002

10270 040164

IF R0 SET.IN CPUBIT AND R0 OFF.IN CONFIG(R1)

040164 030037 002106

BIT R0,CPUBIT
BEQ L374
BIT R0,CONFIG(R1)
BNE L374

040170 001405

040172 030061 002664

040176 001002

10271 040200

CLR ACFLAG

040200 005037 002116

10272 040204

END ;OF IF R0

040204

L374:::::


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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
:0276 040216 000302                SWAB     R2
10277 040220 042702 177770      BIC      #1C7,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?
;*****
;TEST TO INSURE THAT THE TYPE OF MEMORY IN THE PRESENT BANK
;IS OF THE TYPE WE ARE TESTING "TMFLAG".
;RESULT IS RETURNED IN THE CONDITION CODES (OK = (=0)).
MOV TMFLAG,R0
COM R0
MOV MKFLAG,R1
XOR R0,R1
RETURN ;OK = (=OK)

```

10314
10315
10316
10317 040456 013700 002134
10318 040462 005100
10319 040464 013701 002120
10320 040470 074001
10321 040472 000207
10322
10323 040474
10324 040474

```

INCRPT:
INCPAT: SUBTST <<SUBR INCREMENT PATTERN TESTING >>
;*****
;*SUBTEST SUBR INCREMENT PATTERN TESTING
;*****
;INCREMENT THE PATTERN & SET UP THE CONDITION CODES
;RESULT - Z BIT SET INDICATES OVERFLOW
INC PATTERN
CMP #30,PATTERN ;SET UP CONDITION CODES
RETURN ;NOT EQUAL TO ZERO IS GOOD (NO OVERFLOW)

```

10325
10326
10327 040474 005237 002112
10328 040500 022737 000030 002112
10329 040506 000207
10330
10331 040510
10332 040510

```

SETPAT:
HIPAT: SUBTST <<SUBR SET HIGHEST PATTERN TESTING TYPE>>
;*****
;*SUBTEST SUBR SET HIGHEST PATTERN TESTING TYPE
;*****
MOV #27,PATTERN ;SET HIGHEST PATTERN
RETURN

```

10333 040510 012737 000027 002112
10334 040516 000207
10335
10336 040520

```

INCBNK: SUBTST <<SUBR INCREMENT BANK & TEST>>
;*****
;*SUBTEST SUBR INCREMENT BANK & TEST
;*****
;RESULTS RETURNED IN CONDITION CODES
INC BANK
CMP LASTBANK,BANK ;TOO FAR?
RETURN

```

10337
10338 040520 005237 002102
10339 040524 023737 002556 002102
10340 040532 000207

10343 040534

QUIT: SUBTST <<QUIT ROUTINE>>
;*****
;*SUBTEST QUIT ROUTINE
;*****

10344
10345
10346
10347
10348
10349

;INITIALIZE ALL CSR'S
;UNRELOCATE IF NECESSARY
;FLUSH OUT ANY DBE'S
;TURN OFF MEMORY MANAGEMENT
;TURN OFF THE Q-BUS MAP
;HALT

10350 040534 104472
10351 040536 012737 040600 000004

ECCINIT ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
SET4 #QUIT1 ;TRAPS TO 4 GOTO QUIT1
MOV #QUIT1,4
.DSABL CRF

10352 040544
040544 005737 002126
040550 001402
040552 004737 037214
040556

IF RLFLAG IS TRUE THEN \$CALL UNRELOCATE

TST RLFLAG
BEQ L376
JSR PC,UNRELOCATE
L376:::::;

10353 040556 004737 022200
10354 040562 104421
10355 040564 005737 002454
10356 040570 001003
10357 040572 042737 000040 172516
10358 040600 000005
10359 040602 000000
10360

CALL MT0030 ;FLUSH OUT DBE'S
DEENERGIZE ;TURN OFF MEMORY MANAGEMENT
TST NQ22BIT ;IS THIS AN 11/83,11/23-B OR 11/23?
BNE QUIT1
BIC #BIT5,MMR3 ;TURN OFF THE Q-BUS MAP
QUIT1: RESET
HALT

```

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
;*****
      ;INITIALIZE ALL CSR'S
      ;UNRELOCATE
      ;FLUSH OUT DBE'S
      ;RESTORE LOADERS
      ;TURN OFF MEMORY MANAGEMENT
      ;UNMAP THE Q-BUS MAP
      ECCINIT ;TRAP ON DOUBLE BIT ERRORS (NORMAL)
10373          IF RLFLAG IS TRUE THEN $CALL UNRELOCATE
10374
10375          TST  RLFLAG
10376          BEQ  L402
10377          JSR  PC,UNRELOCATE
10378          L402:::;
10382 040636 104472          IF QUICK IS FALSE
10383 040640          TST  QUICK
      040640 005737 002126          BNE  L403
      040644 001402
      040646 004737 037214
      040652          L403:::;
10384 040652          CALL  MT0030 ;FLUSH OUT DBE'S
      040652 005737 002436          END ;OF IF QUICK
      040656 001002
10385 040660 004737 022200          MOV  #1,R0 ;DESTINATION BANK
10386 040664          MOV  LOADHOME,R1 ;SOURCE BANK
      040664          CALL  BANKMOV
10387 040664 012700 000001          DEENERGIZE ;TURN OFF MEMORY MANAGEMENT
10388 040670 013701 002576          TST  NO22BIT ;DOES THIS PDP-11 HAVE 22-BIT ADDR?
10389 040674 004737 037442          BNE  1$ ;BRANCH IF NOT
10390 040700 104421          BIC  #BIT5,MMR3 ;TURN OFF Q-BUS MAP
10391 040702 005737 002454          1$: RETURN
10392 040706 001003
10393 040710 042737 000040 172516
10397 040716 000207
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

SUBSTST <<BLOCK MOVE SUBROUTINE>>

;SUBTEST BLOCK MOVE SUBROUTINE

;BLOCK3 HAS 3 ARGUEMENTS
;BLOCK2 HAS 2 ARGUEMENTS
;BLOCK1 HAS 1 ARGUEMENTS

; ALL ARE CALLED BY THE BMOV MACRO

.ENABL LSB

BLOCK1: PUSH R0,R1,R2

MOV R0,-(SP)
MOV R1,-(SP)
MOV R2,-(SP)

10410
10411
10412
10413
10414
10415
10416 040770
040770 010046
040772 010146
040774 010246
10417 040776 012702 177640
10418 041002 012701 000020
10419 041006 000413

MOV #FASTCITY,R2
MOV #16.,R1
BR 3\$

BLOCK2: PUSH R0,R1,R2

MOV R0,-(SP)
MOV R1,-(SP)
MOV R2,-(SP)

10421 041010
041010 010046
041012 010146
041014 010246
10422 041016 012701 000020
10423 041022 000404
10424

MOV #16.,R1
BR 2\$

BLOCK3: PUSH R0,R1,R2

MOV R0,-(SP)
MOV R1,-(SP)
MOV R2,-(SP)

10425 041024
041024 010046
041026 010146
041030 010246
10426 041032 012501
10427 041034 012502
10428 041036 012500
10429

MOV (R5)+,R1
2\$: MOV (R5)+,R2
3\$: MOV (R5)+,R0

1\$: MOV (R0)+,(R2)+
SOB R1,1\$
POP R2,R1,R0

10430 041040 012022
10431 041042 077102
10432 041044
041044 012602
041046 012601
041050 012600
10433 041052 000205
10434

RTS R5
.DSABL LSB

MOV (SP)+,R2
MOV (SP)+,R1
MOV (SP)+,R0

```

10436                                     .SBTTL FIELD SERVICE MODE
10437
10438 041054    FIELDSERVICE:SUBTST    <<SUBR FIELD SERVICE COMMAND MODE>>
;*****
;*SUBTEST      SUBR      FIELD SERVICE COMMAND MODE
;*****
10439 041054    104415    SAVREG
10440 041056    104401    066116    TYPE      MSG020          ;FIELD SERVICE COMMAND MODE
                                TYPEIT    ,MSG020
                                .DSABL    CRF
10441
10442 041062    005737    002126    IF RLFLAG IS TRUE OR NOFSMODE IS TRUE
                                TST RLFLAG
                                BNE L404
                                TST NOFSMODE
                                BEQ L405
                                L404:;;;
10443 041076    104401    067557    TYPE      MSG048          ;NOT AVAILABLE NOW - TRY LATER!
                                TYPEIT    ,MSG048
                                .DSABL    CRF
                                RESREG
                                RETURN
                                END ;OF IF RLFLAG
                                L405:;;;;;
10444 041102    104416
10445 041104    000207
10446 041106
                                TST      CACHKN
                                BEQ      1$
                                PUSH     CONTRL          ;SAVE CACHE STATUS
                                MOV      CONTRL,-(SP)
10447 041106    005737    002544    TST      CACHKN
10448 041112    001402    BEQ      1$
10449 041114    013746    177746    PUSH     CONTRL          ;SAVE CSR & KAMIKAZE STATUS
                                MOV      CSRNO,-(SP)
                                MOV      KAMIKAZE,-(SP)
10450 041120    013746    002152    1$:    PUSH     CSRNO,KAMIKAZE
                                MOV      KAMIKAZE,-(SP)
                                MOV      KAMIKAZE,-(SP)
                                041124    013746    002006
10451 041130    104424
                                CACHOFF
10452 041132    012737    177777    002006    SET      KAMIKAZE          ;TURN CACHE OFF
                                MOV      #-1,KAMIKAZE
10453 041140    104401    067007    FS1:    TYPE      MSG026          ;COMMAND:
                                TYPEIT    ,MSG026
                                .DSABL    CRF
                                RDDEC
                                POP      R0          ;READ A DECIMAL NUMBER
                                ;COMMAND - > R0
                                MOV      (SP)+,R0
10454 041144    104414
10455 041146    012600
10456 041150    020027    000022    CMP      R0,#18.
10457 041154    101403    BLOS    1$
10458 041156    104401    066137    TYPE      MSG021
                                TYPEIT    ,MSG021
                                .DSABL    CRF
                                BR      FS1
10459 041162    000766
10460 041164    010046    041242    1$:    CASE R0
                                MOV      R0,-(SP)
                                ASL    @SP
                                JSR    PC,L406
10461 041174    041252    FSCMD0          ;EXIT FIELD SERVICE COMMANDS
10462 041176    041354    FSCMD1          ;READ CSR
10463 041200    041464    FSCMD2          ;LOAD CSR
10464 041202    041632    FSCMD3          ;EXAMINE MEMORY
10465 041204    042106    FSCMD4          ;MODIFY MEMORY
10466 041206    042426    FSCMD5          ;SELECT BANK & PATTERN
10467 041210    043344    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	

```

L406:; ; ; ; ;
      ADD (SP),@SP
      MOV @ (SP),-(SP)
      JSR PC,@(SP)

```

	041242	062616		
	041244	013646		
	041246	004736		
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
10486 041256 062706 000002  .DSABL   CRF
10487 041262          ADD      #2,SP
      041262 005737 002010  IF SKIPKAMI IS TRUE
      041266 001405          TST SKIPKAMI
      041270 062706 000002  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     RESO
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     RESO
10501 041344          POP     CONTRL          ;RESTORE CACHE STATUS
      041344 012637 177746  MOV (SP)+,CONTRL
10502 041350          END ;OF IF CACHKN
      041350          L412:::~::~
10503 041350 104416          RESO: 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 000J04  MOV     #TIMEOUT,4
      041412 022737 000005 004010  CMP     #5,PROTYP
      041420 001002          BNE    101$          ;IS THIS AN 11/83/84 ?
      ;BRANCH IF NOT

```

```

041422 005037 177766          CLR    CPUERR      ;CLEAR OUT THE CPU ERROR REGISTER BITS
041426          101$:          ;THAT A EXPECTED TRAP COULD HAVE SET

10514 041426 000207          .DSABL CRF
10515 041430          RETURN
041430 104401 066763          RES1: TYPE MSG025      ;THIS CSR DOES NOT EXIST
                                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

10518 041462 000207          .DSABL CRF
                                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 012737 041576 000004  SET4  #RES2          ;TRAPS TO 4 GOTO RES2
                                MOV   #RES2.4
                                .DSABL CRF
10525 041502 104426          READCSR
10526 041504 104401 067021          TYPE  MSG027
                                TYPEIT ,MSG027
                                .DSABL CRF
10527 041510 012737 177777 002430  SET   NOERROR
                                MOV   #-1,NOERROR
10528 041516 104026          ERROR +26          ;USE ERROR ROUTINE FOR PRINTOUT
10529 041520 012737 034114 000004  RES4          ;RESET TRAPS TO 4 TO DEFAULT
                                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$:
                                ;THAT A EXPECTED TRAP COULD HAVE SET
                                .DSABL CRF
10530 041542 104401 066747          TYPE  MSG023
                                TYPEIT ,MSG023
                                .DSABL CRF
                                ;FIRST CSR WORD
                                RDOCT
10531 041546 104413          POP   CSR          ;READ AN OCTAL NUMBER
10532 041550 012637 002150          ;PUT IN IN LOC "CSR"
                                MOV (SP),.CSR
10533 041554 104425          LOADCSR
10534 041556 104426          READCSR
10535 041560 104401 067036          TYPE  MSG028
                                TYPEIT ,MSG028
                                .DSABL CRF
10536 041564 012737 177777 002430  SET   NOERROR
                                MOV   #-1,NOERROR
10537 041572 104026          ERROR +26          ;USE FOR PRINTOUT - NOT AN ERROR
10538 041574 000207          RETURN
10539 041576 104401 066763  RES2:  TYPE  MSG025
                                TYPEIT ,MSG025
                                .DSABL CRF
                                ;THIS CSR DOES NOT EXIST
10540 041602 013706 002306          MOV   FSSTACK,SP
10541 041606 012737 034114 000004  RES4          ;RESET TRAPS TO 4 TO DEFAULT
                                MOV   #TIMEOUT,4
                                CMP   #5,PROTYP          ;IS THIS AN 11/83/84 ?
                                BNE  101$          ;BRANCH IF NOT
                                CLR   CPUERR          ;CLEAR OUT THE CPU ERROR REGISTER BITS
                                101$:
                                ;THAT A EXPECTED TRAP COULD HAVE SET
                                .DSABL CRF
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 104401 067052          TYPE MSG029 ;EXAMINE MEMORY
                                TYPEIT ,MSG029
                                .DSABL CRF
10549 041664 104401 067111          1$: TYPE MSG031 ;PHYSICAL ADDRESS (0-17775776)??
                                TYPEIT ,MSG031
                                .DSABL CRF
10550 041670 104413          RDOCT ;READ OCTAL NUMBER ONTO STACK & $HIOCT
10551 041672 013737 056146 002102  MOV $HIOCT,BANK ;PUT MSB'S IN BANK
10552 041700 012600          POP RO ;PUT LSB'S IN RO
                                MOV (SP)+,RO
10553 041702 000241          CLC
10554 041704 006100          ROL RO
10555 041706 006137 002102          ROL BANK
10556 041712 000241          CLC
10557 041714 006000          ROR RO
10558 041716 023737 002102 002556  CMP BANK, LASTBANK ;CHECK FOR BANK TOO HIGH
10559 041724 003357          BGT 1$ ;BRANCH IF TRUE
10560 041726 062700 060000          ADD #FIRST,RO
10561 041732 032700 000001          BIT #BIT0,RO ;CHECK FOR ODD ADDRESS
10562 041736 001352          BNE 1$ ;BRANCH IF ODD ADDRESS
10563 041740 020027 157776          CMP RO,#LAST ;CHECK FOR ADDRESS OVER 16K
10564 041744 101347          BHI 1$ ;BRANCH IF OVER 16K
10565 041746 012737 042020 002304  MOV #3$,PARTHERE ;INCASE OF ABORTS
10566 041754 012737 042026 000004  SET4 #4$ ;TRAPS TO 4 GOTO 4$
                                MOV #4$,4
                                .DSABL CRF
10567 041762 010346          MAP BANK ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
                                MOV R3,-(SP)
041762 013703 002102          MOV BANK,R3
041770 004737 035716          CALL MAPPER
                                .DSABL CRF
                                MOV (SP)+,R3
10568 041774 012603          TESTAREA ;ENTER TEST MODE
10568 041776 053737 002552 177776  BIS TESTMODE,PSW ;GO TO SYSTEM TEST MODE
                                .DSABL CRF
10569 042004 011001          MOV (RO),R1
10570 042006 104417          KERNEL ;ENTER KERNEL MODE
10571 042010          TYPOCS R1
                                MOV R1,-(SP) ;SAVE R1 FOR TYPEOUT
                                TYPOS ;GO TYPE--OCTAL ASCII
                                .BYTE 6 ;TYPE 6 DIGITS
                                .BYTE 0 ;SUPPRESS LEADING ZEROS
                                .DSABL CRF
10572 042016 000410          BR EXCMD3
10573
10574 042020 104401 067151          3$: TYPE MSG032 ;PARITY ABORT
                                TYPEIT ,MSG032

