DataGeneral

TECHNICAL STATEMENT

TEXT LISTING

068-000433-03

PROGRAM

ECLIPSE SC-MEMORY TEST

TEXT TAPE

097-000433-03

ABSTRACT

THE SC-MEMORY TEST CONSISTS OF A SERIES OF SC-MEMORY TESTS AND A SIMPLE SUPERVISOR PROGRAM, THE DIAGNOSTIC LINKER. THE DIAGNOSTIC LINKER IS A PROGRAM DESIGNED TO "LINK" THE VARIETY OF SC MEMORY TESTS

```
 0001 .MAIN    MACRO REV 06.30          08:56:25 12/04/78
01
02
03
04
05
06
07              :*****************************************************************
08              :
09              : NAME: ECLSCMT.TX                          PART NUMBER: 097-000433
10              :
11              :
12              : DESCRIPTION: ECLIPSE SC-MEMORY TEST
13              :
14              :
15              : REVISION HISTORY:
16              :
17              :       REV.            DATE
18              :
19              :       00              12/31/76
20              :       01              06/17/77
21              :       02              09/01/78
22              :       03              11/10/78
23              :
24              :
25              : COPYRIGHT (C) DATA GENERAL CORPORATION, 1976, 1977, 1978
26              : ALL RIGHTS RESERVED.
27              :*****************************************************************
```

```
10002 .MAIN
01              :       ECLIPSE SC-MEMORY TEST
02              :1.     ABSTRACT
03              :               THE SC-MEMORY TEST CONSISTS OF A SERIES
04              :               OF SC-MEMORY TESTS AND A SIMPLE
05              :               SUPERVISOR PROGRAM. (THE DIAGNOSTIC LINKER)
06              :
07              :               THE DIAGNOSTIC LINKER IS A PROGRAM
08              :               DESIGNED TO "LINK" THE VARIETY OF
09              :               SC MEMORY TESTS.
10              :
11              :
12              :2.     MACHINE REQUIREMENTS
13              :2.1    ECLIPSE PROCESSOR
14              :2.2    4K TO 512K OF READ/WRITE MEMORY
15              :               (ALLOWS FOR EXPANSION IN 1K INCREMENTS
16              :               BUT MEMORY MUST BE CONTIGUOUS)
17              :2.3    MAP OPTION (OPTIONAL)
18              :2.4    REAL TIME CLOCK (OPTIONAL)
19              :2.5    ERROR CORRECTION OPTION
20              :
21              :2.6    PREREQUISITES
22              :2.6.2  SOFTWARE PREREQUISITES
23              :               THE ECLIPSE CPU DIAGNOSTICS , AND MAP DIAGNOSTICS
24              :               SHOULD HAVE
25              :               BEEN RUN BEFORE ATTEMPING THIS TEST.
26              :3.       SWITCH SETTINGS
27              :3.1      AUTO-SIZE AND GO START AT 200
28              :3.2      MANUAL SELECT/DELETE TESTS START AT 206
29              :3.3      IGNORE MAP START AT 210
```

```
10003 .MAIN
01              :3.4      KEY ENTERED OPTIONS
02              :
03              :       KEY T           SETS SWREG2 BIT 0 = 1
04              :                       WILL ALLOW THE OPERATOR TO
05              :                       SET LOWER LIMIT OF TEST(PHSLO)
06              :                       AND UPPER LIMIT OF TEST(PHSHI)
07              :                       VALUE ENTERED SHOULD BE
08              :                       A MODULO 1K DECIMAL NUMBER .
09              :
10              :                ENTERED LIMITS MUST:
11              :                1. FALL WITHIN THE MEMORY LIMITS
12              :                   SIZED BY THE PROGRAM.
13              :                2. NOT INCLUDE AREA WHICH THE PROGRAM
14              :                   OCCUPIES.
15              :                3. FOR PHSHI BE GREATER THAN OR EQUAL
16              :                   TO PHSLO OR THE LIMITS WILL NOT
17              :                   BE ACCEPTED.
18              :
19              :                        EXAMPLE:
20              :                        TO TEST AREA BETWEEN 16K
21              :                        AND 32K ENTER:
22              :                        (PHSLO,PHSHI) 16,31
23              :
