

# DataGeneral

---

---

## TECHNICAL STATEMENT

---

---

TEXT LISTING

068-000424-04

PROGRAM

MICRONOVA MULTI-PROGRAMMING  
RELIABILITY TEST (SHORT)

TEXT TAPE

097-000424-04

ABSTRACT

THE MICRONOVA MULTI-PROGRAMMING RELIABILITY TEST (SHORT VERSION) CONSISTS OF A SERIES OF INDIVIDUAL PROCESSOR AND PERIPHERAL TESTS AND A SUPERVISOR PROGRAM, THE DIAGNOSTIC LINKER.

COPYRIGHT © DATA GENERAL CORPORATION, 1977, 1979  
ALL RIGHTS RESERVED. PRINTED IN U.S.A.

ONLY FOR OPERATION AND MAINTENANCE PURPOSES  
ON DATA GENERAL CORPORATION MANUFACTURED  
EQUIPMENT.

THE AFFIXATION OF A COPYRIGHT NOTICE ON THIS  
DIAGNOSTIC MATERIAL IS NOT INTENDED BY ITSELF  
TO RENDER THE DISTRIBUTION OF THIS DIAGNOSTIC  
MATERIAL A PUBLICATION.

### NOTICE

DATA GENERAL CORPORATION (DGC) HAS PREPARED  
THIS DIAGNOSTIC MATERIAL FOR USE BY DGC  
PERSONNEL AND CUSTOMERS AS A GUIDE TO THE  
PROPER MAINTENANCE OF DGC EQUIPMENT AND  
SOFTWARE. THE DIAGNOSTIC MATERIALS CONTAINED  
HEREIN ARE THE PROPERTY OF DGC AND SHALL  
NEITHER BE REPRODUCED IN WHOLE OR IN PART WITHOUT  
DGC'S PRIOR WRITTEN APPROVAL NOR BE IMPLIED TO  
GRANT ANY LICENSE TO MAKE, USE, OR SELL EQUIPMENT  
OR SOFTWARE MANUFACTURED IN ACCORDANCE HEREWITH.

```

0001 MNMRT
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28

```

```

AUS ASSEMBLER REV 02.05
09:00:51 09/04/79
*****
? NAME: MNMORTS.TX
? DESCRIPTION: MICRO-NOVA MULTI-PROGRAMMING RELIABILITY TEST
? SHORT VERSION
?
? REVISION HISTORY:
? REV. DATE
? 01 06/24/77
? 02 12/01/78
? 03 08/23/79
? 04 08/31/79
?
? COPYRIGHT © DATA GENERAL CORPORATION 1979
? ALL RIGHTS RESERVED, FOR MAINTENANCE PURPOSES ONLY
? THE AFFIXATION OF A COPYRIGHT NOTICE ON THIS DIAGNOSTIC
? MATERIAL IS NOT INTENDED BY ITSELF TO RENDER THE DISTRIBUTION
? OF THIS DIAGNOSTIC MATERIAL A PUBLICATION.
*****

```

```

10002 MNMRT
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21

```

```

*****
?CONDITIONAL ASSEMBLY FLAGS
? 0=INCLUDE TEST
? 1=IGNORE TEST
*****
.TITLE MNMORT
*****
?FILE FOR MNMORT SHORT (CPU TESTS ONLY)
?CHECKER BOARD RANDOM TEST
?SC MEMORY TEST
?ARITHMETIC TEST
?MULTIPLY DIVIDE TEST
?STACK TEST
?LOAD/STORE BYTE TEST
?ECHO/SKYWALKER (DEV. 26)
?ECHO/SKYWALKER (DEV. 66)
?PRIMARY FLOPPY DISK TEST
?PHOENIX DISK TEST
?SECONDARY FLOPPY DISK TEST
?LINE PRINTER TEST
?I/O TESTER TEST

```

```

000000 CBRDSE=0
000000 ARITH=0
000000 MOUTS=0
000000 STKTS=0
000000 BYTES=0
000001 PMVDSK=1
000001 SMVDSK=1
000001 FPTS=1
000001 PDSK=1
000001 LPTS=1
000001 IOTST=1