```

```

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

```

```

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

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10615 042274 000431          BR      EXCMD4          ;EXIT
10616
10617 042276 062706 000004    4$:   ADD      #4,SP          ;FIX STACK
10618 042302 104401 067170    TYPEIT  ,MSG033        ;TIMEOUT TRAP
      042302          .DSABL  CRF
10619 042306 000424          BR      EXCMD4          ;EXIT
10620
10621 042310 104401 067315    5$:   TYPEIT  ,MSG037        ;OLD DATA WAS
      042310          .DSABL  CRF
10622 042314 010146    TYPEIT  ,MSG037        ;PRINT IT
      042314 104403    TYPOCS  R1              ;;SAVE R1 FOR TYPEOUT
      042316 104403    MOV      R1,-(SP)      ;;GO TYPE--OCTAL ASCII
      042320 006        TYPOS          ;;TYPE 6 DIGITS
      042321 000        .BYTE 6          ;;SUPPRESS LEADING ZEROS
      .BYTE 0
      .DSABL  CRF
10623 042322 104401 067352    TYPEIT  ,MSG039        ;INPUT NEW DATA
      042322          .DSABL  CRF
10624 042326 104413          RDOCT          READ ON OCTAL NUMBER ONTO THE STACK
10625 042330 012601    POP      R1          ;GET NEW NUMBER
      042330          MOV (SP)+,R1
10626 042332 053737 002552 177776 TESTAREA ;ENTER TEST MODE
      042332          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 104401 067334    TYPEIT  ,MSG038        ;DATA IS NOW
      042346          .DSABL  CRF
10631 042352 010146    TYPOCS  R1              ;PRINT IT
      042352 104403    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 012637 000004    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 012737 034114 000004 RES4 ;RESET TRAPS TO 4 TO DEFAULT
      042402 022737 000005 004010 MOV      #TIMEOUT,4
      042410 001002    CMP      #5,PROTYP    ;IS THIS AN 11/83/84 ?
      042416 005037 177766    BNE          ;BRANCH IF NOT
      042420          CLR      CPUERR ;CLEAR OUT THE CPU ERROR REGISTER BITS
      042424          ;THAT A EXPECTED TRAP COULD HAVE SET
10636 042424 000207          .DSABL  CRF
      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 104401 067072 1$: TYPE MSG030 ;BANK(0-177)?
042466 TYPEIT ,MSG030
.DSABL CRF
10644 042472 104413 RDOCT ;READ AN OCTAL NUMBER ONTO THE STACK
10645 042474 POP BANK ;PUT IT IN BANK
042474 012637 002102 IF BANK GT LASTBANK THEN GOTO 1$ ;CHECK FOR BANK TOO HIGH
10646 042500 MOV (SP)+,BANK
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
GOTO 1$
10653 042534 000754 BR 1$
042534
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      BANK,R3          MOV R3,-(SP)
      042600 013703 002102  CALL    MAPPER
      042604 004737 035716  .DSABL  CRF
      MOV (SP)+,R3
      042610 012603
10668 042612 104511
10669 042614 004737 040052  INVALIDATE
10670 042620          CALL    EXBANK          ;SET NEW MARGINS
      042620 005737 002124  IF RRFLAG IS TRUE
      TST RRFLAG
      BEQ L415
10671 042626          TYPE    MSG049          ;BANK REQUIRES RELOCATION
      042626 104401 067617  TYPEIT  ,MSG049
      .DSABL  CRF
      JMP CMD5C
10672 042632 000137 043246  END ;OF IF RRFLAG
      L415:::~::~:
10673 042636
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    #1C17,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
10686 042722 042737 000200 177776          BIC    #BIT7,PSW      ;KILL ANY OLD INTERRUPT
10687 042730 052777 000100 137704          BIS    #BIT6,@TKS     ;LOWER CPU PRIORITY TO 140
      ;ENABLE KEYBOARD INTERRUPTS
10688
10689
10690 042736          SET    HEADER,MUT
      MOV #-1,HEADER
      MOV #-1,MUT
10691 042752 012737 177777 002612  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)
      BIT #BIT12,CONFIG+2(R1)
      BEQ L416
10699 043016 005237 002240          INC    SPLTCSR
10700 043022          MAP    BANK
      MOV R3,-(SP)
      043022 010346
      043024 013703 002102  MOV     BANK,R3
      043030 004737 035716  CALL    MAPPER

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      .DSABL CRF
10701 043034 012603          MOV (SP)+,R3
      043036 012737 120000 002414    MOV #120000,TESTADD+2
10702 043044          END; OF IF #BIT12
      043044          L416:::
10703 043044          IF #SWO SET.IN @SWR
      043044 032777 000001 137564    BIT #SWO,@SWR
      043052 001402          BEQ L417
10704 043054 104470          ECCDIS          ;DISABLE ERROR CORRECTION
10705 043056          ELSE
      043056 000405          BR L420
10706 043060          L417:::
      043060 013746 002152    PUSH CSRNO          MOV CSRNO,-(SP)
10707 043064 104502          CLRCSR          ;CLEAR CSRS
10708 043066          POP CSRNO
      043066 012637 002152    END ;OF IF          MOV (SP)+,CSRNO
10709 043072          L420:::
      043072          MOV #2,NOPAR          ;PARITY ACTION
10710 043072 012737 000002 002076    MOV #2,PCBUMP      ;TRAPS ADD 2 TO PC
10711 043100 012737 000002 002326    MOV #2,PCBUMP
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

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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
;*****
CALL PCONFIG
RETURN

```

10771 043344 004737 032722
10772 043350 000207
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 MTO031
10803 043536          END ;OF IF ACFLAG
043536          L423:;;;;;
10804 043536          END ;OF FOR BANK

```

```

043536 005237 002102
043542 023737 002102 002556
043550 003757
043552
10805 043552 TYPE $BELL ;RING BELL E71:;;;;;
043552 104401 002653 TYPEIT , $BELL
.DSABL CRF
GOTO CMD7B
10806 043556 BR CMD7B
043556 000752
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, RO ;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

FSCMDB: SUBTST <<FS COMMAND 8 ERROR SUMMARY>>

;SUBTEST FS COMMAND 8 ERROR SUMMARY

10818 043644

043644 010046
043646 010246
043650 010346

MOV R0,-(SP)
MOV R2,-(SP)
MOV R3,-(SP)
MOV BANK,-(SP)

10819 043656 013737 056654 002102 002434

10820 043664 005337 002434

10821 043670

043670 013746 002434
043674 104405

MOV \$PASS,TEMP
DEC TEMP
TYPDEC TEMP
MOV TEMP,-(SP) ;:SAVE TEMP FOR TYPEOUT
TYPDS ;:GO TYPE--DECIMAL ASCII WITH SIGN
.DSABL CRF

10822 043676 013737 172350 002270

10823 043704 012737 001000 172350

10824 043712

043712 104401 071242

MOV KIPAR4,SAV4 ;;;I.L.C.;REV B
MOV #1000,KIPAR4 ;;;I.L.C.;REV B
TYPE MSG125 ;PASSES COMPLETED
TYPEIT ,MSG125
.DSABL CRF

10825 043716

043716 013746 002630
043722 104405

TYPDEC \$ERTTL
MOV \$ERTTL,-(SP) ;:SAVE \$ERTTL FOR TYPEOUT
TYPDS ;:GO TYPE--DECIMAL ASCII WITH SIGN
.DSABL CRF

10826 043724

043724 104401 070265

TYPE MSG079 ;ERROR(S) DETECTED
TYPEIT ,MSG079
.DSABL CRF
IF \$ERTTL NE #0

10827 043730

043730 005737 002630
043734 001445

TST \$ERTTL
BEQ L424

10828 043736 005037 002334

10829 043742

043742 005037 002102
043746

CLR SUCCESS
FOR BANK := #0 TO LASTBANK

CLR BANK
B72:::;::;

10830 043746 013703 002102

10831 043752 070327 000004

10832 043756

043756 105763 002666
043762 001424

MOV BANK,R3
MUL #4,R3
IFB CONFIG+2(R3) NE #0

TSTB CONFIG+2(R3)
BEQ L425

10833 043764

043764 005737 002334
043770 001005

IF SUCCESS IS FALSE

TST SUCCESS
BNE L426

10834 043772

043772 104401 070230

TYPE MSG076 ;BANK ERRORS
TYPEIT ,MSG076
.DSABL CRF
SET SUCCESS

10835 043776

043776 012737 177777 002334

MOV #-1,SUCCESS

10836 044004

044004

END ;OF IF SUCCESS

L426:::;::;

10837 044004

044004 013746 002102

TYPDCS BANK,3
MOV BANK,-(SP) ;:SAVE BANK FOR TYPEOUT
;:3

044010 104403
044012 006
044013 000

TYPDS ;:GO TYPE--OCTAL ASCII
.BYTE 6 ;:TYPE 6 DIGITS
.BYTE 0 ;:SUPPRESS LEADING ZEROS
.DSABL CRF

10838 044014

116300 002666

MOVB CONFIG+2(R3),R0

```

10839 044020 042700 177400          BIC      #+C377,R0
10840 044024          TYPDEC   R0
      044024 010046      MOV      RO,-(SP)      ;;SAVE RO FOR TYPEOUT
      044026 104405      TYPDS    ;;GO TYPE--DECIMAL ASCII WITH SIGN
      .DSABL CRF
10841 044030          .DSABL CRF
      044030 104401 002660      TYPE    TYPE      $CRLF
      TYPEIT , $CRLF
      .DSABL CRF
10842 044034          END ;OF IFB CONFIG(R3)
      044034
10843 044034          END ;OF FOR BANK          L425:;;;;;
      044034 005237 002102          INC BANK
      044040 023737 002102 002556      CMP BANK, LASTBANK
      044046 003737          BLE B72
      044050          E72:;;;;;
10844 044050          END ;OF IF $ERTTL          L424:;;;;;
      044050
10845 044050 013737 002270 172350      MOV      SAV4,KIPAR4      ;;I.L.C.;;;REV B
10846 044056          POP      BANK,R3,R2,RO
      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          CLRCR          ;CLEAR CSRS
10859 044144          END ;OF IF          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,RO          ;KILL ANY OLD INTERRUPT
10866 044174 042737 000200 177776          BIC ;JIT7,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 MTO022
10876 044256          END ;OF IF ACFLAG
      044256          L431:;;;;;
10877 044256          END ;OF FOR BANK
      044256 005237 002102          INC BANK

```

```

044262 023737 002102 002556          CMP BANK, LASTBANK
044270 003757          BLE B73
044272          E73: :::::
10878 044272 104401 002653          TYPE $BELL ;RING BELL
          TYPEIT , $BELL
          .DSABL CRF
          GOTO CMD9B
10879 044276          BR CMD9B
          044276 000752
10880
10881 044300 013706 002306          CMD9C: MOV FSSTACK, SP ;RECOVER OLD STACK POINTER
10882 044304 042777 000100          BIC #BIT6, @TKS
10883 044312 117700 136326          MOV @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      RO
044364 010046
10893 044366      TYPE      MSG085          ;FILL COUNT(OCTAL)?
044366 104401 070311  TYPEIT    ,MSG085
      .DSABL  CRF
10894 044372 104413  RDOCT
10895 044374      POP      RO
044374 012600          MOV (SP),RO
10896 044376 042700 177760  BIC      #+C17,RO
10897 044402 110037 002357  MOVB     RO,$FILLS
10898 044406      POP      RO
044406 012600          MOV (SP),RO
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
10915 044462 013737 002544 002546  MOV      CACHKN,CACHKN+2  ;TURN CACHE OFF
10916 044470 005037 002544  CLR      CACHKN          ;SAVE OLD CACHE ON STATE
10917 044474 000207      RETURN          ;KEEP CACHE OFF
10918
10919 044476      FCMD14: SUBTST <<FS  COMMAND 14  TURN CACHE ON>>
;*****
;*SUBTEST      FS  COMMAND 14  TURN CACHE ON

```

10920 044476
044476 104401 070652

10921 044502 013737 002546 002544
10922 044510 104423
10923 044512 000207
10924

```
*****  
;*****  
TYPE MSG107 ;CACHE IS ON (EXCEPT DURING ACTUAL PATTERNS)  
TYPEIT .MSG107  
.DSABL CRF  
MOV CACHKN+2,CACHKN ;RESTORE OLD CACHE ON STATE  
CACHON ;TURN CACHE ON  
RETURN
```

```

10937
10938 044514 FCMD15: SUBTST <<FS COMMAND 15 TEST ONLY SELECTED BANKS>>
;*****
;*SUBTEST FS COMMAND 15 TEST ONLY SELECTED BANKS
;*****
10939 044514 104401 070561 TYPE MSG105 ;ENTER BANKS IN OCTAL - USE NUMBER OUTSIDE RANGE TO TERMINAT
044514 .DSABL CRF
10940 044520 004737 044610 CALL CMD16A ;ERASE OLD SELECTIONS
10941 044524 BEGIN CMD16LOOP
044524 REPEAT B74:;;;;;
10942 044524 REPEAT B75:;;;;;
044524 TYPE MSG030 ;BANK(0-177)?
10943 044524 104401 067072 TYPEIT ,MSG030
044524 .DSABL CRF ;READ AN OCTAL NUMBER ONTO THE STACK
10944 044530 104413 RDOCT ;PUT IT IN R1
10945 044532 012601 POP R1 MOV (SP)+,R1
10946 044534 IF R1 GT #177 OR R1 LT #0 CMP R1,#177
044534 020127 000177 BGT L432
044540 003002 TST R1
044542 005701 BGE L433
044544 002001 L432:;;;;;
044546 LEAVE CMD16LOOP BR E74
10947 044546 000406 END ;OF IF R1 L433:;;;;;
10948 044550 ASL R1 ;R1 <- R1 * 4
044550 ASL R1
10949 044550 006301 BIS #BIT14,CONFIG+2(R1)
10950 044552 006301 END ;OF REPEAT BR B75
10951 044554 052761 040000 002666 E75:;;;;;
10952 044562 000760 END CMD16LOOP E74:;;;;;
044564 TYPE MSG110 ;ONLY SELECTED BANKS WILL BE TESTED
10953 044564 104401 070727 TYPEIT ,MSG110
044564 .DSABL CRF
10954 044570 012737 177777 002002 SET SEL ONLY
044570 000207 RETURN MOV #-1,SELONLY
10955 044570 012737 177777 002002 RETURN
10956 044576 000207
10957
10958 044600 FCMD16: SUBTST <<FS COMMAND 16 RESUME TESTING ALL BANKS>>
;*****
;*SUBTEST FS COMMAND 16 RESUME TESTING ALL BANKS
;*****
10959 044600 104401 070773 TYPE MSG111 ;ALL BANKS WILL BE TESTED
044600 TYPEIT ,MSG111
10960 044604 005037 002002 .DSABL CRF
10961 CLR SELONLY
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
 044620 005001
 044622
 10967 044622 042761 040000 002666
 10968 044630
 044630 062701 000004
 044634 020102
 044636 003771
 044640
 10969 044640 000207

FOR R1 := #0 TO R2 BY #4
 BIC #BIT14,CONFIG+2(R1)
 END ;OF FOR R1
 RETURN

CLR R1
 B76:::~::~
 ADD #4,R1
 CMP R1,R2
 BLE B76
 E76:::~::~

10972 044642

FCMD17: SUBTST <<FS COMMAND 17 ENABLE TRACE>>
;*****
;*SUBTEST FS COMMAND 17 ENABLE TRACE
;*****

10973 044642
044642 104401 071331

TYPE MSG127
TYPEIT ,MSG127
.DSABL CRF
MOV #-1,TRACE
RETURN

10974 044646 012737 177777 006216
10975 044654 000207

10978 044656

FCMD18: SUBTST <<FS COMMAND 18 DISABLE TRACE>>
;*****
;*SUBTEST FS COMMAND 18 DISABLE TRACE
;*****

10979 044656 104401 071350
044656

TYPE MSG128
TYPEIT ,MSG128
.DSABL CRF
CLR TRACE
RETURN

10980 044662 005037 006216
10981 044666 000207

10984 044670

WHICHCSR:SUBTST <<SUBR DETERMINE CORRECT CSR>>
;*****
;*SUBTEST SUBR DETERMINE CORRECT CSR
;*****

10985 044670 013700 002224
10986 044674 022700 100000
10987 044700 001003
10988 044702 005037 002152
10989 044706 000207

MOV TOTCSR,R0 ;GET CSR'S FLAG
CMP #BIT15,R0 ;CSR 0?
BNE 1\$;NO - SKIP
CLR CSRNO ;YES - SET IT UP
RETURN

10990
10991 044710
044710 104401 066725

1\$: TYPE MSG022 ;WHICH CSR(O-F)
TYPEIT ,MSG022
.DSABL CRF
RDLIN ;GET CHARACTER
POP R0 ;PUT IN R0

10992 044714 104412
10993 044716
044716 012600

MOV (R0),R0 ;PUT CHAR IN R0
CMP R0,#106 ;CHECK LIMIT
BHI 1\$;IF BAD LOOP TILL HE TYPES IT RIGHT

10994 044720 011000
10995 044722 020027 000106
10996 044726 101370

10997 044730 022700 000101
10998 044734 103002
10999 044736 162700 000007

2\$: SUB #7,R0
SUB #60,R0
ASL R0
MOV R0,CSRNO
RETURN

11000 044742 162700 000060
11001 044746 006300
11002 044750 010037 002152
11003 044754 000207

```

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
          LET BAD := -2(R1)
11473 045004          KERNEL          ;ENTER KERNEL MODE
          045004 016137 177776 002052          MOV -2(R1),BAD
11474 045012 104417
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
          ;*****
          IF BADPC EQ #0 THEN $CALL BADSTACK
11484 045040          TST BADPC
          045040 005737 002022          BNE L437
          045044 001002          JSR PC,BADSTACK
          045046 004737 034152          L437:;;;;;
          045052
11485 045052          PUSH RO
          045052 010046          MOV RO,-(SP)
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
          TST (R1)          ;READ LOCATION TO READ CHECKBITS INTO CSR
11489 045070 005711
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 EXTRANEQUS 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

```

```

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

```

```

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

```

```

11540          .SBTTL POWER FAIL AUTO RESTART
11541          .SBTTL ROUTINE POWER DOWN AND UP
11542          ;*****
11543          ;POWER DOWN ROUTINE
11544 045352    $PWRDN:
11552          ;SAVE CACHE STATUS
11553 045352 005737 002544    TST    CACHKN
11554 045356 001403          BEQ    5$
11555 045360          PUSH   CONTRL
11556 045360 013746 177746          MOV   CONTRL,-(SP)
11557 045364 104423          CACHON
11558 045366 012737 046300 000024 5$:  MOV   # $ILLUP,PWRVEC ;TURN CACHE ON
11559 045374 012737 000340 000026 5$:  MOV   #340,PWRVEC+2 ;SET FOR FAST UP
11559 045402          PUSH   R0,R1,R2,R3,R4,R5,CSRNO ;;PRIO:7
11559 045402 010046          MOV   R0,(SP)
11559 045404 010146          MOV   R1,-(SP)
11559 045406 010246          MOV   R2,-(SP)
11559 045410 010346          MOV   R3,-(SP)
11559 045412 010446          MOV   R4,-(SP)
11559 045414 010546          MOV   R5,-(SP)
11559 045416 013746 002152          MOV   CSRNO,-(SP)
11560          ;SAVE USER PAR'S & PDR7
11561 045422 012700 177700    MOV   #177700,R0
11562 045426 012701 000021    MOV   #17.,R1
11563 045432          1$:  PUSH   -(R0)
11564 045432 014046          SOB   R1,1$
11564 045434 077102          ;SAVE SUPERVISOR PAR'S
11565          TST   NOSUPER
11566 045436 005737 002456    BNE   PD1
11567 045442 001013          MOV   #172300,R0
11568 045444 012700 172300    MOV   #16.,R1
11569 045450 012701 000020    2$:  PUSH   -(R0)
11570 045454          SOB   R1,2$
11570 045454 014046          MOV   -(R0),-(SP)
11571 045456 077102          IF RLFLAG IS TRUE THEN $CALL WOOPS
11572 045460          TST  RLFLAG
11572 045460 005737 002126          BEQ  L443
11572 045464 001402          JSR  PC,WOOPS
11572 045466 004737 046306          L443:::
11572 045472
11573          ;COPY KERNEL MAP TO USER & SUPERVISOR
11574 045472 012700 172300    PD1:  MOV   #KIPDRO,R0
11575 045476 012701 177600    MOV   #UIPDRO,R1
11576 045502 012702 172200    MOV   #SIPDRO,R2
11577 045506 012703 000040    MOV   #32.,R3
11578 045512 011021    3$:  MOV   (R0),(R1)+
11579 045514 012022    MOV   (R0)+,(R2)+
11580 045516 077303    SOB   R3,3$

```