24              :                        TERMINATE INPUT LIMITS WITH A CARRIAGE
25              :                        RETURN.
26              :
27              :       KEY 0   SW0=1    ENTER THE KEY PARAMETERS
28              :                        UNTIL A CR IS INPUTTED.
29              :                        EACH KEY WILL COMPLEMENT
30              :                        THE PREVIOUS SELECTION
31              :                        OF THE SAME KEY.
32              :       KEY 1   SW1=1    CONTINUE FROM ERROR,NO LOOPING
33              :       KEY 2   SW2=1    INHIBIT ALL TTO TYPEOUTS
34              :       KEY 4   SW4=1    INHIBIT PASS # PRINTOUT
35              :       KEY 5   SW5=1    ALSO USE LPT FOR PRINT OUTS
36              :       KEY 6   SW6=1    HALT AFTER ERROR TYPEOUT
37              :                        TYPE ANY KEY TO CONTINUE
38              :       KEY Q            WILL CAUSE MARCH/GALPAT/GALWREC TO USE
39              :                         ALL 1'S DATA PATTERN ON EACH PASS.
40              :                        SWRG2 BIT 2 = 1
41              :       KEY P            PRINT PASSED FOR EACH TEST COMPLETED
42              :                        SUCESSFULLY. SWRG2 BIT 1 = 1
43              :       KEY (C)S         PRINTS STATUS OF EACH TEST WHICH
44              :                        HAS COMPLETED A PASS. SWRG2 BIT 15 = 1
45              :       KEY (C)D         WILL SET SWREG TO DEFAULT MODE
46              :                        ALL BITS = 0
47              :                        AND WILL RESTART THE PROGRAM.
48              :       KEY M            LIST CURRENT OPERATING MODES
49              :       KEY (C)R         WILL RESTART THE PROGRAM
50              :                        WITHOUT MODIFING THE SWREG
51              :
52              :       WHERE (C) IS A CONTROL KEY
```

```
10004 .MAIN
01              :4.     OPERATING PROCEDURES
02              :4.1      LOAD THE PROGRAM VIA THE BINARY LOADER
03              :4.2      SET SWITCHES TO:
04              :                 200 FOR AUTO SIZE AND GO
05              :                 206 FOR MANUAL SELECT/DELETE
06              :                 210 FOR IGNORING THE MAP IF IT EXISTS
07              :
08              :
09              :4.3      PRESS START
10              :4.4      PROCESSOR WILL TYPE:
11              :                 ECLIPSE SC-MEMORY TEST
12              :                 MEM SIZE #1K'S  MAP EXISTS(OR NOT)
13              :                 ERCC EXISTS (IF PRESENT)
14              :                 PROGRAM RUN LIST
15              :                 PROG#   DESCRIPTION
16              :
17              :4.5      IF START WAS 200 THE LIST OF
18              :                 PROGRAMS TO BE RUN SEQUENTIALLY WILL
19              :                 THEN BE LISTED AND THE TEST PROGRAM
20              :                 WILL AUTO START.
21              :                 NOTE: GALPAT AND GALWREC WILL
22              :                 NOT BE SELECTED ON AN AUTO START.
23              :
24              :4.6      IF START WAS 206 LINKER WILL
25              :                 PAUSE AT THE END OF EACH TEST
26              :                 DESCRIPTION AND WAIT FOR KEYBOARD
27              :                 INPUT.  TYPING IN A SPACE WILL
28              :                 ENABLE THAT TEST TO BE RUN.
29              :                 TYPING IN ANY OTHER CHARACTER WILL
30              :                 DELETE THAT TEST FROM BEING RUN
31              :4.7    IF START WAS 210 THE PROGRAM WILL IGNORE THE
32              :                 MAP IF IT EXISTS. MEMORY WILL BE ONLY SIZED AND
33              :                 TESTED TO A MAXIMUM OF 32K.
34              :4.8    THE PROCESSOR WILL THEN WAIT FOR THE OPERATOR TO SET
35              :                 ANY BIT SWITCH OPTIONS. TEST WILL START
36              :                 AFTER PRESSING ANY CHARACTER ON THE KEYBOARD.
```

```
!0005 .MAIN
01              :5.     ERROR DESCRIPTION
02              :               MOST ERRORS DETECTED BY EITHER