```

10003 MNMRT

```

01 MICRO-NOVA MULTIPROGRAMMING
02 RELIABILITY TEST
03
04 ABSTRACT
05 THE MICRO-NOVA MULTIPROGRAMMING RELIABILITY TEST
06 CONSISTS OF A SERIES OF INDIVIDUAL PROCESSOR
07 AND PERIPHERAL TESTS AND A
08 SUPERVISOR PROGRAM. (THE DIAGNOSTIC LINKER)
09
10 THE DIAGNOSTIC LINKER IS A PROGRAM
11 DESIGNED TO "LINK" THE VARIETY OF
12 PROCESSOR AND PERIPHERAL TESTS IN
13 SUCH A FASHION THAT THEY MAY BE
14 RUN CONCURRENTLY. THEREBY, TESTING
15 THE INTERACTIVE CAPABILITIES OF
16 THE PROCESSOR AND ITS PERIPHERAL
17 EQUIPMENT.
18 THIS TEST IS PROVIDED IN TWO LENGTHS
19
20 THE SHORT VERSION ONLY INCLUDES THOSE TESTS
21 THAT APPLY TO THE CPU, MEMORY,
22 MULADIV, STACK, TTY, AND REAL TIME CLOCK.
23
24 THE LONG VERSION INCLUDES THE ABOVE + PRIMARY DEVICE
25 CODE TESTS FOR THE 6095 DISK, LPT, AND I/O TESTER PLUS PRIMARY
26 AND SECONDARY DEVICE CODE TESTS FOR THE 6038/39 AND
27 6101/2 DISKS.
28
29 MACHINE REQUIREMENTS
30 MICRO-NOVA PROCESSOR
31 8K TO 32K OF READ/WRITE MEMORY (SHORT VER.)
32 16K TO 32K OF READ/WRITE MEMORY (LONG VER.)
33 (MEMORY MUST BE CONTIGUOUS)
34 TTY INPUT/OUTPUT OR TERMINAL
35
36 OPTIONAL EQUIPMENT
37 6038/39 DISK (DEV. 33873, ALL DRIVES)
38 6095 (PHOENIX) DISK (DEV. 27867)
39 LINE PRINTER (DEV. 17)
40 I/O TESTER (DEV. 0)
41 6101/2 DISK (DEV. 26 & 66, ALL DRIVES)
42
43 SOFTWARE PREREQUISITES
44 THE SYSTEM SHOULD BE CAPABLE
45 OF RUNNING ALL INDIVIDUAL LOGIC AND
46 RELIABILITY TESTS PERTAINING TO THE
47 PROCESSOR AND ITS PERIPHERAL EQUIPMENT
48 BEFORE ATTEMPTING TO RUN THIS TEST
49
50 NOTE: ALTHOUGH THIS TEST MAY AT TIMES BE USEFUL
51 IN DETERMINING THE GO/NO GO STATUS OF AN
52 UNKNOWN SYSTEM, IT IS RECOMMENDED THAT
53 ALL OTHER DIAGNOSTICS BE RUN EVEN IN THE
54 EVENT THAT THIS TEST FINDS NO PROBLEMS.
55 AN ATTEMPT BE MADE TO ISOLATE ANY PROBLEMS
56 FOUND BY FIRST UTILIZING THE LOWER
57 LEVEL TESTS FOR MORE CONCISE ERROR REPORTS.

```

10004 MNMRT

```

01 HARDWARE SETUP
02
03 IF THE 6038/39/6102 DISKS ARE TO BE
04 EXERCISED THEY MUST HAVE A DISK INSTALLED
05 AND BE IN THE READY STATE AND WRITE ENABLED.
06
07 IF THE 6095/6101 DISKS ARE TO BE TESTED
08 THEY MUST HAVE A DISK PACK INSTALLED
09 AND BE IN THE READY STATE. THE OPERATOR
10 WILL HAVE THE OPTION OF PROTECTING THE
11 NON-REMOVABLE PLATTER IF THE PROGRAM
12 WAS STARTED AT A NON-AUTO START LOCATION. (IE,
13 LOCATIONS 202,204)
14 OTHERWISE ALL SURFACES WILL BE TESTED.
15
16 OPTIONAL STARTING ADDRESSES
17 200 AUTO-SIZE AND GO START
18 202,204 MANUAL SELECT/DELETE TESTS
19 206 RESTART LAST TEST SELECTIONS
20 IMMEDIATELY ENTER 00T
21
22 KEY ENTERED OPTIONS
23
24 KEY 0 PLACES SMPACKAGE INTO INPUT MODE WHERE
25 MULTIPLE OPTIONS CAN
26 BE SET. TYPE A CR KEY TO EXIT THIS MODE.
27 ENTRIES TYPED IN SET BITS IN SWREG
28 FOR USE BY THE PROGRAM.
29 TYPING A KEY COMPLIMENTS THE PREVIOUS STATE
30 OF THE SWREG BIT.
31
32 KEY SWREG BIT FUNCTION
33 -----
34 1 1 =1 DON'T RELEASE AND ALLOW REASSIGNMENT
35 OF MEMORY AFTER ERROR
36 2 =1 DELETE TTY TIMEOUTS
37 3 =1 RUN TTY & LPT TEST EVERY TIME SELECTED.
38 TYPING A 4 WILL CAUSE THE ELAPSED TIME TO
39 BE PRINTED IF THE REAL TIME CLOCK TEST WAS
40 ENABLED.
41 6 =1 THE ERROR ROUTINE WILL PAUSE AFTER
42 EACH PHASE OF AN ERROR TYPEOUT.
43 TYPING A CR KEY ON DEVICE TTI TO PROCEED.
44 TYPING A 7 WILL CAUSE THE TEST RUN SUMMARY
45 TO BE PRINTED.
46
47 KEY (C)O ENTER THE ODI EDITOR
48 (SEE DESCRIPTION AT PARAGRAPH 7.0)
49 KEY (C)D DEFAULT MODE RESTART. SWREG
50 SET TO 0.
51 KEY (C)R RESTART WITHOUT RESETTING SWREG BITS.
52 KEY M TYPE THE CURRENT CONTENTS OF SWREG.
53
54 WHERE (C) SIGNIFIES A CONTROL KEY.
55