```

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
11643 045752 012677 134660 MOV    (SP)+,@SWR
11644 045756 012700 172340 10$: MOV    #172340,R0
11645 045762 012702 172300 MOV    #KIPDR0,R2
11646 045772 012701 000020 6$: MOV    #16.,R1
045772 012620 POP    (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
11653 046010 012637 172516 11$: POP    MMR2,MMR1,MMR0
046014 012637 177576 MOV    (SP)+,MMR2
046020 012637 177574 MOV    (SP)+,MMR1
046024 012637 177572 MOV    (SP)+,MMR0
11654 ;RESTORE ECC REGISTERS
11655 046030 013701 002224 MOV    TOTCSRS,R1 ;:GET CSR'S
11656 046034 042701 177400 BIC    #177400,R1
11657 046040 BEGIN LCSRRESTORE
11658 046040 FOR CSRNO := #36 DOWNT0 #0 BY #2 B101:::::
046040 012737 000036 002152 MOV    #36,CSRNO
046046 B102:::::
11659 046046 006201 ASR    R1
11660 046050 ON.ERROR
11661 046052 103003 POP    CSR
11662 046052 012637 002150 MOV    (SP)+,CSR
11663 046056 104425 LOADCSR
046060 END ;OF ON.ERROR
11664 046060 IF R1 EQ #0 THEN LEAVE LCSRRESTORE L445:::::
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
                                MOV (SP)+,R0
11680 046140                SUPERVISOR
      046140 052737 040000 177776  BIS      #BIT14,PSW      ;ENTER SUPERVISOR MODE
                                ;GO TO SUPERVISOR MODE
      .DSABL CRF
      MOV    R0,SSP
11681 046146 010006                KERNEL
11682 046150 104417                POP      R0      ;ENTER KERNEL MODE
11683 046152                13$:
      046152 012600                USER
11684 046154 052737 140000 177776  BIS      #BIT15!BIT14,PSW ;GO TO USER MODE
      046154                .DSABL CRF
      MOV    R0,USP
11685 046162 010006                KERNEL      ;ENTER KERNEL MODE
11686 046164 104417                ;RESTORE SUPERVISOR PAR'S
11687                MOV      #172240,R0
11688 046166 012700 172240      MOV      #16.,R1
11689 046172 012701 000020      POP      (R0)+
11690 046176                7$:
      046176 012620                SOB      R1,7$
11691 046200 077102                ;RESTORE USER PAR'S & PDR7
11692                MOV      #177636,R0
11693 046202 012700 177636      MOV      #17.,R1
11694 046206 012701 000021      POP      (R0)+
11695 046212                8$:
      046212 012620                SOB      R1,8$
11696 046214 077102                ;RESTORE POSSIBLE SOFTWARE DISPLAY REGISTER
11697                MOV      $PATMAR,@DISPLAY
11698 046216 013777 002012 134414  MOV      $PATMAR,DISPREG
11699 046224 013737 002012 000174  POP      CSRNO,R5,R4,R3,R2,R1,R0
11700 046232                MOV (SP)+,CSRNO
      046232 012637 002152                MOV (SP)+,R5
      046236 012605                MOV (SP)+,R4
      046240 012604                MOV (SP)+,R3
      046242 012603                MOV (SP)+,R2
      046244 012602                MOV (SP)+,R1
      046246 012601                MOV (SP)+,R0
      046250 012600
11701 046252 012737 045352 000024  MOV      #$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
                                MOV (SP)+,CONTRL
      046272 012637 177746
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
MOV BANK,-(SP)

11725 046312

CLR BANK
MAP BANK ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
MOV R3,-(SP)

11726 046316

MOV BANK,R3
CALL MAPPER
.DSABL CRF

046316

046320

046324

046330

11727 046332

SUPERVISOR ;ENTER SUPERVISOR MODE
BIS #BIT14,PSW ;GO TO SUPERVISOR MODE
.DSABL CRF

046332

046340

11728 046346

11729 046346

11730 046354

046354

046360

046362

046364

MOV FIRST+PWRVEC,WOOPSAV
MOV FIRST+PWRVEC+2,WOOPSAV+2
BMOV FIRST+WOOPUP,WOOPSAV+4,WOOPEND-WOOPUP/2+12.
JSR R5,BLOCK3
WOOPEND-WOOPUP/2+12.
WOOPSAV+4
FIRST+WOOPUP
.DSABL CRF

11731 046366

11732 046374

11733 046402

046402

046406

046410

046412

MOV #WOOPUP,FIRST+PWRVEC
MOV #340,FIRST+PWRVEC+2
BMOV WOOPUP,FIRST+WOOPUP,WOOPEND-WOOPUP/2
JSR R5,BLOCK3
WOOPEND-WOOPUP/2
FIRST+WOOPUP
WOOPUP
.DSABL CRF

11734 046414

11735 046420

11736 046424

11737 046430

11738 046432

11739 046434

11740 046440

11741 046442

11742 046446

11743 046452

11744 046456

11745 046462

11746 046464

046464

11747 046470

1\$:

2\$:

MOV #KIPARO,P0
MOV #FIRST+WOOPEND,R1
MOV #8,R2
MOV (R0)+,(R1)+
SOB R2,1\$
TST NOSUPER
BNE 2\$
MOV MMR3,(R1)+
MOV MMR2,(R1)+
MOV MMR1,(R1)+
MOV MMRO,(R1)+
KERNEL ;ENTER KERNEL MODE
POP BANK
MOV (SP)+,BANK
RETURN

11750 046472

WOOPUP: SUBTST <<POWER UP FROM BANK 0 TO RELOCATION>>
:*****
:*SUBTEST POWER UP FROM BANK 0 TO RELOCATION
:*****

11751 046472 012700 046654
11752 046476 012701 172340
11753 046502 012703 172300
11754 046506 012702 000010
11755 046512 012021
11756 046514 012723 077406
11757 046520 077204
11758 046522 005737 002456
11759 046526 001002
11760 046530 012037 172516
11761 046534 012037 177576
11762 046540 012037 177574
11763 046544 012037 177572
11764 046550 013706 046304
11765 046554
046554 013746 002102
11766 046560 005037 002102
11767 046564
046564 010346
046566 013703 002102
046572 004737 035716

046576 012603
11768 046600
046600 052737 040000 177776

11769 046606 013737 046704 060024
11770 046614 013737 046706 060026
11771
11772
11773 046622 012700 046710
11774 046626 012701 000105
11775 046632 012702 126472
11776 046636 012022
11777 046640 077102
11778
11779 046642 104417
11780 046644
046644 012637 002102
11781 046650 000137 045726
11782 046654 000014
11785 046704 000107

MOV #WOOPEND,R0
MOV #KIPARO,R1
MOV #KIPDRO,R3
MOV #8.,R2
1\$: MOV (R0)+,(R1)+
MOV #77406,(R3)+
SOB R2,1\$
TST NOSUPER
BNE 3\$
3\$: MOV (R0)+,MMR3
MOV (R0)+,MMR2
MOV (R0)+,MMR1
MOV (R0)+,MMR0
MOV \$SAVR6,SP
PUSH BANK

CLR BANK
MAP BANK ;MAP SUPERVISOR SPACE (TEST AREA) TO BANK
MOV R3,(SP)

MOV BANK,-(SP)

MOV BANK,R3
CALL MAPPER
.DSABL CRF

MOV (SP)+,R3
SUPERVISOR ;ENTER SUPERVISOR MODE
BIS #BIT14,PSW ;GO TO SUPERVISOR MODE
.DSABL CRF
MOV WOOPSAV,FIRST+PWRVEC
MOV WOOPSAV+2,FIRST+PWRVEC+2
;SIMULATE THE FOLLOWING BLOCK MOV BUT WITH NO STACK ACCESSES
;BMOV WOOPSAV+4,FIRST+WOOPUP,WOOPEND-WOOPUP/2+12.
MOV #WOOPSAV+4,R0
MOV #WOOPEND-WOOPUP/2+12.,R1
MOV #FIRST+WOOPUP,R2
2\$: MOV (R0)+,(R2)+
SOB R1,2\$

KERNEL ;ENTER KERNEL MODE
POP BANK

JMP \$PWRUP
WOOPEND: .REPT 12.
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

\$TYPE: TSTB \$TPFLG ;; IS THERE A TERMINAL?
BMI 6\$;; BR IF NO
1\$: MOV RO, -(SP) ;; SAVE RO
MOV @2(SP), RO ;; GET ADDRESS OF ASCIZ STRING
4\$: MOV (RO)+, -(SP) ;; PUSH CHARACTER TO BE TYPED ONTO STACK
BNE 7\$;; BR IF IT ISN'T THE TERMINATOR
TST (SP)+ ;; IF TERMINATOR POP IT OFF THE STACK
5\$: MOV (SP)+, RO ;; RESTORE RO
6\$: ADD #2, (SP) ;; ADJUST RETURN PC
RTI ;; RETURN
7\$: CMPB #HT, (SP) ;; BRANCH IF NOT <HT>
BNE 11\$
11\$: MOV #', (SP) ;; REPLACE TAB WITH SPACE
CMPB #CRLF, (SP) ;; BRANCH IF NOT <CRLF>
BNE 8\$
TST (SP)+ ;; POP <CR><LF> EQUIV
TYPE ;; TYPE A CR AND LF
TYPEIT
.DSABL CRF
\$CRLF
CLRB \$CHARCNT ;; CLEAR CHARACTER COUNT
BR 4\$;; GET NEXT CHARACTER
8\$: CALL \$TYPEC ;; GO TYPE THIS CHARACTER
9\$: CMPB \$FILLC, (SP)+ ;; IS IT TIME FOR FILLER CHARS.?
BNE 4\$;; IF NO GO GET NEXT CHAR.
MOV \$NULL, -(SP) ;; GET # OF FILLER CHARS. NEEDED
AND THE NULL CHAR.
10\$: DECB 1(SP) ;; DOES A NULL NEED TO BE TYPED?
BLT 9\$;; BR IF NO--GO POP THE NULL OFF OF STACK
CALL \$TYPEC ;; GO TYPE A NULL
DECB \$CHARCNT ;; DO NOT COUNT AS A COUNT
BR 10\$;; LOOP

XOCHAR: .WORD 0
\$TYPEC: PUSH R1
MOV R1, -(SP)
MOVB 4(SP), R1
TST CACHKN
BEQ 2\$

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11809 047122 105737 002360
11810 047126 100407
11811 047130 010046
11812 047132 017600 000002
11813 047136 112046
11814 047140 001005
11815 047142 005726
11816 047144 012600
11817 047146 062716 000002
11818 047152 000002
11819 047154 122716 000011
11820 047160 001002
11821 047162 112716 000040
11822 047166 122716 000200
11823 047172 001006
11824 047174 005726
11825 047176
047176 104401
11826 047200 002660
11827 047202 105037 047434
11828 047206 000753
11829 047210 004737 047250
11830 047214 123726 002652
11831 047220 001346
11832 047222 013746 002356
11833
11834 047226 105366 000001
11835 047232 002770
11836 047234 004737 047250
11837 047240 105337 047434
11838 047244 000770
11839 047246 000000
11840 047250
047250 010146
11841 047252 116601 000004
11842 047256 005737 002544
11843 047262 001402

```

11844 047264          PUSH   CONTRL
      047264 013746 177746
11845 047270          2$: PUSH   RO
      047270 010046
11846 047272 104424          CACHOFF ;TURN CACHE OFF
11871 047274 105777 133346 3$: 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          $TYPEX: POP  RO
      047436 012600          MOV (SP)+,RO
11902 047440 005737 002544          TST  CACHKN ;IS THERE A CACHE?
11903 047444 001402          BEQ  2$ ;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

```

.SBTTL ERROR DATA SETUP

: USE THIS IF THIS CONDITION DISCRIBES THE ERROR

: PERR01 TRAP
: BAD DATA IN R0 UNLESS ABORTED
: THEN BAD DATA IS POINTED TO BY -(R4)
: GOOD DATA IN R5: PERR02 TRAP
: BAD DATA IN R1 UNLESS ABORTED
: THEN BAD DATA IS POINTED TO BY -(R4)
: GOOD DATA IN R2: PERR03 TRAP
: BAD DATA IS POINTED TO BY -(R1)
: GOOD DATA IN R4: PERR04 TRAP
: BAD DATA IN R4 UNLESS ABORTED
: THEN BAD DATA IS POINTED TO BY 2(R0)
: GOOD DATA IN R2: PERR05 JSR PC
: BAD DATA IS POINTED TO BY -(R0)
: GOOD DATA IN R2
: RETURN AFTER SETTING UP GOOD,BAD,ADDRESS: PERR06 JSR PC
: BAD DATA IS POINTED TO BY -(R0)
: GOOD DATA IS ZERO
: RETURN AFTER SETTING UP GOOD,BAD,ADDRESS: PERR07 TRAP
: BAD DATA IN R2 UNLESS ABORTED
: THEN BAD DATA IS POINTED TO BY (R1)
: GOOD DATA IN DATBUF: PERR10 TRAP
: BAD DATA IN R2 UNLESS ABORTED
: THEN BAD DATA IS POINTED TO BY 2(R1)
: GOOD DATA IN DATBUF+2: PERR11 TRAP
: BYTE TEST
: BAD DATA IN RIGHT BYTE OF R0 UNLESS ABORTED
: THEN BAD DATA IS POINTED TO BY (R1)
: GOOD DATA IS A ZERO BYTE: PERR12 TRAP
: BYTE TEST
: BAD DATA IN RIGHT BYTE OF R0 UNLESS ABORTED
: THEN BAD DATA IS POINTED TO BY (R1)
: GOOD DATA IS A BYTE OF ONES: PERR13 TRAP
: BAD DATA IN R0 UNLESS ABORTED12585
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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


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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	047454	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	

12779	047736	010137	002034	
	047742			
12780	047742	010037	002052	
	047746			
	047746	012737	000377	002044
12781	047754	000137	050264	

LET BAD := R0
LET GOOD := #377
JMP PERRAB

MOV R1, ADDRESS
MOV R0, BAD
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 PERRAW	
12818					
12819	050140			\$PER22: LET ADDRESS := R1	

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

12834 050212

P_LRRAW: SUBTST <<DATA WAS A WORD>>
;*****
;*SUBTEST DATA WAS A WORD
;*****

12835 050212 004737 050446

12836 050216 005737 002144

050222 001402

050224 004737 045252

050230

12837 050230 005737 002022

050234 001002

050236 004737 034152

050242

12838 050242 004737 050422

12839 050246 005737 002144

050252 001002

12840 050254 104011

12841 050256 000401

050260

12842 050260 104012

12843 050262 050262

050262

12844 050262 000002

12845

12846 050264

CALL PERBNK
IF ABORTFLAG IS TRUE THEN \$CALL GETDATA

TST ABORTFLAG
BEQ L450
JSR PC,GETDATA
L450:;;;;;

IF BADPC EQ #0 THEN \$CALL BADSTACK

TST BADPC
BNE L451
JSR PC,BADSTACK
L451:;;;;;

CALL PERXOR
IF ABORTFLAG IS FALSE

TST ABORTFLAG
BNE L452

ERROR +11
ELSE

BR L453
L452:;;;;;

ERROR +12
END ;OF IF ABORTFLAG

L453:;;;;;

RTI

PERRAB: SUBTST <<DATA WAS A BYTE>>
;*****
;*SUBTEST DATA WAS A BYTE
;*****

12847 050264 004737 050446

12848 050270 005737 002144

050274 001402

050276 004737 045252

050302

12849 050302 005737 002022

050306 001002

050310 004737 034152

050314

12850 050314 004737 050422

12851 050320 005737 002144

050324 001002

12852 050326 104014

12853 050330 000401

050332

12854 050332 104015

12855 050334 050334

050334

12856 050334 000002

CALL PERBNK
IF ABORTFLAG IS TRUE THEN \$CALL GETDATA

TST ABORTFLAG
BEQ L454
JSR PC,GETDATA
L454:;;;;;

IF BADPC EQ #0 THEN \$CALL BADSTACK

TST BADPC
BNE L455
JSR PC,BADSTACK
L455:;;;;;

CALL PERXOR
IF ABORTFLAG IS FALSE

TST ABORTFLAG
BNE L456

ERROR +14
ELSE

BR L457
L456:;;;;;

ERROR +15
END ;OF IF ABORTFLAG

L457:;;;;;

RTI

12859 050336

```

PERRA7: SUBTST <<DATA WAS A 7 BIT BYTE>>
;*****
;*SUBTEST DATA WAS A 7 BIT BYTE
;*****
IF BADPC EQ #0 THEN $CALL BADSTACK

```

12860 050336 005737 002022
050342 001002
050344 004737 034152
050350

```

TST BADPC
BNE L460
JSR PC,BADSTACK
L460:;:;:;

```

12861 050350 004737 050422
12862 050354 004737 050446
12863 050360 104022
12864 050362 000002
12865

```

CALL PERXOR
CALL PERBNK
ERROR +22
RTI

```

12866 050364 012737 100000 002046
050364

```

$PER26: LET GOOD2 := #100000 MOV #100000,GOOD2

```

12867 050372 012737 000100 002050
050372

```

LET GOOD3 := #100 MOV #100,GOOD3

```

12868 050400 000137 045040
12869

```

JMP PERRA3

```

12870 050404 005037 002046
12871 050410 012737 000077 002050
050410

```

$PER27: CLR GOOD2
LET GOOD3 := #077 MOV #077,GOOD3