03              :               THE INDIVIDUAL TESTS OR
04              :               BY THE DIAGNOSTIC LINKER WILL
05              :               RESULT IN AN ERROR TYPEOUT. SOME
06              :               SMALL NUMBER OF HIGHLY IMPROBABLE
07              :               ERRORS MAY RESULT IN A PROGRAM HALT
08              :               IF THEY ARE OF A NATURE THAT THE LINKER
09              :               CAN'T RECOVER FROM AND LOGICALLY PROCEED.
10              :
11              :
12              : 5.1   ERROR CORECTION ERRORS
13              :
14              :       IF THE ERROR CORR. OPTION EXISTS AND HAS BEEN
15              :       SELECTED, MEMORY ERRORS WILL CAUSE ERROR
16              :       CORRECTION INTERRUPTS.
17              :
18              :
19              :5.1.1  UPON DETECTION OF AN ERCC ERROR THE FOLLOWING
20              :       WILL BE OUTPUTTED:
21              :
22              :               ERCC ERROR INTERRUPT
23              :       ERCC-CODE # ERRORS
24              :       XXX             XYZ
25              :       TEST#   DIB     DIA     INTR ADDR
26              :       QQQ     JJJ     YYY     ZZZZ
27              :
28              :       WHERE,
29              :               XXX= ERCC CODE
30              :               XYZ= #ERRORS SINCE LAST REPORT
31              :               QQQ= TEST# EXECUTING
32              :               JJJ= DIB FROM ERCC
33              :               YYY= DIA FROM ERCC
34              :               ZZZZ=ADDR OF INTERRUPT
35              :
36              :       NOTE: IF ECLIPSE TYPE IS E130 OR M600
37              :               DIB: BITS 0-4=CODE(SEE 5.1.2)
38              :                    BITS 13-15=COMPLEMENT OF EXTENDED PHYS ADDR
39              :               DIA: BITS 0-3=COMPLEMENT OF LO-ORDER PHYS ADDR
40              :                    BITS 12-15=COMPLEMENT OF LO-ORDER PHYS ADDR
41              :                    BITS 4-11=0
42              :
```

```
!0006 .MAIN
01              :5.1.2  ERCC CODES
02              :
03              :       FOR YOUR CONVENIENCE THE FOLLOWING TABLE
04              :       IS INCLUDED TO HELP DETERMINE WHICH BIT
05              :       IS FAILING IN AN ERROR CORRECTION MEMORY.
06              :       COR.CODE                BIT
07              :         0             NO ERROR
08              :         1             CHECK BIT 4
09              :         2             CHECK BIT 3
10              :         3             DATA BIT 0
11              :         4             CHECK BIT 2
12              :         5             DATA BIT 1
13              :         6             MULTIPLE BIT
14              :         7             DATA BIT 3
15              :         10            CHECK BIT 1
16              :         11            DATA BIT 4
17              :         12            ALL 21 BITS WERE=1
18              :         13            DATA BIT 6
19              :         14            DATA BIT 7
20              :         15            DATA BIT 8
21              :         16            DATA BIT 9
22              :         17            MULT. BITS FAILED
23              :         20            CHECK BIT 0
24              :         21            DATA BIT 11
25              :         22            DATA BIT 12
26              :         23            DATA BIT 13
27              :         24            DATA BIT 14
28              :         25            ALL 21 BITS READ AS 0'S
29              :         26            DATA BIT 2
30              :         27            MULTIPLE BITS
31              :         30            DATA BIT 10
32              :         31            MULTIPLE BITS
33              :         32            DATA BIT 5
34              :         33            MULTIPLE BITS
35              :         34            DATA BIT 15
36              :         35            MULTIPLE BITS
37              :         36            SAME
38              :         37            SAME
```

```
!0007 .MAIN