```

```

10005 MNMRT
01 ? 4. OPERATING PROCEDURES
02 ?
03 ?
04 ? 4.1 LOAD THE PROGRAM VIA WHICHEVER LOAD DEVICE
05 ? AVAILABLE.
06 ?
07 ? 4.4 PROCESSOR WILL TYPE:
08 ? MNMORT (S OR L) REV
09 ? TOTAL #1K'S=XXX(DECIMAL)
10 ? PROGRAM RUN LIST
11 ? PROG# DESCRIPTION
12 ? 4.5 IF START WAS 200 OR 206 THE LIST OF
13 ? PROGRAMS TO BE RUN CONCURRENTLY WILL
14 ? THEN BE LISTED AND THE TEST SYSTEM
15 ? WILL AUTO START
16 ? 4.6 IF START WAS 202 OR 204 LINKER WILL
17 ? PAUSE AT THE END OF EACH TEST
18 ? DESCRIPTION AND WAIT FOR KEYBOARD
19 ? INPUT. TYPING IN A SPACE WILL
20 ? ENABLE THAT TEST TO BE RUN.
21 ? TYPING IN ANY OTHER CHARACTER WILL
22 ? DELETE THAT TEST FROM BEING RUN
23 ? NEXT THE PROGRAM WILL WAIT FOR OPERATOR INPUTED
24 ? SWITCH REGISTER OPTION SETUP. TYPING A CR KEY WILL
25 ? EXIT AND START THE TESTING.
26 ?
27 ? 4.7 CAT/KITTEN OPERATION
28 ?
29 ? THE SHORT VERSION OF THIS TEST WILL START
30 ? THE CAT/KITTEN IF THE CAT SWITCH WAS SET.
31 ?
32 ? THE LONG VERSION WILL NOT RUN THE CAT/KITTEN

10006 MNMRT
01 ? 5. ERROR DESCRIPTION
02 ?
03 ? MOST ERRORS DETECTED BY EITHER
04 ? THE INDIVIDUAL TEST PROGRAMS OR
05 ? BY THE DIAGNOSTIC LINKER WILL
06 ? RESULT IN AN EXTENSIVE ERROR
07 ? TYPEOUT. SOME SMALL NUMBER OF
08 ? HIGHLY IMPROBABLE ERRORS MAY RESULT
09 ? IN A PROGRAM HALT IF THEY ARE NOT
10 ? OF A NATURE THAT THE LINKER CANNOT
11 ? RECOVER FROM AND LOGICALLY PROCEED,
12 ? (I.E. INTERRUPT STACK OVERFLOWS)
13 ?
14 ?
15 ? 5.1 ERROR FORMAT
16 ?
17 ? ERROR TYPEOUTS INCLUDE:
18 ?
19 ? 5.1.1 PROGRAM # AT TIME OF ERROR
20 ? 5.1.2 THE CURRENT CONTENTS OF AC0, AC1, AC2, AC3
21 ? (SCRLO/SCRPI)SCRATCH LIMITS
22 ? 5.1.5 CONTINUATION INFORMATION IN GROUPS
23 ? OF 3 MEMORY LOCATIONS PERTINENT TO
24 ? THE INDIVIDUAL TEST THAT FAILED
25 ?
26 ? 5.1.6 SOME CPU TESTS THAT RELOCATE WILL
27 ? IN THEIR ERROR TYPEOUTS:
28 ? ST.LA START/ERROR (RES.)
29 ? XXXXX YYYYY ZZZZZ
30 ?
31 ? ST.LA THE START OF THE RELOCATED TEST LOOP
32 ? XXXXX (I.E. THE LAST LCALL SETUL)
33 ?
34 ? START THIS NUMBER INDICATES WHERE THE RESIDENT COPY
35 ? YYYYY START OF THE TEST LOOP MAY BE FOUND IN THE LISTING
36 ?
37 ? ERROR THIS NUMBER INDICATES WHERE IN THE RESIDENT
38 ? ZZZZZ COPY OF THE LISTING THE ERROR CALL MAY BE FOUND
39 ? THIS ADDRESS FOR SOME ERROR CONDITIONS MAY NOT
40 ? BE CORRECT.