```

12872 050416 000137 045040
12873

```

JMP PERRA3

```

12874 050422

```

PERXOR: SUBTST <<DETERMINE XOR OF GOOD & BAD>>
;*****
;*SUBTEST DETERMINE XOR OF GOOD & BAD
;*****

```

12875 050422 010046
050422

```

PUSH RO MOV RO, (SP)

```

12876 050424 013700 002044
12877 050430 013737 002052 002060
12878 050436 074037 002060

```

MOV GOOD,RO
MOV BAD,BAD XOR
XOR RO,BAD XOR
POP RO

```

12879 050442 012600
050442

```

MOV (SP)+,RO

```

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 RO,R1
050446 010046 MOV RO,-(SP)
050450 010146 MOV R1,-(SP)
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 RO,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

```


12917	050636			
	050636	023727	002300	000015
	050644	001001		
12918	050646	104043		
12919	050650			
	050650			
12920	050650			
	050650	023727	002300	000016
	050656	001001		
12921	050660	104044		
12922	050662			
	050662			
12923	050662			
	050662	012737	177777	002612
12924	050670	000002		

IF REALPAT EQ #15

ERROR +43
END ;OF IF REALPAT

IF REALPAT EQ #16

ERROR +44
END ;OF IF REALPAT

SET HEADER

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
      050676 001002
      050700 004737 034152
      050704
                                TST BADPC
                                BNE L470
                                JSR PC,BADSTACK
                                L470:;;;;;
12928 050704 010137 002034      MOV R1,ADDRESS
12929 050710 010037 002052      MOV RO,BAD
12930 050714 010237 002044      MOV R2,GOOD
12931 050720          SET HEADER
                                MOV #-1,HEADER
      050720 012737 177777 002612
12932 050726 104040          ERROR +40
12933 050730          SET HEADER
                                MOV #-1,HEADER
      050730 012737 177777 002612
12934 050736 000002          RTI
12935
12936 050740          $PER33: IF BADPC EQ #0 THEN $CALL BADSTACK
      050740 005737 002022
      050744 001002
      050746 004737 034152
      050752
                                TST BADPC
                                BNE L471
                                JSR PC,BADSTACK
                                L471:;;;;;
12937 050752 010137 002034      MOV R1,ADDRESS
12938 050756 010037 002052      MOV RO,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
                                MOV #-1,HEADER
      051000 012737 177777 002612
12943 051006 104041          ERROR +41
12944 051010          SET HEADER
                                MOV #-1,HEADER
      051010 012737 177777 002612
12945 051016 000002          RTI
12946
12947 051020          $PER34:IF BADPC EQ #0 THEN $CALL BADSTACK
      051020 005737 002022
      051024 001002
      051026 004737 034152
      051032
                                TST BADPC
                                BNE L472
                                JSR PC,BADSTACK
                                L472:;;;;;
12948 051032          IF #BIT15!BIT4 OFF.IN CSR
      051032 032737 100020 002150
      051040 001002
                                BIT #BIT15!BIT4,CSR
                                BNE L473
12949 051042 104016          ERROR +16          ;NO SBE OR DBE
12950 051044          ELSE
                                BR L474
      051044 000401
                                L473:;;;;;
12951 051046 104001          ERROR +1          ;EXPECTED SBE SO DBE MUST HAVE GOTTEN SET
12952 051050          END ;OF IF #BIT15!BIT4
                                L474:;;;;;
      051050 000002          RTI
12953 051050
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
12962 051104 000207          RETURN          ;FIX STACK FROM TRAP
                                ;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

```

12978
12979
12980
12981
12982
12983
12984
12985
12986
12987 051146 005237 056656
12988 051152
      051152 002004
12989 051154 005037 056656
12990 051160 105237 056660
12991 051164
      051164
12992 051164 104410
12993 051166 005737 006216
12994 051172 001402
12995 051174 004737 055152
12996 051200
12997 051200 005737 052314
12998 051204 001410
12999 051206 013737 177766 052312
13000 051214 032737 000001 052312
13001 051222 001401
13002 051224 104177
13011 051226
      051226 005737 002420
      051232 001410
      051234 032777 000400 131374
      051242 001404
13012 051244 005037 002420
13013 051250 000137 040604
13014 051254
      051254
13015 051254
      051254 005737 002440
      051260 001401
13016 051262 000002
13017 051264
      051264
13018 051264
      051264 032777 040000 131344
      051272 001051
13019
13020 051274 000425
13021
13022 051276 013746 000004
13023 051302 012737 051322 000004
13024 051310 005737 177060
13025 051314 012637 000004
13026 051320 000430
13027 051322 062706 000004
13028 051326 022737 000005 004010
13029 051334 001002
13030 051336 005037 177766

```

```

.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
$SCOPE: INC $DEVCT ;TELL AP, WE ARE ALIVE
      IF RESULT IS LT
                                BGE L475
                                CLR $DEVCT
                                INCB $UNIT
                                END ;OF IF RESULT
                                L475:::
                                CKSWR ;:TEST FOR CHANGE IN SOFT-SWR
                                TST TRACE
                                BEQ NOTRCE
                                CALL CONTT ;TRACE
                                NOTRCE:
                                TST CPERRF ;IS THERE A CPU ERROR REGISTER? ;R-C
                                BEQ SKJ ;BRANCH IF NOT ;R-C
                                MOV @#177766,CPSAVE ;GET CONTENTS OF ERROR REGISTER ;R-C
                                BIT #BIT0,CPSAVE ;IS THE POWER FAIL MONITOR BIT SET? ;R-C
                                BEQ SKJ ;BRANCH IF NOT ;R-C
                                ERROR +177 ;REPORT IF SO ;R-C
                                SKJ: IF STOPOK IS TRUE AND #SW8 SET.IN @SWR ;R-C
                                TST STOPOK
                                BEQ L476
                                BIT #SW8,@SWR
                                BEQ L476
                                CLR STOPOK
                                JMP EXIT
                                END ;OF IF STOPOK
                                L476:::
                                IF NOSCOPE IS TRUE
                                TST NOSCOPE
                                BEQ L477
                                RTI
                                END ;OF IF NOSCOPE
                                L477:::
                                1$: IF #SW14 SET.IN @SWR THEN GOTO $OVER
                                BIT #SW14,@SWR
                                BNE $OVER
;####START OF CODE FOR THE XOR TESTER####
$XTSTR: BR 2$ ;:IF RUNNING ON THE "XOR" TESTER CHANGE
;THIS INSTRUCTION TO A "NOP" (NOP=240)
MOV ERRVEC,-(SP) ;:SAVE THE CONTENTS OF THE ERROR VECTOR
MOV #1$,ERRVEC ;:SET FOR TIMEOUT
TST 177060 ;:TIME OUT ON XOR?
MOV (SP)+,ERRVEC ;:RESTORE THE ERROR VECTOR
BR $SVLAD ;:GO TO THE NEXT TEST
1$: ADD #4,SP ;:FIX STACK FROM TRAP
CMP #5,PROTYP ;:IS THIS AN 11/83 ?
BNE 6$ ;:BRANCH IF NOT
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
13050 051436 113737 002300 002012
13051 051444
051444 010046
13052 051446 005737 002126
13053 051452 001403
13054 051454 052737 100000 002012
13055 051462
13059 051462 013777 002012 131150
13060 051470 013737 002012 000174
13061 051476
051476 012600
13062 051500 000207

MOV BANK,\$BANK
MOV REALPAT,\$PATMAR
PUSH RO
TST RLFLAG ;ARE WE RELOCATED? MOV RO,-(SP)
BEQ 1\$;NO - SKIP
BIS #BIT15,\$PATMAR ;YES - SET MSB
1\$:
MOV \$PATMAR,@DISPLAY
MOV \$PATMAR,DISPREG ;SOFTWARE DISPLAY REGISTER
POP RO
RETURN
MOV (SP)+,RO

```

13065 .SBTTL ROUTINE ERROR HANDLER
13066 ;*****
13067 ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
13068 ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
13069 ;*AND GO TO $ERRTYP ON ERROR
13070 ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
13071 ;*SW15=1 HALT ON ERROR
13072 ;*SW13=1 INHIBIT ERROR TYPEOUTS
13073 ;*SW10=1 BELL ON ERROR
13074 ;*SW9=1 LOOP ON ERROR
13075 ;*CALL
13076 ;* ERROR N ;;ERROR-EMT AND N=ERROR ITEM NUMBER
13077
13078 .ENABL LSB
13079 051502 105737 056666 $ERROR: TSTB $ENV ;ARE WE RUNNING IN APT MODE ?
13080 051506 001402 BEQ NOAPT ;YES - DO UFD ABORT
13081 051510 004737 000000 JSR PC,ABORT ;GOTO UFD ABORT
13082 051514 105037 052310 NOAPT: CLRB IBSAVE ;R-C
13083 051520 005737 002430 IF NOERROR IS FALSE ;R-C
13084 051526 104410 TST NOERROR
13085 051530 BACK: CKSWR ;;TEST FOR CHANGE IN SOFT SWR BNE L500 ;R C
13086 051530 105237 002014 1$: INCB $ERFLG ;;SET THE ERROR FLAG
13087 051534 001775 BEQ 1$ ;;DON'T LET THE FLAG GO TO ZERO
13088 051536 004737 051430 CALL GETDIS ;SETUP DISPLAY STUFF
13089 051542 013737 002012 056652 MOV $PATMAR,$TESTN ;FOR APT
13090 051550 032777 002000 131060 BIT #SW10,$SWR ;BELL ON ERROR?
13091 051556 001404 BEQ 2$ ;NO SKIP
13092 051560 104401 002653 TYPE $BELL ;RING BELL
13093 051564 104401 066060 TYPEIT , $BELL
.DSABL CRF
TYPE MSG014 ;CONTROL Z
TYPEIT ,MSG014
.DSABL CRF
13094 051570 005237 002630 2$: INC $ERTTL ;;COUNT THE NUMBER OF ERRORS
13095 051574 100003 IF RESULT IS MI ;R-C
13096 051576 012737 077777 002630 MOV #77777,$ERTTL ;R-C
13097 051604 051604 END ;OF IF RESULT BPL L501
13098 051604 051604 END ;OF IF NOERROR L501:;;;;;
13099 051604 011637 002020 MOV (SP),ERRPC ;;GET ADDRESS OF ERROR INSTRUCTION
13100 051610 162737 000002 002020 SUB #2,ERRPC
13101 051616 010637 002024 MOV SP,ERRSP
13102 051622 016637 000002 002030 MOV 2(SP),ERRPSW
13103 051630 117737 130164 002015 MOVB @ERRPC,$ITEMB ;;STRIP AND SAVE THE ERROR ITEM CODE
13104
13105 051636 122737 000177 002015 CMPB #177,$ITEMB ;IS THIS THE POWER FAIL CALL? ;R-C
13106 051644 001431 BEQ 1001$ ;BRANCH IF SO ;R-C
13107 051646 105737 052310 TSTB IBSAVE ;2ND ERROR CALL? ;R C
13108 051652 001024 BNE 1000$ ;BRANCH IF SO ;R-C
13109 051654 005737 052314 TST CPERRF ;IS THERE A CPU ERROR REGISTER? ;R-C
13110 051660 001423 BEQ 1001$ ;BRANCH IF NOT ;R-C
13111 051662 013737 177766 052312 MOV 177766,CPSAVE ;SAVE CONTENTS ;R-C
13112 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 005737 002430      3$: IF NOERROR IS FALSE
                                TST NOERROR
                                BNE L507
13144 052072 005777 130540      TST @SWR                      ;;HALT ON ERROR
13145 052076 100002              BPL 7$                        ;;SKIP IF CONTINUE
13146 052100 000000      $HALT: HALT                    ;;HALT ON ERROR!
13147 052102 104410      CKSWR                          ;;TEST FOR CHANGE IN SOFT SWR
13148 052104 005737 002440      7$: IF NOSCOPE IS FALSE AND #SW9 SET.IN @SWR
                                TST NOSCOPE
                                BNE L510
                                BIT #SW9,@SWR
                                BEQ L510
                                MOV $LPERR,(SP) ;;FUDGE RETURN FOR LOOPING
13149 052122 013716 002624      END ;OF IF NOSCOPE
                                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 $ESCAPE,(SP)              ;;FUDGE RETURN ADDRESS FOR ESCAPE
13154 052140 005737 002220      9$: IF DETFLAG IS FALSE
                                TST DETFLAG
                                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 005737 002350      11$: IF ACTFLAG IS TRUE OR APTFLAG IS TRUE OR FATAL$ IS TRUE
                                TST ACTFLAG
                                BNE L512
                                TST APTFLAG
                                BNE L512
                                TST FATAL$
                                BEQ L513
                                L512:;;;;;
13159 052204 012737 000001 056646 MOV #1,$MSGTY                  ;FOR APT
13160 052212 000137 040604      JMP EXIT
13161 052216 005737 002354      END ;OF IF ACTFLAG
                                L513:;;;;;
13162 052216 005737 002354      IF XXDPCHAIN IS TRUE AND $ERTTL HI #20
                                TST XXDPCHAIN
                                BEQ L514
                                CMP $ERTTL,#20
                                BLOS L514
13163 052234 104401 070051      TYPE MSG066                    ;ERROR COUNT EXCEEDED 20 - ABORTING FOR XXDP CHAIN
                                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 005737 002354      END ;OF IF XXDPCHAIN
                                L514:;;;;;
13168 052254 005737 002354      END ;OF IF DETFLAG
                                L511:;;;;;
13169 052254 000403              ELSE
                                BR L515
13170 052256 012737 177777 002612 SET HEADER
                                L507:;;;;;
13171 052264 005737 002430      END ;OF IF NOERROR
                                MOV #-1,HEADER

```

```

13172 052264          10$: CLEAR TOOMANY,NOERROR          L515:;;;;;
      052264 005037 002406
      052270 005037 002430
13173 052274 105737 052310          TSTB IBSAVE          ;POWER FAIL ERROR CALL? ;R C
13174 052300 001402          BEQ 213$          ;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

```

13183
13184
13185
13186
13187
13188
13189
13190 052316 104415
13191 052320
      052320 104401 002660

13192 052324 005000
13193 052326 153700 002015
13194 052332 001004
13195
13196 052334
      052334 013746 002020
      052340 104402

13197 052342 000511
13198 052344 122700 000177
13199 052350 001003
13200 052352 012700 052626
13201 052356 000406
13202 052360 005300
13203 052362 006300
13204 052364 006300
13205 052366 006300
13206 052370 062700 057274
13207 052374 012037 052432
13208 052400 001417
13209 052402 005737 002430
13210 052406 001003
13211 052410 005737 002612
13212 052414 100011
13213 052416 005737 002064
13214 052422 001402
13215 052424
      052424 104401 070120

13216 052430
      052430 104401

13217 052432 000000
13218 052434
      052434 104401 002660

13219 052440 012037 052464
13220 052444 001412
13221 052446 005737 002430
13222 052452 001003
13223 052454 005737 002612
13224 052460 100004
13225 052462
      052462 104401

```

```

;*****
;*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.
$ERRTYP:SAVREG
      TYPE      $CRLF      ;; "CARRIAGE RETURN" & "LINE FEED"
      TYPEIT    , $CRLF
      .DSABL    CRF
      CLR      RO      ;; PICKUP THE ITEM INDEX
      BISB     $ITE'1B,RO
      BNE      1$      ;; IF ITEM NUMBER IS ZERO, JUST
                        ;; TYPE THE PC OF THE ERROR
      TYPOCT   ERRPC,<ERROR ADDRESS>
      MOV      ERRPC,-(SP) ;; SAVE ERRPC FOR TYPEOUT
                        ;; ERROR ADDRESS
                        ;; GO TYPE--OCTAL ASCII(ALL DIGITS)
      TYPOC
      .DSABL    CRF
      BR      11$      ;; GET OUT
      1$:     CMPB    #177,RO ;; POWER MONITOR CALL? ;R-C
      BNE     100$    ;; BRANCH IF NOT ;R-C
      MOV     #PFECWS,RO ;; MOV ADDRESS OF PFE BIT ERROR TO RO ;R-C
      BR     110$
      100$:   DEC     RO      ;; ADJUST THE INDEX SO THAT IT WILL ;R-C
                        ;; WORK FOR THE ERROR TABLE
      ASL     RO
      ASL     RO
      ASL     RO
      ADD     # $ERRTB,RO ;; FORM TABLE POINTER
      110$:  MOV     (RO)+,3$ ;; PICKUP "ERROR MESSAGE" POINTER ;R-C
      BEQ     4$      ;; SKIP TYPEOUT IF NO POINTER
      TST     NOERROR ;; IS THIS REALLY AN ERROR?
      BNE     12$    ;; YES - SKIP
      TST     HEADER ;; TYPE HEADER?
      BPL     4$      ;; NO - SKIP
      12$:   TST     FATAL$ ;; WAS IT A FATAL ERROR?
      BEQ     2$      ;; NO SKIP
      TYPE    MSG067 ;; FATAL
      TYPEIT  ,MSG067
      .DSABL  CRF
      2$:   TYPE    ;; TYPE THE "ERROR MESSAGE"
      .DSABL  CRF
      3$:   .WORD   0      ;; "ERROR MESSAGE" POINTER GOES HERE
      TYPE    $CRLF    ;; "CARRIAGE RETURN" & "LINE FEED"
      TYPEIT  , $CRLF
      .DSABL  CRF
      4$:   MOV     (RO)+,5$ ;; PICKUP "DATA HEADER" POINTER
      BEQ     6$      ;; SKIP TYPEOUT IF 0
      TST     NOERROR ;; IS THIS REALLY AN ERROR?
      BNE     13$    ;; YES - SKIP
      TST     HEADER ;; TYPE HEADER?
      BPL     6$      ;; NO - SKIP
      13$:  TYPE    ;; TYPE THE "DATA HEADER"
      TYPEIT
      .DSABL  CRF

```

13226 052464 000000
13227 052466
052466 104401 002,60

13228 052472 012001
13229 052474 001427
13230 052476 012002

5\$: .WORD 0 ;; "DATA HEADER" POINTER GOES HERE
TYPE \$CRLF ;; "CARRIAGE RETURN" & "LINE FEED"
TYPEIT , \$CRLF
.DSABL CRF
6\$: MOV (R0)+,R1 ;; PICKUP "DATA TABLE" POINTER
BEQ 10\$;; BR IF NO DATA TO BE TYPED
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 104401 066107    TYPE  MSG018      ;TYPE 2 SPACES
                                TYPEIT .MSG018
                                .DSABL CRF
                                BR    7$           ;;LOOP
13255 052552 000752
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 HFADEER FLAG
13260 052566 104416
13261 052570          11$: RESREG
                                IF #SW7 SET.IN @SWR AND DETFLAG IS FALSE AND NOERROR IS FALSE
                                BIT #SW7,@SWR
                                BEQ L516
                                TST DETFLAG
                                BNE L516
                                TST NOERROR
                                BNE L516
                                CALL  DETAIL
                                END ;OF IF #SW7
                                L516:::;:;:;
13262 052614 004737 053266
13263 052620
13264 052620          TYPE  MSG104      ;CONTROL Z
                                TYPEIT .MSG104
                                .DSABL CRF
                                RETURN
                                .EVEN
13265 052624 000207
13266
13267 052626 052636 052672 052722 PFECWS: .WORD  PFECM,PFECDH,PFECDT,PFECDF ;R-C
                                052634 052732 ;R C
13268 052636 120 117 127 PFECM: .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 122 040