01              :       EXAMPLES:
02              :
03              :MAPPED ERROR TYPEOUT           UNMAPPED ERROR TYPEOUT
04              :-------------------            ----------------------
05              :
06              :MASFST (COMPLEMENT TEST)       GALPAT
07              :C(X)   C/(Y)   LOC(X)  LOC(Y)  C(Y)    C(X)    LOC(X)  LOC(Y)
08              :000000 000010  040010  047767  000000  000100  016010  017345
09              :SCRLO/HI  010000  077777       SCRLO/HI  016000  017777
10              :TSTLO/HI  21   49              TSTLO/HI  7     7
11              :PHSLO/HI  4    78              PHSLO/HI  3     51    TYPE ANY KEY
12              :
13              :NOTE THAT THE SCRATCH LIMITS IN THE MAPPED EXAMPLE ARE
14              :LOGICAL ADDRESSES AND NOT PHYSICAL. ALSO THAT TSTLO/HI
15              :IS DIFFERENT FROM PHSLO/HI .
16              :
17              :       TO DETERMINE PHYSICAL ADDRESS OF A LOCATION
18              :       WHICH IS MAPPED SUBTRACT SCRLO FROM THE
19              :       LOGICAL ADDRESS,ADD THE DIFFERENCE TO TSTLO
20              :       EXPRESSED AS AN OCTAL ADDRESS.
21              :
22              :               IF SW6=1 THE
23              :               TEST WILL HALT WAITING FOR
24              :               THE OPERATOR TO PRESS A KEY
25              :               ON THE CONSOLE
26
```

```
!0008 .MAIN
01              : 6.0   PROGRAM INITIALIZE
02              :               THE DIAGNOSTIC LINKER INITIALIZES ITSELF
03              :               AND INDIVIDUAL TESTS IN THE FOLLOWING
04              :               SEQUENCE:
05              :                  1. SYSTEM IS RESET.
06              :                  2. ANY OTHER NECESSARY CONSTANTS
07              :                       ARE INITIALIZED
08              :                  3. MEMORY IS SIZED IN 1K INCREMENTS
09              :
10              :                  4. LINKER THEN TYPES THE PROGRAM
11              :                       NAME AND REVISION LEVEL,SYSTEM SIZE,
12              :                       MAP OPTION INFORMATION ALONG WITH
13              :                       THE PROGRAM RUN LIST (AND WILL ALLOW THE
14              :                       OPERATOR  TO SELECT OR DELETE SPECIFIC TESTS
15              :                       IF START WAS 206
16              :                       OR 210).
17              : 6.1 OPTION SELECTION
18              :
19              :               IF THE PROGRAM WAS NOT AUTOSTARTED
20              :               (NOT LOC 200) THE LINKER WILL PRINT
21              :               "OPTIONS?" AND WAIT FOR A CARRIAGE RETURN
22              :               TO START EXECUTING THE TESTS.
23              :               THIS ALLOWS THE OPERATOR TO SET UP
24              :               THE KEY ENTRY OPTIONS INCLUDING
25              :               KEY "T" WHICH ALLOWS SETTING OF MEMORY
26              :               TEST AREA LIMITS.
```

```
!0009 .MAIN
01              ;6.3    PROGRAM EXECUTION
02              ;               ONCE THE LINKER HAS COMPLETED ALL
03              ;               INITIALIZATION THE FOLLOWING SERIES
04              ;               OF OPERATIONS IS LOOPED THROUGH
05              ;
06              ;
07              ;                  1. LINKER SEARCHES THRU LIST OF TESTS
08              ;                       UNTIL IT FINDS ONE WHICH IS
09              ;                       NOT DELETED.
10              ;
11              ;                  2. LINKER THEN SETS UP SEGMENT SIZE
12              ;                     BAISED ON THE VALUE IN THE
13              ;                       PARAMETER TABLE FOR EACH TEST.
14              ;
15              ;                     3. A.
16              ;                          IF MAP IS USED THE LINKER MAPS
17              ;                          PAGE 0 AND THE TEST TO ITSELF
18              ;                          AND THE TEST SEGMENT AREA TO
19              ;                          LOGICAL AREA STARTING AT 10000