```

10007	MNMRT	01	ERROR ANALYSIS	10008	MNMRT	01	
02		02	DU TO THE INTERACTIVE NATURE OF	02		02	ARITHMETIC TEST
03		03	THE TESTS INVOLVED, A SERIES OF	03		03	
04		04	ERROR TYPEDS WILL PROBABLY BE	04		04	THE AC'S WILL BE TYPED AS THEY WERE AT THE
05		05	REQUIRED FOR ANALYSIS BEFORE A	05		05	TIME OF ERROR DETECTION
06		06	PROBLEM WILL BE ISOLATED.	06		06	
07		07	A RESTART AT 202 AND DELETION OF ALL	07		07	
08		08	BUT THE TEST THAT ORIGINALLY	08		08	IN ADDITION THE FOLLOWING LOCATIONS ARE TYPED:
09		09	FAILED MAY HELP TO ISOLATE	09		09	THE LAST THREE RANDOM NUMBERS GENERATED.
10		10	INTERACTIVE PROBLEMS AS FOLLOWS:	10		10	AT.LC STARTING ADDRESS OF ARITH IN SCRATCH
11		11		11		11	ATS03 AC3 AT TIME OF ERROR
12		12	IF THE TEST RUNS BY ITSELF THE PROBLEM	12		12	AT.BG BEGINNING OF TEST IN THE LISTING
13		13	IS INTERACTIVE-RE-ENABLE ONE OTHER TEST AT	13		13	(SEE DISCUSSION OF ST.LA,ETC AT PARA.5.1.6)
14		14	A TIME TO DETERMINE WHICH ONE IS THE PROBLEM.	14		14	MULTIPLY/DIVIDE TEST
15		15	IF THE TEST DOES NOT RUN BY ITSELF	15		15	
16		16	RESORT TO SIMILAR BUT LOWER LEVEL TESTS	16		16	MULTIPLY/DIVIDE FAILURES WILL INDICATE
17		17	FOR ISOLATION	17		17	EITHER MUL(S) FOR MULTIPLY OR DIV(S) FOR DIVIDE
18		18	PERTINENT MEMORY LOC'S TYPED	18		18	IN ADDITION, THREE SETS OF AC'S ARE TYPED
19		19		19		19	ORIGINAL OPERANDS
20		20	CHECKERBOARD RAN	20		20	HARDWARE RESULT (ASSUMED TO BE INCORRECT )
21		21		21		21	SOFTWARE RESULT (ASSUMED TO BE CORRECT )
22		22	THE AC'S AT ERROR WILL INDICATE:	22		22	STACK ERROR TEST
23		23	GOOD DATA- BAD DATA-LOGICAL ADDRESS	23		23	
24		24		24		24	THE AC'S AT THE TIME OF ERROR DETECTION WILL
25		25	IN ADDITION THE FOLLOWING LOCATIONS ARE TYPED:	25		25	BE TYPED.
26		26	CB.TK TEST COUNTER	26		26	
27		27	0 GENERATE CHECKERBOARD	27		27	AC0 = ACTUAL
28		28	1 DISTURB PASS	28		28	AC1 = EXPECTED
29		29	2 CHECK PATTERN	29		29	AC3 = ADDRESS OF ERROR CALL
30		30	3 CHECKSUM THE # OF '-1'S IN PATTERN	30		30	
31		31	CB.LC STARTING LOGICAL ADDRESS OF "BEGIN"	31		31	
32		32					
33		33	CB.SE AC3 AT ERROR CALL				
34		34					
35		35	SC MEMORY TEST				
36		36					
37		37	THIS IS AN ISZ/DSZ TEST FOR SC-MEMORIES.				
38		38					
39		39	THE AC'S AT ERROR WILL INDICATE:				
40		40	ACTUAL-EXPECTED-LOGICAL ADDRESS				
41		41					
42		42	IN ADDITION THE FOLLOWING LOCATIONS ARE TYPED:				
43		43	MM.TK ERROR NUMBER:				
44		44	0 PATTERN STORING ERROR(SHD BE -1)				
45		45	1 LOCATION NOT -1 BEFORE DOING ISZ				
46		46	2 ISZ DIDN'T SKIP				
47		47	3 LOCATION NOT EQUAL TO 0 AFTER ISZ				
48		48	4 DSZ SKIP ERROR				
49		49	5 DSZ TEST-LOCATION NOT -1 AFTER DSZ				
50		50	6 SAME AS 1, EXCEPT TESTING IN REV DIRECTION				
51		51	7 SAME AS 2, EXCEPT " " " "				
52		52	10 SAME AS 3, EXCEPT " " " "				
53		53	MM.LC RELOCATED CODE ADDRESS START				
54		54	MM.ET START ADDRESS OF TESTED AREA				
55		55	MM.EN END OF TESTED AREA IN SCRATCH				
56		56	MM.SE INSTRUCTION ADDRESS FOLLOWING ERROR CALL				
57		57	LOCATION ADDRESS OF FAILING LOCATION				