```

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

13276
 13277
 13278
 13279 052736
 052736 017146 000000
 052742 104402

```

;*****
;*** OCTAL ***
;*****
TAG70$: TYP OCT @ (R1) ;:TYPE AN OCTAL NUMBER
        MOV @ (R1),-(SP) ;:SAVE @ (R1) FOR TYPEOUT
        TYP OC ;:GO TYPE--OCTAL ASCII(ALL DIGITS)
        .DSABL CRF
        RETURN
  
```

13280 052744 000207
 13281
 13282
 13283
 13284
 13285 052746
 052746 017146 000000
 052752 104405

```

;*****
;*** DECIMAL ***
;*****
TAG71$: TYP DEC @ (R1) ;:TYPE A DECIMAL NUMBER
        MOV @ (R1),-(SP) ;:SAVE @ (R1) FOR TYPEOUT
        TYP DS ;:GO TYPE--DECIMAL ASCII WITH SIGN
        .DSABL CRF
        RETURN
  
```

13286 052754 000207
 13287
 13288
 13289
 13290
 13291 052756
 052756 010146
 052760 010546
 13292 052762 013701 002102
 13293 052766 070127 000004
 13294 052772
 052772 012737 177777 002372
 13295 053000
 053000 104401 066060

```

;*****
;*** INTERLEAVE ***
;*****
TAG72$: PUSH R1,R5
;*****
        MOV R1,-(SP)
        MOV R5,-(SP)
        MOV BANK,R1
        MUL #4,R1
        SET NOTAB ;INDICATE NO TABLE TO BE PRINTED - NOW
;*****
        TYPE MSG014
        TYPEIT ,MSG014
        .DSABL CRF
        CALL TCFIG1
        CLR NOTAB
        POP R5,R1
;*****
        MOV (SP)+,R5
        MOV (SP)+,R1
        TYPE MSG014 ;1 SPACE
        TYPEIT ,MSG014
        .DSABL CRF
        RETURN
  
```

13296 053004 004737 033404
 13297 053010 005037 002372
 13298 053014
 053014 012605
 053016 012601
 13299 053020
 053020 104401 066060

13300 053024 000207
 13301
 13302
 13303
 13304

```

;*****
;*** CSR ***
;*****
TAG73$: PUSH R1,R5
;*****
  
```

13305 053026
 053026 010146
 053030 010546
 13306 053032 013701 002102
 13307 053036 070127 000004
 13308 053042
 053042 012737 177777 002372
 13309 053050 004737 033600
 13310 053054 005037 002372
 13311 053060
 053060 012605
 053062 012601
 13312 053064 000207

```

        MOV R1,-(SP)
        MOV R5,-(SP)
        MOV BANK,R1
        MUL #4,R1
        SET NOTAB
;*****
        MOV #-1,NOTAB
        CALL TCFIG3
        CLR NOTAB
        POP R5,R1
;*****
        MOV (SP)+,R5
        MOV (SP)+,R1
        RETURN
  
```

13313
 13314
 13315
 13316
 13317 053066 013746 002300
 053072 104403
 053074 002
 053075 001
 13318 053076 000207
 13319
 13320
 13321
 13322
 13323 053100 013746 002102
 053104 104403
 053106 003
 053107 000
 13324 053110 000207

```

;*****
;*** PATTERN ***
;*****
TAG74$: TYPOCS REALPAT,<TYPE (0-77)>,2,Z
        MOV     REALPAT,-(SP)      ;;SAVE REALPAT FOR TYPEOUT
                                           ;;TYPE (0-77)
                                           ;;GO TYPE--OCTAL ASCII
        TYPOS   .BYTE 2            ;;TYPE 2 DIGIT(S)
        .BYTE  1                    ;;TYPE LEADING ZEROS
        .DSABL CRF
        RETURN

;*****
;*** BANK ***
;*****
TAG75$: TYPOCS BANK,<TYPE (0-176)>,3
        MOV     BANK,-(SP)        ;;SAVE BANK FOR TYPEOUT
                                           ;;TYPE (0-176)
                                           ;;GO TYPE--OCTAL ASCII
        TYPOS   .BYTE 3            ;;TYPE 3 DIGIT(S)
        .BYTE  0                    ;;SUPPRESS LEADING ZEROS
        .DSABL CRF
        RETURN

```



```

13326 ;*****
13327 ;*** MTYPE ***
13328 ;*****
13329 053112 TAG76$: PUSH R1,R5
      053112 010146 MOV R1,-(SP)
      053114 010546 MOV R5,-(SP)
13330 053116 013701 002102 MOV BANK,R1
13331 053122 070127 000004 MUL #4,R1
13332 053126 SET NOTAB
      053126 012737 177777 002372 MOV # -1,NOTAB
13333 053134 TYPE MSG019
      053134 104401 066112 TYPEIT ,MSG019
      .DSABL CRF
      CALL TCFIG2
      CLR NOTAB
      POP R5,R1
      MOV (SP),R5
      MOV (SP),R1
13334 053140 004737 033444
13335 053144 005037 002372
13336 053150
      053150 012605 MOV (SP),R5
      053152 012601 MOV (SP),R1
      053154 000207 RETURN
13337
13338
13339 ;*****
13340 ;*** UNKNOWN DATA ***
13341 ;*****
13342 053156 TAG77$: TYPE MSG061
      053156 104401 067767 TYPEIT ,MSG061
      .DSABL CRF
      RETURN
13343 053162 000207
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
      053236 104401 056634 TYPE $OCT8
      TYPEIT , $OCT8
      .DSABL CRF
      RETURN
13358 053242 000207
13359
13360 ;*****
13361 ;*** OCTAL BYTE ***
13362 ;*****
13363 053244 TAG79$: TYPE MSG018 ;2 SPACES
      053244 104401 066107 TYPEIT ,MSG018
      .DSABL CRF
      TYPOCS @ (R1), <TYPE BYTE>, 3, Z
      MOV @ (R1), -(SP) ;;SAVE @ (R1) FOR TYPEOUT
      ;;TYPE BYTE
      TYPOS ;;GO TYPE--OCTAL ASCII
      .BYTE 3 ;;TYPE 3 DIGIT(S)
      .BYTE 1 ;;TYPE LEADING ZEROS
13364 053250
      053250 017146 000000
      053254 104403
      053256 003
      053257 001

```

13365 053260
053260 104401 066060

13366 053264 000207

.DSABL CRF
TYPE MSG014 ;SPACE
TYPEIT .MSG014
.DSABL CRF
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,DETRO	
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	DETRO,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
13447 053470 004737 055152      4:      ;SIMULATE CONTROL "T"
13448                                CALL      CONTT                ;DISPLAY "DISPLAY" INFO
13449                                ;TYPE CONTENTS OF ALL CSR'S
13450 053474                                PUSH     CSR,CSRNO,R1
                                MOV CSR,-(SP)
                                MOV CSRNO,-(SP)
                                MOV R1,-(SP)
                                053474 013746 002150
                                053500 013746 002152
                                053504 010146
13451 053506                                TYPE     MSG058
                                053506 104401 067745      TYPEIT   ,MSG058
                                .DSABL CRF
                                TYPE     $CRLF
                                TYPEIT   ,$CRLF
                                .DSABL CRF
13452 053512                                MOV     TOTCSRS,R1
                                053512 104401 002660      BEGIN DUMPCSRLOOP
                                FOR CSRNO := #0 TO #36 BY #2      B103::::::::::
                                ASL      R1
                                ON.ERROR CLR CSRNO
                                B104::::::::::
                                READCSR
                                TYPOCT CSR
                                MOV     CSR,-(SP)      ;;SAVE CSR FOR TYPEOUT
                                TYPOC      ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                .DSABL CRF
                                TYPE     MSG018      ;2 SPACES
13453 053516                                TYPEIT   ,MSG018
                                053522 005037 002152      .DSABL CRF
                                053526 006301      END ;OF ON.ERROR
13456 053526                                IF R1 EQ #0 THEN LEAVE DUMPCSRLOOP      L517::::::::::
13457 053530                                TST R1
                                053530 103006                                BEQ E103
13458 053532                                END ;OF FOR CSRNO
13459 053534                                ADD #2,CSRNO
                                053534 013746 002150      CMP CSRNO,#36
                                053540 104402      BLE B104
                                E104::::::::::
13460 053542                                END DUMPCSRLOOP
                                053542 104401 066107      POP     R1,CSRNO,CSR
                                E103::::::::::
                                MOV (SP)+,R1
                                MOV (SP)+,CSRNO
                                MOV (SP)+,CSR
13461 053546                                ;TYPE STACKS
                                053546 005701      PUSH     R0,R1
13462 053546                                TYPE     MSG088      ;KERNEL STACK
                                053550 001407      TYPEIT   ,MSG088
                                053552 062737 000002 002152      .DSABL CRF
                                053560 023727 002152 000036      MOV     KSTACK,R1
                                053566 003757      SUB     #2,R1
                                053570
13464 053570                                ;TYPE STACKS
13465 053570                                PUSH     R0,R1
                                053570 012601
                                053572 012637 002152
                                053576 012637 002150
13466
13467
13468 053602                                ;TYPE STACKS
                                053602 010046      PUSH     R0,R1
                                053604 010146
13469 053606                                TYPE     MSG088      ;KERNEL STACK
                                053606 104401 070336      TYPEIT   ,MSG088
                                .DSABL CRF
13470 053612                                MOV     KSTACK,R1
13471 053616 162701 000002      SUB     #2,R1

```

13472	053622				FOR	RO :- SP TO R1 BY #2		
	053622	010600						MOV SP,R0
	053624							B105:::~::~
13473	053624	104401	002660		TYPE	\$CRLF		
	053624				TYPEIT	,\$CRLF		
					.DSABL	CRF		
13474	053630				TYPOCT		RO	
	053630	010046			MOV	RO,-(SP)		::SAVE RO FOR TYPEOUT
	053632	104402			TYPOC			::GO TYPE--OCTAL ASCII(ALL DIGITS)
					.DSABL	CRF		
13475	053634	104401	066107		TYPE		MSG018	:2 SPACES
	053634				TYPEIT	,MSG018		
					.DSABL	CRF		
13476	053640				TYPOCT		(RO)	
	053640	011046			MOV	(RO),-(SP)		::SAVE (RO) FOR TYPEOUT
	053642	104402			TYPOC			::GO TYPE--OCTAL ASCII(ALL DIGITS)
					.DSABL	CRF		
13477	053644				END ;OF	FOR RO		
	053644	062700	000002					ADD #2,R0
	053650	020001						CMP RO,R1
	053652	003764						BLE B105
	053654							E105:::~::~
13478								
13479	053654	005737	002456					
13480	053660	001036						
13481	053662	042737	030000	177776				
13482	053670	052737	010000	177776				
13483	053676	006506						
13484	053700							
	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 RO LT	#SUPSTK		
	053710	020027	000740					CMP RO,#SUPSTK
	053714	002016						BGE L520
13487	053716							
	053716				FOR RO :=	RO TO #SUPSTK-2 BY #2		
13488	053716	104401	002660		TYPE			B106:::~::~
	053716				TYPEIT	,\$CRLF		
					.DSABL	CRF		
13489	053722				TYPOCT		RO	
	053722	010046			MOV	RO,-(SP)		::SAVE RO FOR TYPEOUT
	053724	104402			TYPOC			::GO TYPE--OCTAL ASCII(ALL DIGITS)
					.DSABL	CRF		
13490	053726	104401	066107		TYPE		MSG018	:2 SPACES
	053726				TYPEIT	,MSG018		
					.DSABL	CRF		
13491	053732				TYPOCT		(RO)	
	053732	011046			MOV	(RO),-(SP)		::SAVE (RO) FOR TYPEOUT
	053734	104402			TYPOC			::GO TYPE--OCTAL ASCII(ALL DIGITS)
					.DSABL	CRF		
13492	053736				END ;OF	FOR RO		
	053736	062700	000002					ADD #2,R0
	053742	020027	000736					CMP RO,#SUPSTK-2
	053746	003763						BLE B106

```

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

```

```

E106:
BR L521
L520:
L521:
MOV (SP)+,R0
CMP R0,#USESTK
BGE L522
B107:
E107:
BR L523
L522:
L523:
MOV (SP)+,R0

```

```

13552          .SBTTL  ROUTINE BINARY TO OCTAL (ASCII) AND TYPE
13553
13554          ;*****
13555          ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
13556          ;*OCTAL (ASCII) NUMBER AND TYPE IT.
13557          ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
13558          ;*CALL:
13559          ;*      MOV      NUM, (SP)          ;;NUMBER TO BE TYPED
13560          ;*      TYPOS          ;;CALL FOR TYPEOUT
13561          ;*      .BYTE  N              ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
13562          ;*      .BYTE  M              ;;M=1 OR 0
13563          ;*                                  ;;1=TYPE LEADING ZEROS
13564          ;*                                  ;;0=SUPPRESS LEADING ZEROS
13565          ;*
13566          ;*$TYPON---ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
13567          ;*$TYPOS OR $TYPOC
13568          ;*CALL:
13569          ;*      MOV      NUM, -(SP)         ;;NUMBER TO BE TYPED
13570          ;*      TYPON          ;;CALL FOR TYPEOUT
13571          ;*
13572          ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
13573          ;*CALL:
13574          ;*      MOV      NUM, -(SP)         ;;NUMBER TO BE TYPED
13575          ;*      TYPOC          ;;CALL FOR TYPEOUT
13576
13577 054056 017646 000000          $TYPOS: MOV      @ (SP), -(SP)          ;;PICKUP THE MODE
13578 054062 116637 000001 054301  MOVB     1(SP), $OFILL          ;;LOAD ZERO FILL SWITCH
13579 054070 112637 054303          MOVB     (SP)+, $OMODE+1          ;;NUMBER OF DIGITS TO TYPE
13580 054074 062716 000002          ADD      #2, (SP)              ;;ADJUST RETURN ADDRESS
13581 054100 000406          BR      $TYPON
13582 054102 112737 000001 054301  $TYPOC: MOVB     #1, $OFILL          ;;SET THE ZERO FILL SWITCH
13583 054110 112737 000006 054303  MOVB     #6, $OMODE+1          ;;SET FOR SIX(6) DIGITS
13584 054116 112737 000005 054300  $TYPON: MOVB     #5, $OCNT          ;;SET THE ITERATION COUNT
13585 054124 010346          MOV      R3, -(SP)            ;;SAVE R3
13586 054126 010446          MOV      R4, -(SP)            ;;SAVE R4
13587 054130 010546          MOV      R5, -(SP)            ;;SAVE R5
13588 054132 113704 054303          MOVB     $OMODE+1, R4          ;;GET THE NUMBER OF DIGITS TO TYPE
13589 054136 005404          NEG      R4
13590 054140 062704 000006          ADD      #6, R4                ;;SUBTRACT IT FOR MAX. ALLOWED
13591 054144 110437 054302          MOVB     R4, $OMODE           ;;SAVE IT FOR USE
13592 054150 113704 054301          MOVB     $OFILL, R4           ;;GET THE ZERO FILL SWITCH
13593 054154 016605 000012          MOV      12(SP), R5           ;;PICKUP THE INPUT NUMBER
13594 054160 005003          CLR      R3                    ;;CLEAR THE OUTPUT WORD
13595 054162 006105          1$:   ROL      R5                ;;ROTATE MSB INTO "C"
13596 054164 000404          BR      3$                    ;;GO DO MSB
13597 054166 006105          2$:   ROL      R5                ;;FORM THIS DIGIT
13598 054170 006105          ROL      R5
13599 054172 006105          ROL      R5
13600 054174 010503          MOV      R5, R3
13601 054176 006103          3$:   ROL      R3                ;;GET LSB OF THIS DIGIT
13602 054200 105337 054302          DECB     $OMODE                ;;TYPE THIS DIGIT?
13603 054204 100016          BPL      6$                    ;;BR IF NO
13604 054206 042703 177770          BIC      #177770, R3           ;;GET RID OF JUNK
13605 054212 001002          BNE      4$                    ;;TEST FOR 0
13606 054214 005704          TST      R4                    ;;SUPPRESS THIS 0?
13607 054216 001403          BEQ      5$                    ;;BR IF YES
13608 054220 005204          4$:   INC      R4                ;;DON'T SUPPRESS ANYMORE 0'S
    
```



```

13630          .SBTTL  ROUTINE CONVERT BINARY TO DECIMAL AND TYPE
13631          ;*****
13632          ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
13633          ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
13634          ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
13635          ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
13636          ;*REPLACED WITH SPACES.
13637          ;*CALL:
13638          ;*      MOV      NUM,-(SP)          ;;PUT THE BINARY NUMBER ON THE STACK
13639          ;*      TYPDS   ;;GO TO THE ROUTINE
13640          $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)