20              ;                          UP TO 77777.
21              ;                        B.
22              ;                          IF MAP ISN'T USED THEN THE LINKER
23              ;                          PASSES THE ACTUAL PHYSICAL ADDRESS
24              ;                          TO THE TEST.
25              ;
26              ;                     4.   THE LINKER RE-ENTERS THE TEST WITH
27              ;                          EACH SEGMENT UNTIL THE AREA SELECTED
28              ;                          HAS BEEN EXERCISED. AFTER COMPLETION
29              ;                          THE LINKER SEARCHES FOR ANOTHER TEST
30              ;                          IN THE SERIES.
31              ;
32              ;
33              ;               5.       AFTER SEVERAL PASSES OF EACH TEST
34              ;                        SELECTED THE LINKER WILL PRINT
35              ;                        "PASS XX" IF SWREG BIT 4 HAS NOT
36              ;                        BEEN SET.
37              ;
38              ;               6.       IF PROGRAM WAS LOADED FROM DTOS WITH
39              ;                        EITHER CAT OR KITTEN IT WILL START
40              ;                        CAT/KITTEN AFTER FIRST "PASS".
41              ;
```

```
!0010 .MAIN
01              ;7.0 TEST DESCRIPTIONS
02              ;
03              ;       7.1 ERROR CORRECTION TEST
04              ;
05              ;       THIS TEST PRINTS THE ERROR CORRECTION MESSAGES
06              ;       WHICH WERE CAUSED BY OTHER TEST MEMORY FAILURES.
07              ;       IF NOT SELECTED THEN NO ERROR CORRECTION WILL OCCUR.
08              ;
09              ;       7.2 DATA EQUALS ADDRESS TEST
10              ;
11              ;               THIS TEST WRITES THE ADDRESS OF EACH
12              ;               LOCATION INTO EACH LOCATION AS DATA
13              ;
14              ;               IT THEN READS BACK ALL LOCATIONS AND CHECKS
15              ;               THE VALUE READ AGAINST THE ADDRESS.
16              ;
17              ;       7.3 ISZ INSTRUCTION TEST
18              ;
19              ;               7.3.1 FORWARD ISZ TEST
20              ;
21              ;               THIS TEST FILLS ALL SCRATCH WITH A MINUS
22              ;               ONE PATTERN, THEN PERFORMS A ISZ INSTR.
23              ;               FOLLOWED BY A READ OF THE LOC. TO
24              ;               VERIFY IT CONTAINS A ZERO. THIS IS
25              ;               DONE AT EACH LOCATION FROM SCRLO TO
26              ;               SCRHI.
27              ;
28              ;               7.3.2 REVERSE ISZ  TEST
29              ;
30              ;               THIS TEST IS IDENTICAL TO THE ABOVE TEST
31              ;               EXCEPT THAT THE MEMORY ADDRESSES ARE SCANED
32              ;               FROM SCRHI TO SCRLO.
33              ;
34              ;
35              ;
36              ;       7.4 MARCH
37              ;
38              ;               THIS TEST FUNCTIONALLY CHECKS EACH BIT IN THE
39              ;               MEMORY AND THE ADDRESSING .
40              ;
41              ;               THIS TEST USES EITHER RANDOM DATA (KEY OPTION "Q"=0)
42              ;               OR ALL ONES DATA (OPTION "Q"= 1).
43              ;
44              ;               A TEST PATTERN IS WRITTEN INTO THE BACKGROUND
45              ;               STARTING AT SCRLO AND ENDING AT SCRHI.
46              ;               ADDRESSING IS THEN SCANNED ACROSS THIS RANGE
47              ;               AND AT EACH ADDRESS THE TEST WORD IS
48              ;               READ AND A COMPLEMENTED TEST WORD IS
49              ;               WRITTEN BACK INTO THE SAME LOCATION.
50              ;
51              ;               THE DATA IS THEN COMPLEMENTED AND THE ABOVE
52              ;               SEQUENCE REPEATED.
53              ;
54              ;               THE PROCESS IS THEN REPEATED
55              ;               STARTING AT SCRHI AND PROCEEDING TO SCRLO .
```

