DataGeneral

TECHNICAL STATEMENT

LISTING

068-001665-00

PROGRAM

CS30 MULTI-PROGRAMMING RELIABILITY
TEST SHORT

TAPE

097-001665-00

ABSTRACT

THE CS30 MULTI-PROGRAMMING RELIABILITY TEST SHORT CONSISTS OF A SERIES OF INDIVIDUAL PROCESSOR AND PERIPHERAL TESTS AND A SUPERVISOR PROGRAM, THE DIAGNOSTIC LINKER.

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        LICENSED MATERIAL - PROPERTY OF DATA GENERAL CORPORATION
 0001 C3MRT    MACRO REV 06.30          10:33:11 08/30/79
01
02
03
04
05              ;*****************************************************************
06              ;
07              ; NAME: CS30MORTS.TX                      PART NUMBER: 097-001665
08              ;
09              ; DESCRIPTION: CS30 MULTI-PROGRAMMING RELIABILITY  TEST (SHORT)
10              ;                       CPU TESTS
11
12              ;
13              ;
14              ; REVISION HISTORY:
15              ;
16              ;       REV.            DATE
17              ;       00              05/09/79
18              ;
19              ;
20              ;
21              ;  COPYRIGHT (C) DATA GENERAL CORPORATION, 1979
22              ;  ALL RIGHTS RESERVED.
23              ;*****************************************************************
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        LICENSED MATERIAL - PROPERTY OF DATA GENERAL CORPORATION
 0002 C3MRT
01              ;CONDITIONAL ASSEMBLY FLAGS
                        .TITL  C3MRT
03
04              ;FILE FOR CS30MORT SHORT (CPU TESTS ONLY)
05        000000 CBRDS=0
06        000000 SCMTS=0
07        000000 AKITH=0
08        000000 MUDVT=0
09        000000 STKTS=0
10        000001 FPYTS=1
11        000001 PEDSK=1
12        000001 PXDSK=1
13        000001 FXYTS=1
14        000001 LPTTS=1
15        000001 IOTST=1
```

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01                ;       CS30 MULTIPROGRAMMING RELIABILITY TEST
02                ;
03                ;
04                ;1.     ABSTRACT
05                ;       THE CS30 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                ;
19                ;2.     MACHINE REQUIREMENTS
20                ;2.1    MICRO-NOVA PROCESSOR
21                ;2.2    32K OF READ/WRITE MEMORY
22                ;       (MEMORY MUST BE CONTIGUOUS)
23                ;2.3    TTY INPUT/OUTPUT OR TERMINAL
24                ;
25                ;2.4    OPTIONAL EQUIPTMENT
26                ;2.4.1  6038/39 DISK (DEV.33ALL DRIVES)
27                ;2.4.2  6095(PHOENIX) DISK (DEV.27)
28                ;2.4.3  LINE PRINTER (DEV. 17)
29                ;2.4.4  PROGRAM BANK SELECT OPTION
30                ;       WITH 1 TO 7 EXTENDED 8K MEMORY BANKS
31                ;
32                ;2.5    SOFTWARE PREREQUISITES
33                ;       THE SYSTEM SHOULD BE CAPABLE
34                ;       OF RUNNING ALL INDIVIDUAL LOGIC AND
35                ;       RELIABILITY TESTS PERTAINING TO THE
36                ;       PROCESSOR AND ITS PERIPHERAL EQUIPMENT
37                ;       BEFORE ATTEMPTING TO RUN THIS TEST
38                ;NOTE:  ALTHOUGH THIS TEST MAY AT TIMES BE USEFUL
39                ;IN DETERMING THE GO/NO GO STATUS OF AN
40                ;UNKNOWN SYSTEM, IT IS RECOMMENDED THAT:
41                ;A. ALL OTHER DIAGNOSTICS BE RUN EVEN IN THE
42                ;   EVENT THAT THIS TEST FINDS NO PROBLEMS.
43                ;B. AN ATTEMPT BE MADE TO ISOLATE ANY PROBLEMS
44                ;   FOUND BY FIRST UTILIZING THE LOWER
45                ;   LEVEL TESTS FOR MORE CONSISE ERROR REPORTS.
```