13641 054316 012746 020200      MOV      #20200,-(SP)          ;;SET BLANK SWITCH AND SIGN
13642 054322 016605 000020      MOV      20(SP),R5          ;;GET THE INPUT NUMBER
13643 054326 100004          BPL      1$          ;;BR IF INPUT IS POS.
13644 054330 005405          NEG      R5          ;;MAKE THE BINARY NUMBER POS.
13645 054332 112766 000055 000001  MOVB     #'-,1(SP)          ;;MAKE THE ASCII NUMBER NEG.
13646 054340 005000          CLR      R0          ;;ZERO THE CONSTANTS INDEX
13647 054342 012703 054520      MOV      #$DBLK,R3          ;;SETUP THE OUTPUT POINTER
13648 054346 112723 000040      MOVB     #' ,(R3)+          ;;SET THE FIRST CHARACTER TO A BLANK
13649 054352 005002          CLR      R2          ;;CLEAR THE BCD NUMBER
13650 054354 016001 054510      MOV      $DTBL(R0),R1          ;;GET THE CONSTANT
13651 054360 160105          SUB      R1,R5          ;;FORM THIS BCD DIGIT
13652 054362 002402          BLT      4$          ;;BR IF DONE
13653 054364 005202          INC      R2          ;;INCREASE THE BCD DIGIT BY 1
13654 054366 000774          BR       3$
13655 054370 060105          4$:     ADD      R1,R5          ;;ADD BACK THE CONSTANT
13656 054372 005702          TST      R2          ;;CHECK IF BCD DIGIT=0
13657 054374 001002          BNE      5$          ;;FALL THROUGH IF 0
13658 054376 105716          TSTB     (SP)          ;;STILL DOING LEADING 0'S?
13659 054400 100407          BMI      7$          ;;BR IF YES
13660 054402 106316          5$:     ASLB     (SP)          ;;MSD?
13661 054404 103003          BCC      6$          ;;BR IF NO
13662 054406 116663 000001 177777  MOVB     1(SP),-1(R3)          ;;YES--SET THE SIGN
13663 054414 052702 000060          6$:     BIS      #'0,R2          ;;MAKE THE BCD DIGIT ASCII
13664 054420 052702 000040          7$:     BIS      #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
13665 054424 110223          MOVB     R2,(R3)+          ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
13666 054426 005720          TST      (R0)+          ;;JUST INCREMENTING
13667 054430 020027 000010      CMP      R0,#10          ;;CHECK THE TABLE INDEX
13668 054434 002746          BLT      2$          ;;GO DO THE NEXT DIGIT
13669 054436 003002          BGT      8$          ;;GO TO EXIT
13670 054440 010502          MOV      R5,R2          ;;GET THE LSD
13671 054442 000764          BR       6$          ;;GO CHANGE TO ASCII
13672 054444 105726          8$:     TSTB     (SP)+          ;;WAS THE LSD THE FIRST NON-ZERO?
13673 054446 100003          BPL      9$          ;;BR IF NO
13674 054450 116663 177777 177776  MOVB     -1(SP),-2(R3)          ;;YES- SET THE SIGN FOR TYPING
13675 054456 105013          9$:     CLRB     (R3)          ;;SET THE TERMINATOR
13676 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
    
```

					TYPE	\$DBLK	
13677	054472				TYPEIT	,\$DBLK	::NOW TYPE THE NUMBER
	054472	104401	054520		.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					

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13687          .SBTTL ROUTINE TTY INPUT
13688          ;*****
13689          ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
13690          ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
13691          ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
13692          ;*WHEN OPERATING IN TTY FLAG MODE.
13693          .ENABLE LSB
13694 054530      $CKSWR:
13695 054530      TST      XOCHAR      ;;SOMETHING THERE?
13696 054534      BEQ      NOCH        ;; GO ON IF NOT
13697 054536      MOV      XOCHAR, -(SP) ;; USE IT
13698 054542      CLR      XOCHAR
13699 054546      JMP      CONTS1
13700 054552      NOCH:  TSTB     @TKS          ;;CHAR THERE?
13701 054556      BPL      SWREND       ;;IF NO, DON'T WAIT AROUND
13702 054560      MOVB    @TKB, -(SP)    ;;SAVE THE CHAR
13703 054564      BIC     #C177, (SP)    ;;STRIP-OFF THE ASCII
13704 054570      CONTS1: CMP     #6, (SP)   ;;IS IT CONTROL F?
13705 054574      BNE     1$           ;;NO SKIP
13706 054576      CALL    FIELDSERVICE
13707 054602      1$:   CMP     #24, (SP)  ;;IS IT CONTROL T?
13708 054606      BNE     16$          ;;NO - SKIP
13709 054610      CALL    CONTT         ;;YES - CALL CONTROL T ROUTINE
13710 054614      16$:  CMP     #3, (SP)   ;;IS IT CONTROL C?
13711 054620      BEQ     5$           ;;YES EXIT *****NOTE***** STACK IS SCREWF UP!
13712 054622      2$:   CMP     #23, (SP) ;;IS IT CONTROL S?
13713 054626      BNE     17$          ;;NO - SKIP
13714 054630      CALL    CONTS        ;;YES - CALL CONTROL S ROUTINE
13715 054634      17$:  CMP     #13, (SP)  ;;IS IT CONTROL K?
13716 054640      BNE     6$           ;;NO - SKIP
13717 054642      TYPE   $CNTLK        ;;TYPE A +K
13718 054642      TYPEIT , $CNTLK
13718 054646      .DSABL CRF
13719 054652      MOV     CTLKVEC, SP    ;;RESET KSP TO AFTER PATTERN EXEC ROUTINE
13720 054654      RETURN  ;;RETURN TO PATTERN EXEC ROUTINE
13721 054662      6$:   CMP     #SWREG, SWR  ;;IS THE SOFT-SWR SELECTED?
13722 054664      BNE     CKEND         ;;BRANCH IF NO
13723 054666      CMP     #7, (SP)     ;;IS IT A CONTROL G?
13724 054670      BNE     CKEND         ;;NO, RETURN TO USER
13725 054672      TST     $AUTO        ;;ARE WE RUNNING IN AUTO-MODE?
13726 054676      BNE     CKEND         ;;BRANCH IF YES
13727 054700      TYPE   $CNTLG        ;;ECHO THE CONTROL-G (+G)
13728 054700      TYPEIT , $CNTLG
13727 054704      $GTSWR: TYPE   $MSWR      ;;TYPE CURRENT CONTENTS
13728 054704      TYPEIT , $MSWR
13728 054710      .DSABL CRF
13728 054710      TYPOCT @SWR          ;;OF THE SWR
13728 054714      MOV     @SWR, (SP)    ;;SAVE @SWR FOR TYPEOUT
13729 054716      TYPOC  ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
13729 054716      .DSABL CRF
13729 054716      TYPE   $MNEW         ;;PROMPT FOR NEW SWR
13729 054716      TYPEIT , $MNEW
13730 054722      3$:   .DSABL CRF
13731 054724      CLR     -(SP)         ;;CLEAR COUNTER
13732 054726      CLR     -(SP)         ;;THE NEW SWR
13732 054726      4$:   TSTB     @TKS          ;;CHAR THERE?

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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      L525:;;;;;
      055050      TYPE     $CRLF    ;;ECHO <CR> AND <LF>
13756 055050      TYPEIT   , $CRLF
      055050 104401 002660  .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          RO
055152 010046          MOV RO,-(SP)
13783 055154          TYPE          $CRLF
055154 104401 002660  TYPEIT         $CRLF
                                .DSABL        CRF
                                IF RLFLAG IS TRUE
13793 055160          TST RLFLAG
055160 005737 002126  BEQ L526
055164 001402
13794 055166          TYPE          MSG092          ;RELOCATED
055166 104401 070424  TYPEIT         ,MSG092
                                .DSABL        CRF
                                END ;OF IF RLFLAG
13795 055172
055172
13796 055172          TYPE          MSG093          ;BANK=          L526:::::
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
055204 003           .BYTE          3          ;;GO TYPE--OCTAL ASCII
055205 000           .BYTE          0          ;;TYPE 3 DIGIT(S)
                                .DSABL        CRF      ;;SUPPRESS LEADING ZEROS
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
055220 002           .BYTE          2          ;;GO TYPE--OCTAL ASCII
055221 000           .BYTE          0          ;;TYPE 2 DIGIT(S)
                                .DSABL        CRF      ;;SUPPRESS LEADING ZEROS
13803 055222          POP          RO
055222 012600          MOV (SP),RO
13804 055224 000207
13805          RETURN

```

13806 055226

CONTS: SUBTST <<CONTROL S & CONTROL Q>>
;*****
;*SUBTEST CONTROL S & CONTROL Q
;*****

13807 055226

POF R0 ;GET RID OF RETURN ADDRESS FROM STACK
MOV (SP),R0

13808 055230 012600 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

BR L530

055260 000401

L527:::::;

13815 055262 000762

BR CONTS2

13816 055264

END ;OF IF (SP)

L530:::::;

055264

```

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)
13865 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

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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	055710	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

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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          015 $CNTLC: .ASCIZ /+C/<15><12> ;;CONTROL "C"
      055741          012          000
13920 055743          136          015 $CNTLU: .ASCIZ /+U/<15><12> ;;CONTROL "U"
      055746          012          000
13921 055750          136          015 $CNTLG: .ASCIZ /+G/<15><12> ;;CONTROL "G"
      055753          012          000
13922 055755          015          123 $MSWR: .ASCIZ <15><12>/SWR = /
      055760          127          040
      055763          075          040 000
13923 055766          040          116 $MNEW: .ASCIZ / NEW = /
      055771          105          040
      055774          075          040 000
13924                .EVEN

```

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13926          .SBTTL  ROUTINE READ AN OCTAL NUMBER FROM THE TTY
13927          ;*****
13928          ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
13929          ;*CHANGE IT TO BINARY.
13930          ;*THE INPUT CHARACTERS WILL BE CHECKED TO INSURED THEY ARE LEGAL
13931          ;*OCTAL DIGITS. IF AN ILLEGAL CHARACTER IS READ A "?" WILL BE TYPED
13932          ;*FOLLOWED BY A CARRIAGE RETURN-LINE FEED. THE COMPLETE NUMBER MUST
13933          ;*THEN BE RETYPED. THE INPUT IS TERMINATED BY TYPING A CARRIAGE RETURN.
13934          ;*CALL:
13935          ;*      RDOCT          ;;READ AN OCTAL NUMBER
13936          ;*      RETURN HERE  ;;LOW ORDER BITS ARE ON TOP OF THE STACK
13937          ;*                  ;;HIGH ORDER BITS ARE IN $HIOCT
13938 056000 011646          $RDOCT: MOV      (SP),-(SP)  ;;PROVIDE SPACE FOR THE
13939 056002 016666 000004 000002  MOV      4(SP),2(SP)  ;;INPUT NUMBER
13940 056010          PUSH     R0,R1,R2
13941          056010 010046          MOV R0,-(SP)
13942          056012 010146          MOV R1,-(SP)
13943          056014 010246          MOV R2,-(SP)
13941 056016 104412          1$:  RDLIN          ;;READ AN ASCII LINE
13942 056020 012600          MOV      (SP)+,R0          ;;GET ADDRESS OF 1ST CHARACTER
13943 056022 010037 056126  MOV      R0,5$          ;;AND SAVE IT
13944 056026 005001          CLR      R1          ;;CLEAR DATA WORD
13945 056030 005002          CLR      R2
13946 056032 112046          2$:  MOVB     (R0)+,-(SP)  ;;PICKUP THIS CHARACTER
13947 056034 001420          BEQ     3$          ;;IF ZERO GET OUT
13948 056036 122716 000060  CMPB    #'0,(SP)      ;;MAKE SURE THIS CHARACTER
13949 056042 003026          BGT     4$          ;;IS AN OCTAL DIGIT
13950 056044 122716 000067  CMPB    #'7,(SP)
13951 056050 002423          BLT     4$
13952 056052 006301          ASL     R1          ;;*2
13953 056054 006102          ROL     R2
13954 056056 006301          ASL     R1          ;;*4
13955 056060 006102          ROL     R2
13956 056062 006301          ASL     R1          ;;*8
13957 056064 006102          ROL     R2
13958 056066 042716 177770  BIC     #'C7,(SP)    ;;STRIP THE ASCII JUNK
13959 056072 062601          ADD     (SP)+,R1    ;;ADD IN THIS DIGIT
13960 056074 000756          BR      2$          ;;LOOP
13961 056076 005726          3$:  TST     (SP)+      ;;CLEAN TERMINATOR FROM STACK
13962 056100 010166 000012  MOV     R1,12(SP)   ;;SAVE THE RESULT
13963 056104 010237 056146  MOV     R2,$HIOCT
13964 056110          POP     R2,R1,R0
13964          056110 012602          MOV (SP)+,R2
13964          056112 012601          MOV (SP)+,R1
13964          056114 012600          MOV (SP)+,R0
13965 056116 000002          RTI          ;;RETURN
13966 056120 005726          4$:  TST     (SP)+      ;;CLEAN PARTIAL FROM STACK
13967 056122 105010          CLRB    (R0)       ;;SET A TERMINATOR
13968 056124          TYPE          ;;TYPE UP THRU THE BAD CHAR.
13968          056124 104401          TYPEIT
13969 056126 000000          .DSABL  CRF
13970 056130          .WORD  0
13970          056130 104401 067776  TYPE    MSG062      ;INPUT MUST BE A
13970          056130          TYPEIT ,MSG062
13971 056134          .DSABL  CRF
13971          056134 104401 070016  TYPE    MSG063      ;N OCTAL
13971          056134          TYPEIT ,MSG063

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13972	056140				.DSABL	CRF		
	056140	104401	070027		TYPE	MSG064	:	NUMBER
					TYPEIT	.MSG064		
13973	056144	000724			.DSABL	CRF		
13974	056146	000000			BR	1\$::TRY AGAIN
13975					\$HIOCT:	.WORD	0	::HIGH ORDER BITS GO HERE
13976					.SBTTL	ROUTINE READ A DECIMAL NUMBER FROM THE TTY		
13977								
13978					;*****			
13979					;*THIS ROUTINE WILL READ A DECIMAL (ASCII) NUMBER FROM THE TTY AND			
13980					;*CHANGE IT TO BINARY. IF TOO MANY CHARACTERS OR ANY ILLEGAL CHARACTERS			
13981					;*ARE READ A "?" FOLLOWED BY A CARRIAGE RETURN-LINE FEED WILL BE TYPED.			
13982					;*THE COMPLETE NUMBER MUST BE RETYPED. THE INPUT IS TERMINATED BY THE			
13983					;*USER TYPING A CARRIAGE RETURN. THE RANGE OF THE INPUT NUMBER IS			
13984					;*POSITIVE 32767 TO NEGATIVE 32768.			
13985					;*CALL:			
13986					* RDDEC			::READ A DECIMAL NUMBER
13987					* RETURN HERE			::NUMBER IS ON TOP OF THE STACK
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 ASCII LINE
13993	056170	012600				MOV	(SP)+,R0	::ADDRESS OF 1ST CHAR.
13994	056172	010037	056316			MOV	R0,6\$::SAVE IN CASE 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	

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056300 012602
056302 012601
056304 012600
14023 056306 000002
14024
14025 056310 005726
14026 056312 105010
14027 056314
056314 104401
14028 056316 000000
14029 056320
056320 104401 067776
14030 056324
056324 104401 070037
14031 056330
056330 104401 070027
14032 056334 000714
RTI
5$: TST (SP)+
CLR8 (R0)
TYPE
TYPEIT
.DSABL CRF
.WORD 0
TYPE MSG062
TYPEIT ,MSG062
.DSABL CRF
TYPE MSG065
TYPEIT ,MSG065
.DSABL CRF
TYPE MSG064
TYPEIT ,MSG064
.DSABL CRF
BR 1$
MOV (SP),R2
MOV (SP),R1
MOV (SP),R0
;;RETURN
;;CLEAN PARTIAL NUMBER FROM STACK
;;SET A TERMINATOR
;;TYPE THE INPUT UP TO BAD CHAR.
;;POINTER GOES HERE
;INPUT MUSST BE A
;DECIMAL
;NUMBER
;;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 $SAVREG:
14052 PUSH R0,R1,R2,R3,R4,R5
14053 056336 010046 MOV R0,-(SP)
14054 056336 010146 MOV R1,-(SP)
14055 056342 010246 MOV R2,-(SP)
14056 056344 010346 MOV R3,-(SP)
14057 056346 010446 MOV R4,-(SP)
14058 056350 010546 MOV R5,-(SP)
14059 056352 016646 000022 MOV 22(SP),-(SP) ;;SAVE PS OF MAIN FLOW
14060 056356 016646 000022 MOV 22(SP),-(SP) ;;SAVE PC OF MAIN FLOW
14061 056362 016646 000022 MOV 22(SP),-(SP) ;;SAVE PS OF CALL
14062 056366 016646 000022 MOV 22(SP),-(SP) ;;SAVE PC OF CALL
14063 056372 000002 RTI
14064 ;*RESTORE R0-R5
14065 ;*CALL:
14066 ;* RESREG
14067 $RESREG:
14068 056374 012666 000022 MOV (SP)+,22(SP) ;;RESTORE PC OF CALL
14069 056400 012666 000022 MOV (SP)+,22(SP) ;;RESTORE PS OF CALL
14070 056404 012666 000022 MOV (SP)+,22(SP) ;;RESTORE PC OF MAIN FLOW
14071 056410 012666 000022 MOV (SP)+,22(SP) ;;RESTORE PS OF MAIN FLOW
14072 056414 POP R5,R4,R3,R2,R1,R0
14073 056414 012605 MOV (SP)+,R5
14074 056416 012604 MOV (SP)+,R4
14075 056420 012603 MOV (SP)+,R3
14076 056422 012602 MOV (SP)+,R2
14077 056424 012601 MOV (SP)+,R1
14078 056426 012600 MOV (SP)+,R0
14079 056430 000002 RTI

```

```

14070                                     .SBTTL  ROUTINE RANDOM NUMBER GENERATOR
14071
14072                                     ;*****
14073                                     ;*THIS ROUTINE IS A DOUBLE PRECISION PSEUDO RANDOM NUMBER GENERATOR
14074                                     ;*WITH A RANGE OF 0 TO 2**(+33)-1.
14075                                     ;*CALL:
14076                                     ;*   CALL   $RAND           ;;CALL THE ROUTINE
14077                                     ;*   RETURN          ;;RETURN HERE THE RANDOM
14078                                     ;*                                     ;;NUMBER WILL BE IN
14079                                     ;*                                     ;;$HINUM,$LONUM
14080
14081 056432 $RAND: PUSH   R0,R1,R2
14081 056432 010046
14081 056434 010146
14081 056436 010246
14082 056440 013700 002604
14083 056444 013701 002602
14084 056450 012702 000007
14085 056454 006300
14086 056456 006101
14087 056460 077203
14088 056462 063700 002604
14089 056466 005501
14090 056470 063701 002602
14091 056474 062700 001057
14092 056500 005501
14093 056502 062701 047401
14094 056506 010037 002604
14095 056512 010137 002602
14096 056516
14096 056516 012602
14096 056520 012601
14096 056522 012600
14097 056524 000207