10011	MNMRT	10012	MNMRT
01	TESTING LDB FOR	01	SPECIAL CASE ERROR TYPEOUTS
02	8 SPECIAL CASE WHEN	02	POWER FAIL INTERRUPT
03	8 8 BYTE POINTER AND	03	UPON DETECTION OF A POWER FAIL INTERRUPT
04	0 0 DESTINATION AC	04	THE LOGICAL ADDR. OF THE P.C. AT INTERRUPT
05	1 1 ARE THE SAME.	05	WILL BE SAVED.
06	1 1	06	IF AUTO-RESTART IS ENABLED OR THE POWER
07	1 0	07	FAIL WAS ONLY MOMENTARY, THE TEST WILL RE-
08	1 4	08	START AS IN A START AT 206 AFTER TYPING
09		09	POWER FAIL @XXXXXX (WHERE XXXXXX IS THE PC AT INTR.)
10	TESTING LDB FOR	10	ILLEGAL SUPERVISOR CALL
11	8 THE GENERAL CASE	11	
12	8 8	12	
13	0 0	13	
14	1 5	14	UPON DETECTION OF A SUPERVISOR CALL
15	1 1	15	WHICH DIDN'T MATCH THE LIST OF SUBROUTINES
16	1 6	16	CALLS THE FOLLOWING MESSAGE WILL BE TYPED:
17		17	
18	TESTING STB FOR	18	ILLEGAL SUPER. CALL AT XXXXXX
19	8 SPECIAL CASE WHEN	19	
20	8 8 8	20	PROG# NN NAME
21	1 1 SOURCE AC ARE THE	21	AC0 AC1 AC2 AC3
22	1 7 1	22	00000 YYYYYY ZZZZZZ ODDDDO
23	1 1 SAME.	23	CALL ADDR= TTTTT
24	1 1	24	INSTRUCTION= IIIIII
25	1 2	25	
26	1 0	26	
27		27	WHERE XXXXXX IS THE LOGICAL ADDRESS OF THE
28	TESTING STB FOR	28	SUPER CALL.
29	8 GENERAL CASE.	29	NOTE: A ILLEGAL SUPERCALL AT LOCATION 0
30	8 8	30	INDICATES THAT THE PROGRAM WAS
31	2 1	31	EXECUTING LOCATION 0.
32	1 1	32	
33	1 1	33	INTERRUPT WAIT ELAPSED
34	1 3	34	
35	1 2	35	THE PERIPHERAL DEVICE ASSOCIATED WITH THE
36		36	PROG. NUMBER TYPED HAS NOT RESPONDED WITH
37	PAIR TESTS FOR	37	A PROGRAM INTERRUPT FOR AN EXTENDED
38	8 LDB AND STB. STB	38	PERIOD OF TIME. THE 2ND NUMBER TYPED
39	8 8 PERFORMED FIRST.	39	SHOULD POINT AT THE INTERRUPT HANDLER
40	1 3 TESTING FOR INTER	40	FOR THE DEVICE THAT FAILED
41	1 3 ACTION THROUGH	41	
42	1 1 THE BYTE POINTER.	42	STACK OVERFLOW ERROR
43	1 1	43	UPON A STACK OVERFLOW CONDITION THE
44	1 1	44	STACK INTERRUPT HANDLER WILL PRINT THE
45		45	FOLLOWING ERROR MESSAGE:
46	PAIR TEST FOR	46	STACK OVERFLOW ERROR @ XXXXX
47	8 LDB AND STB. LDB	47	
48	8 8 PERFORMED FIRST.	48	SP FP STADR
49	1 3 TESTING FOR INTER	49	YYYYY ZZZZZ SSSSS
50	1 4 ACTION THROUGH	50	
51	1 1 THE DATA AC.	51	AND THEN IF NOT RETURNABLE TO DTOS, HALT.
52	1 1	52	WHERE, XXXXX IS THE ADDRESS OF THE INTERRUPT
53		53	YYYYY IS THE STACK POINTER
		54	ZZZZZ IS THE FRAME POINTER
		55	SSSSS IS THE STACK BASE ADDRESS (CURRENTLY)
		56	
		57	
		58	
		59	
		60	

10013 MNMRT

```
01 ;
02 ;
03 ;
04 ;
05 ;
06 ;
07 ;
08 ;
09 ;
10 ;
11 ;
12 ;
13 ;
14 ;
15 ;
16 ;
17 ;
18 ;
19 ;
20 ;
21 ;
```

15.4.5 RELOCATED CODE ERROR

UPON DETECTION OF AN ERROR BY A RELOCATED TEST THE RELOCATED CODE IS COMPARED TO THE ORIGINAL COPY. IF A DIFFERENCE IS FOUND THE FOLLOWING INFORMATION IS TYPED:

RELOCATED CODE ERROR

EXPECTED ACTUAL ADDR-E ADDR-A

XXXX YYYYY GGGG ZZZZ

WHERE,

XXXX IS THE ORIGINAL WORD

YYYY IS THE RELOCATED WORD

GGGG IS THE ADDRESS OF ORIGINAL

ZZZZ IS THE ADDRESS OF RELOCATED WORD

WHEN THIS OCCURS THE ERROR WAS PROBABLY CAUSED BY THE MODIFICATION OF THE RELOCATED CODE.