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01                ;2.6    HARDWARE SETUP
02                ;
03                ;       IF THE 6038/39 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 DISK IS TO BE TESTED
08                ;       IT 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-REMOVEABLE 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                ;3.  OPTIONAL STARTING ADDRESSESS
17                ;3.1    200     AUTO-SIZE AND GO START
18                ;3.2    202,204 MANUAL SELECT/DELETE TESTS
19                ;3.3    206     RESTART LAST TEST SELECTIONS
20                ;3.4    210     IMMEDIATELY ENTER ODT
21                ;
22                ;3.5    KEY ENTERED OPTIONS
23                ;
24                ;       KEY 0   PLACES SWPACKAGE 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    2 =1    DELETE TTY TYPEOUTS
37                ;  3    3 =1    RUN TTY & LPT TEST EVERY TIME SELECTED.
38                ;  4            TYPING A 4 WILL CAUSE THE ELAPSED TIME TO
39                ;                BE PRINTED IF THE REAL TIME CLOCK TEST WAS
40                ;                ENABLED.
41                ;  6     6=1    THE ERROR ROUTINE WILL PAUSE AFTER
42                ;                EACH PHASE OF AN ERROR TYPEOUT.
43                ;                TYPE A CR KEY ON DEVICE TTI TO PROCEED.
44                ;  7            TYPING A 7 WILL CAUSE THE TEST RUN SUMMARY
45                ;                TO BE PRINTED.
46                ;
47                ;
48                ;       KEY (C)O        ENTER THE ODT EDITOR
49                ;                       (SEE DESCRIPTION AT PARAGRAPH 7.0)
50                ;       KEY (C)D        DEFAULT MODE RESTART. SWREG
51                ;                       SET TO 0.
52                ;       KEY (C)R        RESTART WITHOUT RESETTING SWREG BITS.
53                ;       KEY M           TYPE THE CURRENT CONTENTS OF SWREG.
54                ;
55                ;       WHERE (C) SIGNIFIES A CONTROL KEY.
```

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        LICENSED MATERIAL - PROPERTY OF DATA GENERAL CORPORATION
10005 C3MRT
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                ;       CS30MORT REV XX  (WHERE XX WILL = THE CURRENT REV#)
09                ;       TOTAL #1K'S=XXX(DECIMAL)  PBS MAP=YYY
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 WWILL WAIT FOR OPPERATOR INPUTED
24                ;       SWITCH REGISTER OPTION SETUP. TYPING A CR KEY WILL
25                ;       EXIT AND START THE TESTING.
26                ;
27                ;4.7    PBS MAP= (EXPLANATION)
28                ;       IF THE CS30 SYSTEM INCLUDES THE PROGRAM BANK SELECTOR OPTION
29                ;       THIS TYPEOUT WILL BE INCLUDED IN THE TEST HEADER. THE NUMBER
30                ;       FOLLOWING THE = SHOULD BE 1,3,7,17,37,77,177 OR 377. EACH
31                ;       BIT OF THE UP TO 8 THAT WILL BE TYPED INDICATES AN EXISTING
32                ;       EXTENDED 8K MEMORY BANK. BANK 0 IS ASSUMED AND IS REPRESENTED
33                ;       BY BIT 15 OF THE MAP WORD AS IT IS TYPED WITH 0'S SUPPRESSED.
34                ;       BIT 14 REPRESENTS BANK1,BIT 13=BANK2, BIT12=BANK3,ETC.
35                ;       UNTIL BIT 8 REPRESENTS BANK7.
36                ;                FOR INSTANCE, BANK 0 IS ASSUMMED,
37                ;       IF THE CONFIGURATION WAS SIZED SUCH THAT BANK 1 WAS NOT FOUD,
38                ;       BUT BANKS 2 AND 3 WERE FOUND, THE PBS MAP THAT WOULD BE TYPED
39                ;       WOULD =15.
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        LICENSED MATERIAL - PROPERTY OF DATA GENERAL CORPORATION
10006 C3MRT
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
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 PROGRAM BANK SELECT PARAMETERS
21                ;       INCLUDING PBSNO,PBDCH,PBSLF,PBSHF
22                ;       PBSNO   INDICATES THE CURRENT EXTENDED BANK ASSIGNED
23                ;               TO PROCESSOR TYPE TESTS (I.E. ARITHMETIC TEST)
24                ;       PBDCH   INDICATES THE CURRENT EXTENDED BANK ASSIGNED TO