MOV SEEDLO,R0 ;SET R0 WITH LOW
MOV SEEDHI,R1 ;SET R1 WITH HIGH
MOV #7,R2 ;SET SHIFT COUNT
1$: ASL R0 ;;SHIFT R0 LEFT AND
ROL R1 ;;ROTATE CARRY INTO R1 AND
SOB R2,1$
ADD SEEDLO,R0 ;ADD NUMBER TO MAKE X 129
ADC R1 ;;PROPOGATE CARRY
ADD SEEDHI,R1 ;ADD NUMBER TO MAKE X 129
ADD #1057,R0 ;;ADD LOW CONSTANT
ADC R1 ;;PROPOGATE CARRY
ADD #47401,R1 ;;ADD HIGH CONSTANT
MOV R0,SEEDLO ;SAVE R0
MOV R1,SEEDHI ;SAVE R1
POP R2,R1,R0
MOV (SP)+,R2
MOV (SP)+,R1
MOV (SP)+,R0

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 ASCII 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 ASCII CHAR. IS ON THE STACK
14108
14109
14110 056526 104415          $DB20: SAVREG          ;; SAVE ALL REGISTERS
14111 056530 016601 000002 MOV    2(SP),R1        ;; PICKUP THE POINTER TO LOW WORD
14112 056534 012705 056645 MOV    #12.,R4         ;; POINTER TO DATA TABLE
14113 056540 012704 000014 MOV    #12.,R4         ;; DO ELEVEN CHARACTERS
14114 056544 012703 177770 MOV    #1C7,R3        ;; MASK
14115 056550 012100 MOV    (R1)+,R0       ;; LOWER WORD
14116 056552 012101 MOV    (R1)+,R1       ;; HIGH WORD
14117 056554 005002 CLR    R2              ;; TERMINATOR
14118 056556 110245 1$:  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)      ;; ASCII 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

14197
 14198
 14199
 14200
 14201
 14202
 14203
 14204
 14205
 14206 056734 177777
 14207 056736 177777
 14208 056740 177777
 14209 056742 177777
 14210 056744 177777
 14211 056746 177777
 14215 056750
 14216
 14217
 14218
 14219 056750
 14220 056750 000000
 14221 056752 056646
 14222 056754 000043
 14223 056756 001274
 14224 056760 000000
 14225 056762 000041

;THE FOLLOWING LOCATIONS SPECIFY WHICH PATTERNS
 ;ARE TO BE RUN FOR PARTICULAR MEMORIES
 ;
 ;REFERENCE THE TABLE LISTED BELOW TO RELATE BITS TO PATTERNS.
 ;BITO SET WILL RUN THE FIRST ENTRY IN THE TABLE, BITO SET
 ;IN THE SECOND WORD WILL RUN THE 17TH ENTRY IN THE TABLE ...

;NOTE** NULL TESTS DO NOT TAKE ANY TIME

				;FIELD SERVICE VALUE	
\$DDW0:	.WORD	177777	;ECC CSR TESTS	177777	TABLE = MKCSRT:
\$DDW1:	.WORD	177777	;ECC CSR TESTS	177777	TABLE = MKCSRT:
\$DDW2:	.WORD	177777	;ECC PATTERNS	103777	TABLE = MKPAT:
\$DDW3:	.WORD	177777	;ECC PATTERNS	177777	TABLE = MKPAT:
\$DDW4:	.WORD	177777	;PARITY PATTERNS	003777	TABLE = MJPAT:
\$DDW5:	.WORD	177777	;PARITY PATTERNS	177774	TABLE = MJPAT:

\$ETEND:
 ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
 ;INTERFACE SPEC.

\$APTHD:				
\$HIBTS:	.WORD	0		::TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
\$MBADR:	.WORD	\$MAIL		::ADDRESS OF APT MAILBOX (BITS 0-15)
\$TSTM:	.WORD	35.		::RUN TIM OF LONGEST TEST
\$PASTM:	.WORD	700.		::RUN TIME IN SECS. OF 1ST PASS ON 128K (QUICK VERIFY)
\$UNITM:	.WORD	0.		::EXTRA RUN TIME OF A PASS FOR EACH ADDJTIONAL 128K (QV)
	.WORD	\$ETEND \$MAIL/2		::LENGTH MAILBOX ETABLE(WORDS)

.SBTTL ROUTINE TRAP DECODER

```

14227
14228
14229
14230
14231
14232
14233
14234
14235 056764 010046
14236 056766 016600 000002
14237 056772 005740
14238 056774 111000
14239 056776 006300
14240 057000 016000 057026
14241 057004 000200
14242
14243
14244
14245
14246 057006 011646
14247 057010 016666 000004 000002
14248 057016 000002
14249
14250 057020
      057020 104401 065507
14251 057024 000000

```

```

;*****
;*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.
$TRAP:  MOV    RO,-(SP)          ;;SAVE RO
        MOV    2(SP),RO        ;;GET TRAP ADDRESS
        TST    -(RO)           ;;BACKUP BY 2
        MOVB   (RO),RO         ;;GET RIGHT BYTE OF TRAP
        ASL    RO              ;;POSITION FOR INDEXING
        MOV    $TRPAD(RO),RO   ;;INDEX TO TABLE
        RTS    RO              ;;GO TO ROUTINE

;;THIS IS USE TO HANDLE THE "CETPRI" MACRO
$TRAP2: MOV    (SP),-(SP)      ;;MOVE THE PC DOWN
        MOV    4(SP),2(SP)    ;;MOVE THE PSW DOWN
        RTI                    ;;RESTORE THE PSW

$NOTRAP:TYPE  MSG006          ;UNDEFINED TRAP INSTRUCTION
        TYPEIT ,MSG006
        .DSABL CRF

$HALT2: HALT