10014 MNMRT

```
01 ;
02 ;
03 ;
04 ;
05 ;
06 ;
07 ;
08 ;
09 ;
10 ;
11 ;
12 ;
13 ;
14 ;
15 ;
16 ;
17 ;
18 ;
19 ;
20 ;
21 ;
22 ;
23 ;
24 ;
25 ;
26 ;
27 ;
28 ;
29 ;
30 ;
31 ;
32 ;
33 ;
34 ;
35 ;
36 ;
37 ;
38 ;
39 ;
```

16.0 DIAGNOSTIC LINKER

16.1 PROGRAM INITIALIZE

THE DIAGNOSTIC LINKER INITIALIZES ITSELF AND INDIVIDUAL TESTS IN THE FOLLOWING SEQUENCE:

1. SYSTEM IS RESET,
2. ANY OTHER NECESSARY CONSTANTS ARE INITIALIZED (MEM ALLOCATION TABLES)
3. INTERRUPT VECTOR TABLES ARE SET UP TO PROCESS UNEXPECTED DEVICE INTERRUPTS
4. MEMORY IS SIZED IN 1K INCREMENTS FROM 0 TO 32K AND BUILT A 2 WORD BIT MAP OF EXISTING CONTIGUOUS MEMORY
5. THE (EXIST)MEMORY SIZED BIT TABLE IS MOVED TO THE AVAILABLE (AVAIL)MEMORY BIT TABLE AND EACH BIT CORRESPONDING TO 1K OF UTILIZED MEMORY IS REMOVED FROM THE TABLE SO THAT IT WILL NOT BE ASSIGNED AS A SCRATCH AREA TO ANY TEST. (INCLUDES PROGRAM STORAGE, MEMORY ALLOC. TABLES, INTERRUPT MASKS AND STACK AREA AND THE LAST 1K OF MEMORY TO PRESERVE THE LOADER)
6. EACH TEST IS ENTERED IN SEQUENCE AT ITS INIT. ENTRY POINT. OPTION TESTS DETERMINE IF THE DEVICE THEY ARE ASSOC. WITH EXISTS OR NOT AND PASS INTERRUPT SERVICE PARAM'S TO THE LINKER. (DEV#, MASK AND INTERRUPT SERVICE ADDRESS)
7. LINKER THEN TYPES THE SYSTEM SIZE INFORMATION ALONG WITH THE PROGRAM RUN LIST. THE OPERATOR CAN SELECT OR DELETE SPECIFIC TESTS IF START WAS 202 OR 204.



10015	MNMRT	16.2			
01	PROGRAM RUN				
02	ONCE THE LINKER HAS COMPLETED ALL				
03	INITIALIZATION THE FOLLOWING SERIES				
04	OF OPERATIONS ARE LOOPED THROUGH:				
05					
06					
07					
08	1. LINKER RANDOMLY SELECTS ONE OF				
09	THE INDIVIDUAL TESTS UNTIL IT				
10	FINDS ONE THAT IS NOT WAITING				
11	FOR INTERRUPT (WAITING IS BIT 0=1 OF				
12	THE THIRD WORD IN TEST) AND THAT				
13	THE NEXT RANDOM NUMBER FALLS WITHIN				
14	ITS ENTER LIMITS				
15					
16	2. MEMORY LOCATIONS SCRLO				
17	AND SCRHI (SCRATCH LOW AND HIGH) ARE				
18	SET TO INDICATE THE LIMITS OF				
19	THE SCRATCH AREA AVAILABLE TO THE TEST.				
20					
21	3. THE SELECTED TEST IS ENTERED AT				
22	ITS SPECIFIED EXECUTE ENTRY POINT				
23					
24	4. THE TEST THEN EXITS AND ITS PASS COUNT				
25	IS INCREMENTED UNLESS IT WAS UNABLE TO				
26	OBTAIN SCRATCH AREA.				

  

10016	MNMRT	16.3	INDIVIDUAL TEST DESCRIPTIONS
01			
02			
03			
04		16.3.1	CHECKERBOARD RAM
05			
06			THIS MEMORY CHECKER BOARD TEST IS A SUBSET OF OTHER MEMORY
07			CHECKERBOARDS. A COMPLETE TEST OF AN AVAILABLE SCRATCH
08			AREA IS COMPRISED OF THE FOLLOWING SEQUENCE:
09		CB.TK=0	
10			REQUEST 1 TO 20K OF SCRATCH, RANDOMLY RE-
11			LOCATE THE EXECUTE PORTION OF CHECKERBOARD
12			INTO SCRATCH AND GENERATE THE CHECKERBOARD
13			PATTERN
14		CB.TK=1	
15			DISTURBS PASS-COMPLIMENT A SINGLE BIT IN EACH
16			OF THE FIRST 16 WORDS OF SCRATCH, SHUFFLE THESE
17			WORDS 16 TIMES SUCH THAT THEY END UP IN THEIR
18			ORIGINAL POSITION, RE-COMPLIMENT THE SINGLE
19			BIT IN EACH WORD-PROCEED WITH EACH GROUP OF
20			16 WORDS UNTIL ALL MEMORY HAS BEEN EXERCISED.
21		CB.TK=2	
22			CHECK PASS-COMPARE EACH WORD IN SCRATCH WITH
23			THE PATTERN EXPECTED
24			
25		CB.TK=3	
26			FAST CHECKSUM MEMORY TO ENSURE THAT ALL DATA
27			IS INTACT (RETURNS TO CHECK PASS IF CHECK-
28			SUM DOES NOT AGREE.)