25                ;               DATA CHANNEL DEVICE TYPE TESTS.
26                ;       PBSLF   INDICATES THE CURRENT CONTENTS OF THE PROGRAM
27                ;               BANK SELECTOR LOW FENCE REGISTER.
28                ;       PBSHF   INDICATES THE CURRENT CONTENTS OF THE PROGRAM
29                ;               BANK SELECTOR HIGH FENCE REGISTER
30                ;5.1.3          THE CURRENT CONTENTS OF AC0, AC1, AC2, AC3
31                ;5.1.4          (SCRLO/SCRHI)SCRATCH LIMITS
32                ;5.1.5          CONTINUATION INFORMATION IN GROUPS
33                ;               OF 3 MEMORY LOCATIONS PERTINENT TO
34                ;               THE INDIVIDUAL TEST THAT FAILED
35                ;
36                ;5.1.6  SOME CPU TESTS THAT RELOCATE WILL
37                ;IN THEIR ERROR TYPEOUTS:
38                ;ST.LA  START/ERROR (RES.)
39                ;XXXXXX YYYYYY  ZZZZZZ
40                ;
41                ;ST.LA  THE START OF THE RELOCATED TEST LOOP
42                ;XXXXXX (I.E. THE LAST LCALL SETUL)
43                ;
44                ;START  THIS NUMBER INDICATES WHERE THE RESIDENT COPY
45                ;YYYYYY START OF THE TEST LOOP MAY BE FOUND IN THE LISTING
46                ;
47                ;ERROR  THIS NUMBER INDICATES WHERE IN THE RESIDENT
48                ;ZZZZZZ COPY OF THE LISTING THE ERROR CALL MAY BE FOUND
49                ;       THIS ADDRESS FOR SOME ERROR CONDITIONS MAY NOT
50                ;       BE CORRECT.
```

```
!0007 C3MRT
01                ;5.2    ERROR ANALYSIS
02                ;        DUE TO THE INTERACTIVE NATURE OF
03                ;        THE TESTS INVOLVED, A SERIES OF
04                ;        ERROR TYPEOUTS WILL PROBABLY BE
05                ;        REQUIRED FOR ANALYSIS BEFORE A
06                ;        PROBLEM WILL BE ISOLATED.
07                ;        A RESTART AT 202 AND DELETION OF ALL
08                ;        BUT THE TEST THAT ORIGINALLY
09                ;        FAILED MAY HELP TO ISOLATE
10                ;        INTERACTIVE PROBLEMS AS FOLLOWS:
11                ;
12                ;5.2.1          IF THE TEST RUNS BY ITSELF THE PROBLEM
13                ;        IS INTERACTIVE-RE-ENABLE ONE OTHER TEST AT
14                ;        A TIME TO DETERMINE WHICH ONE IS THE PROBLEM.
15                ;        IF THE TEST DOES NOT RUN BY ITSELF
16                ;        RESORT TO SIMILAR BUT LOWER LEVEL TESTS
17                ;        FOR ISOLATION
18                ;5.3    PERTINENT MEMORY LOC'S TYPED
19                ;
20                ;5.3.1  CHECKERBOARD RAN
21                ;
22                ;        THE AC'S AT ERROR WILL INDICATE:
23                ;        GOOD DATA- BAD DATA-LOGICAL ADDRESS
24                ;
25                ;        IN ADDITION THE FOLLOWING LOCATIONS ARE TYPED:
26                ;        CB.TK    TEST COUNTER
27                ;        0        GENERATE CHECKERBOARD
28                ;        1        DISTURB PASS
29                ;        2        CHECK PATTERN
30                ;        3        CHECKSUM THE # OF -1'S IN PATTERN
31                ;        CB.LC    STARTING LOGICAL ADDRESS OF "BEGIN"
32                ;                 RELOCATED TO SCRATCH
33                ;        CB.SE    AC3 AT ERROR CALL
34                ;
35                ;5.3.2  SC MEMORY TEST
36                ;
37                ;        THIS IS AN ISZ/DSZ TEST FOR SC-MEMORIES.
38                ;
39                ;        THE AC'S AT ERROR WILL INDICATE:
40                ;        ACTUAL-EXPECTED-LOGICAL ADDRESS
41                ;
42                ;        IN ADDITION THE FOLLOWING LOCATIONS ARE TYPED:
43                ;        MM.TK    ERROR NUMBER:
44                ;        0        PATTERN STORING ERROR(SHD BE -1)
45                ;        1        LOCATION NOT -1 BEFORE DOING ISZ
46                ;        2        ISZ DIDN'T SKIP
47                ;        3        LOCATION NOT EQUAL TO 0 AFTER ISZ
48                ;        4        DSZ SKIP ERROR
49                ;        5        DSZ TEST-LOCATION NOT -1 AFTER DSZ