```

```

14254                               .SBTTL TRAP TABLE
14255
14256                               ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
14257                               ;*BY THE "TRAP" INSTRUCTION.
14258
14259                               ;
14260                               ; ROUTINE
14261                               ;-----
14261 057026 057006 $TRPAD: .WORD $TRAP2
14262 057030 047122 $TYPE ;CALL=TYPEIT TRAP+1(104401) TTY TYPEOUT ROUTINE
14263 057032 054102 $TYPOC ;CALL=TYPOC TRAP+2(104402) TYPE OCTAL NUMBER (WITH LEADING ZEROS)
14264 057034 054056 $TYPOS ;CALL=TYPOS TRAP+3(104403) TYPE OCTAL NUMBER (NO LEADING ZEROS)
14265 057036 057020 $NOTRAP;$TYPON ;CALL=TYPON TRAP+4(104404) TYPE OCTAL NUMBER (AS PER LAST CALL)
14266 057040 054304 $TYPDS ;CALL=TYPDS TRAP+5(104405) TYPE DECIMAL NUMBER (WITH SIGN)
14267 057042 057020 $NOTRAP;$TYPBN ;CALL=TYPBN TRAP+6(104406) TYPE BINARY (ASCTI) NUMBER
14268
14269 057044 054704 $GTSWR ;CALL=GTSWR TRAP+7(104407) GET SOFT-SWR SETTING
14270 057046 054530 $CKSWR ;CALL=CKSWR TRAP+10(104410) TEST FOR CHANGE IN SOFT-SWR
14271
14272 057050 055264 $RDCHR ;CALL=RDCHR TRAP+11(104411) TTY TYPEIN CHARACTER ROUTINE
14273 057052 055414 $RDLIN ;CALL=RDLIN TRAP+12(104412) TTY TYPEIN STRING ROUTINE
14274 057054 056000 $RDOCT ;CALL=RDOCT TRAP+13(104413) READ AN OCTAL NUMBER FROM TTY
14275 057056 056150 $RDDEC ;CALL=RDDEC TRAP+14(104414) READ A DECIMAL NUMBER FROM TTY
14276
14277 057060 056336 $SAVREG ;CALL=SAVREG TRAP+15(104415) SAVE R0-R5 ROUTINE
14278 057062 056374 $RESREG ;CALL=RESREG TRAP+16(104406) RESTORE R0-R5 ROUTINE
14279
14280 057064 034202 $KERNEL ;CALL=KERNEL TRAP+17(104417) ENTER KERNEL MODE
14281 057066 034212 $ENERGIZE;CALL=ENERGIZETRAP+20(104420) TURN ON MEMORY MANAGEMENT & TRAPS
14282 057070 034222 $DEENERGI;CALL=DEENERGITRAP+21(104421) TURN OFF MEMORY MANAGEMENT & TRAPS
14283
14284 057072 036310 $KMAP ;CALL=KMAP TRAP+22(104422) MAP KERNEL 1 TO 1
14285
14286 057074 034232 $CACHN ;CALL=CACHON TRAP+23(104423) TURN CACHE ON
14287 057076 034256 $CACHF ;CALL=CACHOFF TRAP+24(104424) TURN CACHE OFF
14288
14289 057100 034274 $LOADC ;CALL=LOADCSR TRAP+25(104425) LOAD CORRECT CSR
14290 057102 034370 $READC ;CALL=READCSR TRAP+26(104426) READ CORRECT CSR
14291
14292 057104 047456 $PER01 ;CALL=PERRO1 TRAP+27(104427) PROGRAM DETECTED ERROR
14293 057106 047504 $PER02 ;CALL=PERRO2 TRAP+30(104430) PROGRAM DETECTED ERROR
14294 057110 047532 $PER03 ;CALL=PERRO3 TRAP+31(104431) PROGRAM DETECTED ERROR
14295 057112 047562 $PER04 ;CALL=PERRO4 TRAP+32(104432) PROGRAM DETECTED ERROR
14296 057114 047644 $PER07 ;CALL=PERRO7 TRAP+33(104433) PROGRAM DETECTED ERROR
14297 057116 047666 $PER10 ;CALL=PERR10 TRAP+34(104434) PROGRAM DETECTED ERROR
14298 057120 047716 $PER11 ;CALL=PERR11 TRAP+35(104435) PROGRAM DETECTED ERROR
14299 057122 047736 $PER12 ;CALL=PERR12 TRAP+36(104436) PROGRAM DETECTED ERROR
14300 057124 047760 $PER13 ;CALL=PERR13 TRAP+37(104437) PROGRAM DETECTED ERROR
14301 057126 050000 $PER14 ;CALL=PERR14 TRAP+40(104440) PROGRAM DETECTED ERROR
14302 057130 050022 $PER15 ;CALL=PERR15 TRAP+41(104441) PROGRAM DETECTED ERROR
14303 057132 050044 $PER16 ;CALL=PERR16 TRAP+42(104442) PROGRAM DETECTED ERROR
14304 057134 050064 $PER17 ;CALL=PERR17 TRAP+43(104443) PROGRAM DETECTED ERROR
14305 057136 050102 $PER20 ;CALL=PERR20 TRAP+44(104444) PROGRAM DETECTED ERROR
14306 057140 050120 $PER21 ;CALL=PERR21 TRAP+45(104445) PROGRAM DETECTED ERROR
14307 057142 050140 $PER22 ;CALL=PERR22 TRAP+46(104446) PROGRAM DETECTED ERROR
14308 057144 050156 $PER23 ;CALL=PERR23 TRAP+47(104447) PROGRAM DETECTED ERROR
14309 057146 050174 $PER24 ;CALL=PERR24 TRAP+50(104450) PROGRAM DETECTED ERROR
14310 057150 044756 $PER25 ;CALL=PERR25 TRAP+51(104451) PROGRAM DETECTED ERROR

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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
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 ;:ILC;REV B
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

.SBTTL TABLE ERROR POINTER

;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
;*LOCATION \$ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
;*NOTE1: IF \$ITEMB IS 0 THE ONLY PERTINENT DATA IS (ERRPC).
;*NOTE2: EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:

;* EM ;;POINTS TO THE ERROR MESSAGE
;* DH ;;POINTS TO THE DATA HEADER
;* DT ;;POINTS TO THE DATA
;* DF ;;POINTS TO THE DATA FORMAT

14358
14359
14360
14361
14362
14363
14364
14365
14366
14367
14368
14369
14370
14371
14372 057274
14373 057274 061762
14374 057276 064172
14375 057300 060320
14376 057302 060701
14377
14378 057304 060747
14379 057306 063501
14380 057310 060144
14381 057312 060557
14382
14383 057314 061005
14384 057316 063561
14385 057320 060162
14386 057322 060674
14387
14388 057324 061037
14389 057326 063561
14390 057330 060172
14391 057332 060674
14392
14393 057334 061105
14394 057336 063615
14395 057340 060202
14396 057342 060557
14397
14398 057344 061162
14399 057346 063615
14400 057350 060202
14401 057352 060557
14402
14403 057354 061207
14404 057356 063615
14405 057360 060202
14406 057362 060557
14407
14408 057364 063173
14409 057366 064714
14410 057370 060476
14411 057372 060557

\$ERRTB: ;ERROR 1
EM24
DH13
DT13
DF11
;ERROR 2
EM2
DH1
DT1
DF2
;ERROR 3
EM3
DH3
DT3
DF9
;ERROR 4
EM4
DH3
DT4
DF9
;ERROR 5
EM5
DH5
DT5
DF2
;ERROR 6
EM6
DH5
DT5
DF2
;ERROR 7
EM7
DH5
DT5
DF2
;ERROR 10
EM53
DH25
DT25
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			;ERROR 35
14519	057634	063146	EM52
14520	057636	064714	DH25
14521	057640	060476	DT25
14522	057642	060557	DF2
14523			;ERROR 36
14524	057644	062137	EM27
14525	057646	064465	DH16
14526	057650	060410	DT17
14527	057652	060672	DF8
14528			;ERROR 37
14529	057654	062634	EM35
14530	057656	063741	DH7
14531	057660	060234	DT7
14532	057662	060603	DF3
14533			;ERROR 40
14534	057664	062227	EM29
14535	057666	063741	DH7
14536	057670	060234	DT7
14537	057672	060603	DF3
14538			;ERROR 41
14539	057674	062311	EM30
14540	057676	063741	DH7
14541	057700	060234	DT7
14542	057702	060631	DF5
14543			;ERROR 42
14544	057704	063343	EM60
14545	057706	064507	DH20
14546	057710	060434	DT23
14547	057712	060712	DF13
14548			;ERROR 43
14549	057714	062421	EM32
14550	057716	063741	DH7
14551	057720	060234	DT7
14552	057722	060603	DF3
14553			;ERROR 44
14554	057724	062526	EM33
14555	057726	063741	DH7
14556	057730	060234	DT7
14557	057732	060603	DF3
14558			;ERROR 45
14559	057734	063076	EM51
14560	057736	064645	DH24
14561	057740	060456	DT24
14562	057742	060722	DF14
14563			;ERROR 46
14564	057744	062721	EM36
14565	057746	063674	DH6
14566	057750	060220	DT6
14567	057752	060557	DF2

14570			;ERROR	47
14571	057754	062770	EM40	
14572	057756	063536	DH2	
14573	057760	060416	DT20	
14574	057762	060557	DF2	
14575			;ERROR	50
14576	057764	063243	EM56	
14577	057766	064770	DH27	
14578	057770	060516	DT27	
14579	057772	060556	DF1	
14580			;ERROR	51
14581	057774	063405	EM61	
14582	057776	064645	DH24	
14583	060000	060456	DT24	
14584	060002	060722	DF14	
14585			;ERROR	52
14586	060004	062227	EM29	
14587	060006	064172	DH13	
14588	060010	060320	DT13	
14589	060012	060701	DF11	
14590			;ERROR	53
14591	060014	062041	EM25	
14592	060016	065044	DH30	
14593	060020	060536	DT30	
14594	060022	060740	DF16	
14595			;ERROR	54
14596	060024	063275	EM57	
14597	060026	065044	DH30	
14598	060030	060536	DT30	
14599	060032	060740	DF16	
14600			;ERROR	55
14601	060034	061573	EM20	
14602	060036	064645	DH24	
14603	060040	060456	DT24	
14604	060042	060722	DF14	
14605			;ERROR	56
14606	060044	061573	EM20	
14607	060046	065044	DH30	
14608	060050	060536	DT30	
14609	060052	060740	DF16	
14610			;ERROR	57
14611	060054	061521	EM19	
14612	060056	064645	DH24	
14613	060060	060456	DT24	
14614	060062	060722	DF14	
14615			;ERROR	60
14616	060064	061315	EM13	
14617	060066	064507	DH20	
14618	060070	060434	DT23	
14619	060072	060712	DF13	
14620			;ERROR	61
14621	060074	062311	EM30	
14622	060076	064507	DH20	
14623	060100	060434	DT23	
14624	060102	060712	DF13	
14625			;ERROR	62
14626	060104	061573	EM20	

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

14646						.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, MMRO, 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	DETRO, 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, MMRO, 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				

Address	Hex	Hex	Hex	Hex	DF	Format	Value
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	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	000			
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	000			
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	000			
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	000			
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	000			
14681	060672	000	005	000	DF8:	.BYTE	0,5
14682	060674	000	001	001	DF9:	.BYTE	0,1,1,1,1
	060677	001	001	000			
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	000			
14685	060722	000	005	000	DF14:	.BYTE	0,5,0,3,6,2,4
	060725	003	006	002			
	060730	004	000	000			
14686	060731	000	005	000	DF15:	.BYTE	0,5,0,8.,3,6,4
	060734	010	003	006			
	060737	004	000	000			
14687	060740	000	005	010	DF16:	.BYTE	0,5,8.,0,0,3,4
	060743	000	000	003			
	060746	004	000	000			

Address	Hex 1	Hex 2	Hex 3	Hex 4	Message
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	

	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/

	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	
14709	061570	105	104	000	
	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	
14710	061650	104	000		
	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	

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	

	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	

	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	11^	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		

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	

	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		

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		

Address	Offset	Value	Field	Header
14737				.SBTTL ERROR DATA HEADERS (DH)
14738	063501	040	120	DH1: .ASCIZ / PC DEV ADD GOOD BAD/
	063504	103	040	
	063507	040	104	
	063512	126	040	
	063515	104	104	
	063520	040	040	
	063523	117	117	
	063526	040	040	
	063531	040	102	
	063534	104	000	
14739	063536	040	120	DH2: .ASCIZ / PC GD CC BD-CC/
	063541	103	040	
	063544	040	107	
	063547	055	103	
	063552	040	102	
	063555	055	103	
	063560	000		
14740	063561	040	120	DH3: .ASCIZ / PC 1ST ADD # OF ERRORS/
	063564	103	040	
	063567	040	061	
	063572	124	040	
	063575	104	104	
	063600	040	043	
	063603	117	106	
	063606	105	122	
	063611	117	122	
	063614	000		
14741	063615	040	120	DH5: .ASCIZ / PC MMR0 MMR1 MMR2 MMR3 CPUERR/
	063620	103	040	
	063623	040	040	
	063626	115	115	
	063631	060	040	
	063634	040	040	
	063637	115	122	
	063642	040	040	
	063645	040	115	
	063650	122	062	
	063653	040	040	
	063656	115	115	
	063661	063	040	
	063664	040	103	
	063667	125	105	
	063672	122	000	
14742	063674	040	120	DH6: .ASCIZ / PC APTPAR LSIZE APTECC MSIZE/
	063677	103	040	
	063702	040	101	
	063705	124	120	
	063710	122	040	
	063713	040	114	
	063716	111	132	
	063721	040	040	
	063724	120	124	
	063727	103	103	
	063732	040	115	
	063735	111	132	
	063740	000		

	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	C40	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							

	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						

Address	Value	Value	Value	Label	Value	Value	Value
14764				.SBTTL MESSAGES			
14765	065123	200	040	MSG001: .ASCIZ <CRLF>/			MEMORY CONFIGURATION MAP/
	065126	040	040				
	065131	040	040				
	065134	040	040				
	065137	040	040				
	065142	040	040				
	065145	040	040				
	065150	040	040				
	065153	040	115				
	065156	115	117				
	065161	131	040				
	065164	117	116				
	065167	111	107				
	065172	122	101				
	065175	111	117				
	065200	040	115				
	065203	120	000				
14766	065205	200	040	MSG002: .ASCIZ <CRLF>/			16K WORD BANKS/
	065210	040	040				
	065213	040	040				
	065216	040	040				
	065221	040	040				
	065224	040	040				
	065227	040	040				
	065232	040	040				
	065235	040	040				
	065240	040	040				
	065243	061	066				
	065246	040	127				
	065251	122	104				
	065254	102	101				
	065257	113	123				
14767	065262	200	040	MSG003: .ASCII <CRLF>/	1	2	3/
	065265	040	040				
	065270	040	040				
	065273	040	040				
	065276	040	040				
	065301	040	040				
	065304	040	040				
	065307	040	040				
	065312	040	062				
	065315	040	040				
	065320	040	040				
	065323	063					
14768	065324	040	040	.ASCIZ /	4	5	6 7 /
	065327	040	040				
	065332	040	064				
	065335	040	040				
	065340	040	040				
	065343	065	040				
	065346	040	040				
	065351	040	040				
	065354	040	040				
	065357	040	040				
	065362	040	067				
	065365	040	000				

14769	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		

	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
	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
	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	
14779	066043	067	000	
14780	066045	060	061	062
	066050	063	064	065
	066053	066	067	000
14781	066056	130	000	
14782	066060	040	000	
14783	066062	000	000	
14784	066064	200	103	123
	066067	122	040	040
	066072	040	040	040

MSG011: .ASCIZ / 0 1 2 3 4 5 6/

MSG012: .ASCIZ /4567012345670123456701234567012345670123456701234567/

MSG11B: .ASCIZ /1/
 MSG11C: .ASCIZ /7/
 MSG11D: .ASCIZ /01234567/

MSG013: .ASCIZ /X/
 MSG014: .ASCIZ / / ;SPACE
 MSG015: .BYTE 0,0 ;FOR SINGLE ASCII CHARACTERS & TERMINATOR
 MSG016: .ASCIZ <CRLF>/CSR /

14785	066075	000							
	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					

	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	

	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/

	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	MSG034: .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	MSG034: .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	

	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	

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 / /

	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	

14853	070262	040	043	000	
	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	

	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/

	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			MSG122: .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	

	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>" CVMJAA0 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/

MESSAGES

	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	B107	054002	B61	035112	CPUERR=	177766	DH13	064172
ABORTF	002144	B108	053522	B62	035116	CR	= 000015	DH14	064267
ABORT1	000032	B109	053526	B63	035322	CRLF	= 000200	DH15	064346
ABORT2	000046	B110	053624	B64	035326	CSR	002150	DH16	064465
ACFLAG	002116	B111	053716	B65	036444	CSRADD=	172100	DH19	064502
ACTFLA	002350	B112	054002	B66	036452	CSRBMF	006024	DH2	063536
ADDRES	002034	B113	013010	B67	036602	CSRCS	017004	DH20	064507
ANA2	007372	B114	013060	B7	012220	CSRFB	002232	DH23	064566
APTDOW	040720	B115	013122	B70	036616	CSRFB	002226	DH24	064645
APTECC	002424	B116	013122	B71	043510	CSRHOL	002526	DH25	064714
APTFLA	002352	B117	013400	B72	043746	CSRINC	002330	DH26	064752
APTHAN	014126	B118	014172	B73	044230	CSRINF	002462	DH27	064770
APTHLT	040766	B119	015610	B74	044524	CSRINT	002236	DH3	063561
APTPAR	002422	B120	016060	B75	044524	CSRLAS	002230	DH30	065044
APTSIZ	002444	B121	016066	B76	044622	CSRLBA	002234	DH5	063615
BACK	051530	B122	016104	B77	045562	CSRL00	002332	DH6	063674
BACKGN	032630	B123	016146	CACHKF	002550	CSRMAP	006034	DH7	063741
BAD	002052	B124	016220	CACHKN	002544	CSRNO	002152	DIAGFL	002004
BADPC	002022	B125	016220	CACHOF=	104424	CSR0UT	035314	DISPLA	002640
BADPSW	002032	B126	021642	CACHON=	104423	CSRSTU=	000021	DISPRE=	000174
BADSP	002026	B127	021646	CACHVE=	000114	CSRIS	002322	DISPTB	013600
BADSTA	034152	B128	022026	CBCSR	= 104474	CTEST	006714	DOBACK	014162
BADXOR	002060	B129	022034	CBITS	002316	CTLKVE	002146	DONE	006700
BAD2	002054	B130	022034	CBREG	= 104513	DATARG=	177754	DSWR	= 177570
BAD3	002056	B131	022264	CB1CSR=	104475	DATBUF	002242	DT1	060144
BAFPAF	014262	B132	025750	CHECK	002314	DBEMSK	002256	DT10	060264
BAFPAR	014370	B133	026140	CHKDIS=	104504	DDISP	= 177570	DT11	060306
BAKPAT	002632	B134	026176	CHKTRP	032220	DEENER=	104421	DT12	060314
BANK	002102	B135	026620	CHK1DI=	104505	DETAIL	053266	DT13	060320
BANKIN	002104	B136	026656	CKEND	055056	DETFLA	002220	DT14	060342
BANKMO	037442	B137	026672	CKSWR	= 104410	DETPSW	002216	DT16	060360
BANKOK	040456	B138	027012	CLRCR=	104502	DETRO	002200	DT17	060410
BAWPAF	014476	B139	027172	CLREX	007342	DETR0	002202	DT2	060156
BAWPAR	014626	B140	027214	CLRMEM	007232	DETR1	002204	DT20	060416
BGTEST	027610	B141	027742	CLR1CS=	104503	DETR2	002204	DT22	060426
BITNO	002324	B142	030102	CMD16A	044610	DETR3	002206	DT23	060434
BIT0	= 000001	B143	030140	CMD16L=	000074	DETR4	002210	DT24	060456
BIT1	= 000002	B144	030432	CMD5B	042752	DETR5	002212	DT25	060476
BIT10	= 002000	B145	030646	CMD5C	043246	DETSP	002214	DT26	060510
BIT11	= 004000	B146	031050	CMD7B	043504	DET1	053756	DT27	060516
BIT12	= 010000	B147	031224	CMD7C	043560	DF1	060556	DT3	060162
BIT13	= 020000	B148	031244	CMD9B	044224	DF11	060701	DT30	060536
BIT14	= 040000	B149	031254	CMD9C	044300	DF13	060712	DT4	060172
BIT15	= 100000	B150	031572	CONFGE	002450	DF14	060722	DT5	060202
BIT2	= 000004	B151	031742	CONFIE	003670	DF15	060731	DT6	060220
BIT3	= 000010	B152	031756	CONFIG	002664	DF16	060740	DT7	060234
BIT4	= 000020	B153	032022	CONTFL	002222	DF2	060557	DUMMY	002176
BIT5	= 000040	B154	032022	CONTRL=	177746	DF3	060603	DUMPCS=	000103
BIT6	= 000100	B155	034746	CONTS	055226	DF4	060616	ECCDIS=	104470
BIT7	= 000200	B156	011544	CONTS1	054570	DF5	060631	ECCINI=	104472
BIT8	= 000400	B157	034752	CONTS2	055230	DF6	060644	ECC1DI=	104471
BIT9	= 001000	B158	034752	CONTS3	047340	DF7	060657	ECC1IN=	104473
BLOCK1	040770	B159	034752	CONTT	055152	DF8	060672	EMTSV	003670
BLOCK2	041010	B160	034752	COUNT	002370	DF9	060674	EMTVEC=	000030
BLOCK3	041024			CPERRF	052314	DH1	063501	EM11	061247
BMFLAG	002130			CPSAVE	052312	DH10	064051	EM12	061271
BRG08B	027612			CPUBIT	002106	DH11	064147	EM13	061315
						DH12	064165		

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 =	006065
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	IMPTE	011750	LO	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	020034	FIRST =	060000	KIPAR0 =	172340	L12	005300
EM6	061162	E32	026414	FLIPLO	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
EQFLAG	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

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	00655	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	MAPHO	= 170202
L227	026272	L327	032272	L410	041306	L475	051164	MAPKER	037740
L230	026350	L33	006332	L411	041336	L476	051254	MAPLO	= 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	MSG037	067315	MSG126	071264	MT0005	020140	OLDCSR	002156
MFPT	= 000007	MSG038	067334	MSG127	071331	MT0006	020222	ONES	002614
MJPAT	017430	MSG039	067352	MSG128	071350	MT0007	020256	PADDRE	002036
MJTEST	017324	MSG040	067374	MSG129	071471	MT0010	020320	PAFBAF	014756
MKCNT	016476	MSG041	067420	MSG130	071474	MT0014	020354	PAFBAW	015106
MKCONT	015656	MSG042	067445	MSIZE	002402	MT0017	020434	PARBAF	015260
MKCSRT	017014	MSG043	067463	MTA030	022212	MT0020	020456	PARBAW	015410
MKFLAG	002120	MSG046	067505	MTEST	015562	MT0021	020536	PARCNT	002072
MKLOOP	016040	MSG047	067540	MTPA03	024750	MT0022	021026	PARITY	033744
MKPAT	017244	MSG048	067557	MTPA04	025106	MT0023	021060	PARTHE	002304
MKTEST	017104	MSG049	067617	MTPA21	026442	MT0024	021124	PARVEC	= 000114
MMR0	= 177572	MSG051	067652	MTPA24	027266	MT0026	021332	PASCNT	002570
MMR1	= 177574	MSG055	067671	MTPA26	027360	MT0027	021610	PASFLG	002264
MMR2	= 177576	MSG056	067712	MTPB03	025010	MT0030	022200	PASSNO	002266
MMR3	= 172516	MSG058	067745	MTPB04	025142	MT0031	022454	PATERR	002074
MMTRAP	034126	MSG061	067767	MTPB21	026472	MT0032	022644	PATPLU	004644
MMVEC	= 000250	MSG062	067776	MTPB24	027326	MT0033	023160	PATTER	002112
MONFLG	002276	MSG063	070016	MTPB26	027374	MT0034	023346	PCBUMP	002326
MSEEDH	002606	MSG064	070027	MTPC03	025050	MT0035	023446	PCONFI	032722
MSEEDL	002610	MSG065	070037	MTPC21	026526	MT0036	023560	PCONFS	033334
MSG012	071210	MSG066	070051	MTPC24	027342	MT0037	023622	PCONF1	033242
MSG034	067207	MSG067	070120	MTPC26	027430	MT0041	023660	PCONF2	033302
MSG034	067245	MSG070	070127	MTPD03	025066	MT0042	023740	PDP110	034140
MSG000	071422	MSG073	070160	MTPD21	026562	MT0043	023774	PD1	045472
MSG001	065123	MSG075	070176	MTPD26	027450	MT0044	024024	PERA05	047614
MSG002	065205	MSG076	070230	MTP000	024640	MT0045	024104	PERBNK	050446
MSG003	065262	MSG077	070251	MTP001	024664	MT0046	024134	PERECC	050526
MSG004	065367	MSG079	070265	MTP002	024716	MT0047	024164	PERRAB	050264
MSG005	065475	MSG085	070311	MTP005	025162	MT0999	024220	PERRAW	050212
MSG006	065507	MSG088	070336	MTP006	025216	MT1	015636	PERRA3	045040
MSG008	071370	MSG089	070354	MTP007	025416	MT2	015642	PERRA7	050336
MSG009	065544	MSG090	070376	MTP010	025516	MUT	002110	PERR01	= 104427
MSG010	065556	MSG091	070412	MTP014	025624	M1184	071100	PERR02	= 104430
MSG011	065656	MSG092	070424	MTP017	026050	NC	047400	PERR03	= 104431
MSG012	065744	MSG093	070440	MTP020	026126	NEMCNT	002070	PERR04	= 104432
MSG013	066056	MSG095	070446	MTP022	026612	NEWBAN	002310	PERR05	047610
MSG014	066060	MSG101	070456	MTP030	027466	NEWKER	037672	PERR06	047636
MSG015	066062	MSG102	070506	MTP031	027476	NEWLOA	037774	PERR07	= 104433
MSG016	066064	MSG103	070535	MTP032	027554	NOAPT	051514	PERR10	= 104434
MSG017	066076	MSG104	070557	MTP033	027606	NOCH	054552	PERR11	= 104435
MSG018	066107	MSG105	070561	MTP034	027704	NOERRO	002430	PERR12	= 104436
MSG019	066112	MSG106	070634	MTP035	027730	NOFSMO	002426	PERR13	= 104437
MSG020	066116	MSG107	070652	MTP036	030072	NONEM	002100	PERR14	= 104440
MSG021	066137	MSG11A	065570	MTP037	030316	NONEXI	034050	PERR15	= 104441
MSG022	066725	MSG11B	066041	MTP041	030370	NOOJ	033034	PERR16	= 104442
MSG023	066747	MSG11C	066043	MTP042	030542	NOOJ1	033144	PERR17	= 104443
MSG025	066763	MSG11D	066045	MTP043	031030	NOPAR	002076	PERR20	= 104444
MSG026	067007	MSG110	070727	MTP044	031224	NORES	003722	PERR21	= 104445
MSG027	067021	MSG111	070773	MTP045	031546	NOS COP	002440	PERR22	= 104446
MSG028	067036	MSG112	071025	MTP046	031734	NOSUPE	002456	PERR23	= 104447
MSG029	067052	MSG113	071057	MTP047	032274	NOTAB	002372	PERR24	= 104450
MSG030	067072	MSG117	071112	MTST3	011414	NOTRCE	051200	PERR25	= 104451
MSG031	067111	MSG119	071124	MT0000	017510	NOUBMT	071547	PERR26	= 104452
MSG032	067151	MSG120	071133	MT0001	017544	NO22BI	002454	PERR27	= 104453
MSG033	067170	MSG121	071154	MT0002	017640	NULLFL	002344	PERR30	= 104454
MSG035	067273	MSG122	071174	MT0003	017754	NXTCSR	005752	PERR31	= 104455
MSG036	067276	MSG125	071242	MT0004	020070	OLDCAC	002302	PERR32	= 104456

Symbol table

PERR33-	104457	SAV30	003706	SUPDR0	002160	TMFLAG	002134	WOOPSA	046704
PERR34-	104460	SAV32	003710	SUPDR1	002162	TOOMAN	002406	WOOPUP	046472
PERR35-	104461	SAV4	002270	SUPDR2	002164	TJTCSR	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
PFECEN	052636	SEEDLO	002604	SWRFLG	002566	TST5	013552	\$CBCSR	034672
PFECWS	052626	SELONL	002002	SWO =	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	TYPC =	104402	\$CDW2	056730
PHYADD	002040	SIPAR0=	172240	SW12 =	010000	TYP05 =	104403	\$CHARC	047434
PHEMFL	002142	SIPAR3=	172246	SW13 =	020000	TYP50 =	000000	\$CHKDI	035266
PROTYP	004010	SIPAR5=	172252	SW14 =	040000	TYP51 =	000002	\$CHK1D	035302
PSIZE	002404	SIPAR6=	172254	SW15 =	100000	TYP52 =	000000	\$CKSWR	054530
PSW =	177776	SIPDR0=	172200	SW2 =	0C0004	TYP53 =	000000	\$CLRCS	035244
PTABLE	030276	SIZE =	040000	SW3 =	000010	TYP54 =	000000	\$CLR1C	035256
PWRVEC-	000024	SKIPKA	002010	SW4 =	000020	TYP55 =	000000	\$CMTAG	002000
QUICK	002436	SKIPMK	002342	SW5 =	000040	TYP56 =	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	UIPDRO=	17760^	\$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	\$DIDDO=	000000
RESVEC=	000010	SUBAAA	004702	TAG9\$	010710	WARN1	010776	\$DOAGA	014156
RESO	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	SUCCEC	002334	TEMP	002434	WASSBE=	104476	\$ECC1D	034604
RWCSR	006220	SUPDOA	002262	TESTAD	002412	WAS1DB=	104501	\$ECC1I	034632
SAVCSR	002154	SUPD01	024270	TESTMO	002552	WAS1SB=	104477	\$ENASB	034644
SAVMON	002274	SUPD02	024304	TIME	002340	WHICHC	044670	\$ENAS1S	034660
SAVPAR	002272	SUPD03	024446	TIMEOU	034114	WOOPEN	046654	\$ENDAD	014042
SAVREG-	104415	SUPD04	024462	TKVEC =	000060	WOOPS	046306	\$ENERG	034212

Symbol table

\$ENV	056666	\$LL	= 000106	\$0\$	= 000000	\$PER37	051136	\$TRAP2	057006
\$ENVM	056667	\$LOADC	034274	\$PASS	056654	\$PER40	051142	\$TRPAD	057026
\$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	= 177771	\$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	\$TYPC	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
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