10017 MNMRT

```

01 16.3.2 SC MEMORY TEST
02 ?
03 ? THIS MEMORY TEST DOES A READ/MODIFY/WRITE TO THE AVAILABLE
04 ? SCRATCH AREA USING AN "ISZ" INSTRUCTION. TEST IS BROKEN INTO THE
05 ? FOLLOWING CHECKS:
06 ?
07 ? MM.TK= 0 WRITE INTO EACH MEMORY LOCATION A MINUS
08 ? ONE STARTING AT SCRLO AND ENDING AT SCRHI
09 ? VERIFYING EACH GOT THERE.
10 ?
11 ? MM.TK= 1 READ A LOCATION BEFORE DOING THE ISZ
12 ? TO VERIFY IT HASN'T BEEN DISTURBED.
13 ?
14 ? MM.TK= 2 ISZ DIDN'T SKIP
15 ?
16 ? MM.TK= 3 LOCATION NOT 0 AFTER ISZ
17 ?
18 ? MM.TK= 4 DSZ SKIPPED=ERROR
19 ?
20 ? MM.TK= 5 DSZ TST- LOCATION NOT -1 AFTER DSZ
21 ?
22 ? MM.TK= 6 SAME AS 1, EXCEPT TESTING IN THE REVERSE
23 ? DIRECTION
24 ?
25 ? MM.TK= 7 SAME AS 2, EXCEPT TESTING IN THE REVERSE
26 ? DIRECTION.
27 ?
28 ? MM.TK= 10 SAME AS 3, EXCEPT TESTING IN THE REVERSE
29 ? DIRECTION.
30 ?
31 ? 16.3.3 ARITHMETIC TEST
32 ?
33 ? THE MULTIPROGRAMMING RELIABILITY ARITHMETIC TEST WAS
34 ? DERIVED FROM THE STAND ALONE ARITHMETIC TEST. THIS TEST
35 ? REQUIRES 2K OF SCRATCH FOR EXECUTION. THE EXECUTE PORTION
36 ? OF THE TEST IS RANDOMLY RELOCATED WITHIN AVAILABLE
37 ? SCRATCH. AT THE END OF EACH EXECUTION PASS SCRATCH
38 ? AREA IS RANDOMLY RELEASED OR HELD. IF HELD, THE NEXT TIME
39 ? THE TEST IS ENTERED, THE EXECUTABLE PORTION OF THE TEST WILL
40 ? AGAIN BE RANDOMLY RELOCATED WITHIN SCRATCH FOR EXECUTION.
41 ?
42 ? 16.3.4 MUL(S)/DIV(S) TEST
43 ?
44 ? THIS TEST WAS DERIVED FROM THE STAND ALONE
45 ? MUL/DIV TEST.
46 ? NO TEST RELOCATING IS DONE IN THIS TEST.

```

10018 MNMRT

```

01 ?
02 ? **NOLOC STKTS
03 ?
04 ? 16.3.5 STACK ERROR TEST
05 ?
06 ? THIS TEST VERIFIES THE OPERATION OF THE
07 ? HARDWARE STACK BY FORCING STACK OVERFLOW ERRORS
08 ? AND REALLOCATING THE STACK THROUGH OUT MEMORY.
09 ?
10 ? 16.3.6 REAL TIME CLOCK
11 ?
12 ? THE REAL TIME CLOCK RUNS AT 416.66 HERTZ. RUNTIME ALONG
13 ? WITH ACCUMULATED ERROR COUNT ARE PRINTED AT 5 MINUTES
14 ? 15 MINUTES, 30 MINUTES AND EVERY 30 MINUTES OF RUNTIME
15 ? THEREAFTER. THIS TIMEOUT ALSO OCCURS AFTER EVERY ERROR
16 ? TIMEOUT OR IF A TTY KEY WITH SW 4=1 IS TYPED.
17 ?
18 ? 16.3.7 TELETYPE TEST
19 ?
20 ? THE TELETYPE TEST PRINTS A SINGLE LINE CONSISTING OF THE
21 ? CHARACTERS SPACE TO Z. THE TEST WILL ALSO ECHO CHARACTERS
22 ? AS TYPED.

```

10019 MNMRT

01 ?  
 02 ?  
 03 ?  
 04 ?  
 05 ?  
 06 ?  
 07 ?  
 08 ?  
 09 ?  
 10 ?  
 11 ?  
 12 ?  
 13 ?  
 14 ?  
 15 ?  
 16 ?  
 17 ?  
 18 ?  
 19 ?