7.5 MASEST (SEGMENT MAX. = 2)

CHECKS FOR DESTRUCTION OF STORED DATA THAT MAY RESULT FROM MULTIPLE SELECTION OF ADDRESSES INTERNAL TO THE MEMORY CAUSED BY FAULTY DECODERS OR LOGICAL SWITCHING HAZARDS.

ALTERNATE ALL ONE'S, ALL ZERO'S ARE WRITTEN IN ASCENDING LOCATIONS. EACH LOCATION IS THEN READ AND VERIFIED WHILE GOING THRU THE ADDRESS SEQUENCE OF ADDRESS, COMPLEMENT OF ADDRESS, ADDRESS PLUS ONE, COMPLEMENT OF ADDRESS PLUS ONE, ETC. . MEMORY IS THEN READ SEQUENTIALLY AND THE ALTERNATE ONE'S ZERO'S PATTERN VERIFIED.

7.6 SLDIAG (SEGMENT MAX = 1)

THIS TEST IS NOT SELECTED IF THE PROGRAM IS STARTED AT LOC 200.

THIS TEST FILLS THE BACKGROUND WITH ALL 0'S PATTERN AND THEN WRITES A DIAGONAL PATTERN USING THE COMPLEMENT OF THE BACKGROUND.

THE ARRAY IS THEN VERIFIED READING DOWN EACH COLUMN INSTEAD OF ACROSS EACH ROW.

IF NO ERRORS ARE FOUND THE PROCCES IS REPEATED WITH THE DIAGONAL SHIFTED ONE POSITION UNTIL ALL POSITIONS ARE USED.

NEXT THE BACKGROUND IS COMPLEMENTED AND THE TEST REPEATED.

7.7 GALPAT (SEGMENT MAX = 1)

THIS TEST DOESN'T RUN ON AN AUTOSTART.

THIS TEST CHECKS ADDRESSING, INTERACTION BETWEEN BITS, AND PATTERN AND SEQUENCE DEPENDENCY FOR TRANSIENT PERFORMANCE.

THIS TEST EIHER USES RANDOM DATA OR ALL ONES (SEE KEY OPTION "Q")

A BACKGROUND PATTERN IS WRITTEN THRU-OUT MEMORY. THEN STARTING AT THE FIRST LOCATION, A TEST WORD IS WRITTEN(COMPLEMENT OF BACKGROUND). MEMORY IS THEN READ IN ALL LOCATIONS IN THE FOLLOWING SEQUENCE: BACKGROUND, TEST WORD NEXT BACKGROUND, TEST WORD, NEXT BACKGROUND, ETC. AFTER COMPLETION OF A PASS FROM SCRLO TO SCRHI , THE TEST WORD IS MOVED TO THE NEXT SEQUENTIAL LOCATION AND THE PROCESS OF READING REPEATED. THIS CONTINUES UNTIL THE TEST WORD HAS BEEN LOCATED IN EVERY MEMORY LOCATION FROM SCRLO TO SCRHI.

AT COMPLETION,THE ABOVE SEQUENCE IS REPEATED USEING A COMPLEMENTED PATTERN.

FOR SAKE OF TYPEOUTS:
LOC(X) = TEST WORD LOCATION
LOC(Y) = BACKGROUND LOCATION

7.8 GALWREC (SEGMENT MAX = 1)

THIS TEST DOESN'T RUN ON AN AUTOSTART.

THIS TEST CHECKS ALL POSSIBLE WRITES FOLLOWED BY READS AT DIFFERENT LOCATIONS

THIS TEST EITHER USES RANDOM DATA OR ALL ONES (SEE KEY OPTION "Q")

A BACKGROUND PATTERN(B) IS WRITTEN THRU-OUT MEMORY. EVERY PAIR OF ADDRESSES ARE THEN CHECKED IN THE FOLLOWING MANNER, STARTING WITH THE FIRST LOCATION,LOC(X):
WRITE T(INVERTED B) IN LOC(Y)=(X+1),READ B IN LOC(X),WRITE B IN LOC(Y),
READ B IN LOC(X),WRITE T IN LOC(Y)=(Y+1)
READ B IN LOC(X),ETC.

AFTER ALL LOC. HAVE BEEN CHECKED IN RELATION TO LOCATION ONE(X),THE SEQUENCE IS REPEATED WITH RESPECT TO LOC(X)=(X+1), ETC.

AT COMPLETION , THE ABOVE SEQUENCE IS REPEATED USEING A COMPLEMENTED PATTERN.

```
0013 .MAIN
**00000 TOTAL ERRORS, 00000 PASS 1 ERRORS
```