76.3.13 LOAD BYTE/STORE BYTE TEST

TESTING OF EACH INSTRUCTION IS DIVIDED INTO TWO SECTIONS. SUBTESTS L8B01 THROUGH L8B32 TRY OUT ALL POSSIBLE COMBINATIONS OF ACCUMULATORS AS BYTE POINTERS AND DATA REGISTERS. DATA IS TRANSFERRED INTO AND OUT OF FIRED LOCATIONS IN MEMORY TO SIMPLIFY DIAGNOSIS. THIS SECTION IS DESIGNED TO CATCH THE GROSS FAILURES.

SUBTESTS L8B33 AND L8B34 ARE INTENDED TO FORCE MORE SUBTLE FAILTS. EACH TEST IN THIS SECTION EXERCISES BOTH LDB AND STB TOGETHER IN AN EFFORT TO DETECT INTERACTION BETWEEN INSTRUCTIONS. THESE TESTS ALSO USE RANDOM BUFFERS AND EXECUTE MANY LDB AND STB INSTRUCTIONS IN A SHORT PERIOD OF TIME IN AN EFFORT TO DETECT FAILURES IN INTERACTING WITH THE SYSTEM ENVIRONMENT.

10020 MNMRT

01 ?  
 02 ?  
 03 ?  
 04 ?  
 05 ?  
 06 ?  
 07 ?  
 08 ?  
 09 ?  
 10 ?  
 11 ?  
 12 ?  
 13 ?  
 14 ?  
 15 ?  
 16 ?  
 17 ?  
 18 ?  
 19 ?  
 20 ?  
 21 ?  
 22 ?  
 23 ?  
 24 ?  
 25 ?  
 26 ?  
 27 ?  
 28 ?  
 29 ?  
 30 ?  
 31 ?  
 32 ?  
 33 ?  
 34 ?  
 35 ?  
 36 ?  
 37 ?  
 38 ?  
 39 ?  
 40 ?  
 41 ?  
 42 ?  
 43 ?  
 44 ?  
 45 ?  
 46 ?  
 47 ?  
 48 ?  
 49 ?  
 50 ?  
 51 ?  
 52 ?  
 53 ?

77.0 ODT EDITOR

77.1 REQUESTING THE ODT EDITOR TO ENTER THE ODT TYPE A CONTROL 0 ON THE TTI. THIS CAN BE DONE AT ANY POINT IN THE PROGRAM.

77.2 ON ENTERING THE ODT A CARRIAGE RETURN, LINE FEED AND AN @ IS TYPED ON THE TTO.

77.3 CONVENTIONS AND SYMBOLS IN COMMAND LINES

CR PRESSING THE RETURN KEY IS REPRESENTED BY CR .

LF PRESSING THE LINE FEED KEY IS REPRESENTED BY LF .

? PRESSING AN ILLEGAL KEY CAUSES THE ODT TO RESPOND WITH A ? .

@ ODT IS READY AND AT YOUR SERVICE.

77.4 COMMAND STRUCTURE

AN ODT COMMAND HAS THE GENERAL FORMAT:

(ARGUMENT) [COMMAND]

ARGUMENT MAY BE ONE OF THE FOLLOWING:

ADR AN OCTAL ADDRESS OR AN EXPRESSION OF THE FORM: X+X+X+... WHERE EACH X IS AN OCTAL INTEGER, SEPARATED FROM THE FOLLOWING X BY EITHER +(PLUS) OR -(MINUS). LEADING ZEROS NEED NOT BE TYPED.

N AN OCTAL INTEGER.

A COMMAND IS A SINGLE TELETYPE CHARACTER

CHARACTERS USED TO OPEN/CLOSE LOCATIONS INCLUDE:

"/" "CR" "LF" "n" "r"

CHARACTERS USED TO ENTER/EXIT ODT INCLUDE:

"0" (CTRL 0) "R" "P"

CHARACTERS USED TO MODIFY CURRENT ARGUMENTS ARE:

"RUBOUT" "+" "-" AND THE INTEGERS 0 TO 7

THE CHARACTER "=" ALLOWS THE CURRENT ARGUMENT TO BE EXAMINED WITHOUT OPENING OR CLOSING THE CURRENT LOC.



10023 MNMRT

\*\*00000 TOTAL ERRORS, 00000 FIRST PASS ERRORS

0024 MNMRT

ARITH 000000	2/11#	8/02	17/30
BYTES 000000	2/14#	9/01	19/01
CBRDS 000000	2/09#	7/20	16/05
FPYTS 000001	2/17#	9/01	18/23
FXYTS 000001	2/19#		
IOTST 000001	2/21#	9/01	19/01
LPTTS 000001	2/20#	9/01	18/23
MDUST 000000	2/12#	8/14	17/41
PEOSK 000001	2/18#	9/01	19/01
PMVDS 000001	2/15#	9/01	19/01
SCMTS 000000	2/10#	7/35	17/01
SMVDS 000001	2/16#		
STKTS 000000	2/13#	8/23	