50                ;        6        SAME AS 1, EXCEPT TESTING IN REV DIRECTION
51                ;        7        SAME AS 2, EXCEPT   "     "  "    "
52                ;        10       SAME AS 3, EXCEPT   "     "        "       "
53                ;        MM.LC    RELOCATED CODE ADDRESS START
54                ;        MM.FT    START ADDRESS OF TESTED AREA
55                ;        MM.EN    END OF TESTED AREA IN SCRATCH
56                ;        MM.SE    INSTRUCTION ADDRESS FOLLOWING ERROR CALL
57                ;        LOCATION  ADDRESS OF FAILING LOCATION
```



```
!0008 C3MRT
01
02                ;5.3.3  ARITHMETIC TEST
03                ;
04                ;        THE AC'S WILL BE TYPED AS THEY WERE AT THE
05                ;        TIME OF ERROR DETECTION
06                ;
07                ;        IN ADDITION THE FOLLOWING LOCATIONS ARE TYPED:
08                ;        THE LAST THREE RANDOM NUMBERS GENERATED.
09                ;        AT.LC    STARTING ADDRESS OF ARITH IN SCRATCH
10                ;        ATS03    AC3 AT TIME OF ERROR
11                ;        AT.BG    BEGINNING OF TEST IN THE LISTING
12                ;        (SEE DISCUSSION OF ST.LA,ETC AT PARA.5.1.6)
13                ;
14                ;5.3.4  MUL/DIV TEST
15                ;
16                ;        MULTIPLY DIVIDE FAILURES WILL INDICATE
17                ;        EITHER MUL FOR MULTIPLY OR DIV FOR DIVIDE
18                ;         IN ADDITION, THREE SETS OF AC'S ARE TYPED
19                ;            ORIGINAL OPERANDS
20                ;            HARDWARE RESULT (ASSUMED TO BE INCORRECT )
21                ;            SOFTWARE RESULT (ASSUMED TO BE CORRECT )
22                ;
23                ;5.3.5  STACK ERROR TEST
24                ;
25                ;        THE AC'S AT THE TIME OF ERROR DETECTION WILL
26                ;        BE TYPED.
27                ;
28                ;        AC0 =    ACTUAL
29                ;        AC1 =    EXPECTED
30                ;        AC3 =    ADDRESS OF ERROR CALL
31                ;
```

```
!0009 C3MRT
01                ;5.4    SPECIAL CASE ERROR TYPEOUTS
02                ;
03                ;5.4.1  POWER FAIL INTERRUPT
04                ;       UPON DETECTION OF A POWER FAIL INTERRUPT
05                ;       THE LOGICAL ADRS. OF THE P.C. AT INTERRUPT
06                ;       WILL BE SAVED.
07                ;       IF AUTO-RESTART  IS ENABLED OR THE POWER
08                ;       FAIL WAS ONLY MOMENTARY, THE TEST WILL RE-
09                ;       START AS IN A START AT 206 AFTER TYPING
10                ;POWER FAIL @XXXXXX (WHERE XXXXXX IS THE PC AT INTR.)
11                ;
12                ;5.4.2  ILLEGAL SUPERVISOR CALL
13                ;
14                ;       UPON DETECTION OF A SUPERVISOR CALL
15                ;       WHICH DIDN'T MATCH THE LIST OF SUBROUTINES
16                ;       CALLS THE FOLLOWING MESSAGE WIIL BE TYPED:
17                ;
18                ;       ILLEGAL SUPER CALL AT XXXXXX
19                ;
20                ;       PROG#   NN      NAME
21                ;
22                ;        AC0    AC1     AC2     AC3
23                ;       QQQQQQ  YYYYYY  ZZZZZZ  DDDDDD
24                ;       CALL ADDR= TTTTTT
25                ;       INSTRUCTION= IIIIII
26                ;
27                ;               WHERE XXXXXX IS THE LOGICAL ADDRESS OF THE
28                ;               SUPER CALL.
29                ;       NOTE:   A ILLEGAL SUPERCALL AT LOCATION 0
30                ;               INDICATES THAT THE PROGRAM WAS
31                ;               EXECUTING LOCATION 0.
32                ;
33                ;5.4.3  INTERRUPT WAIT ELAPSED
34                ;
35                ;       THE PERIPHERAL DEVICE ASSOCIATED WITH THE
36                ;       PROG. NUMBER TYPED HAS NOT RESPONDED WITH
37                ;       A PROGRAM INTERRUPT FOR AN EXTENDED
38                ;       PERIOD OF TIME. THE 2ND NUMBER TYPED
39                ;       SHOULD POINT AT THE INTERRUPT HANDLER
40                ;       FOR THE DEVICE THAT FAILED
41                ;
42                ;5.4.4  STACK OVERFLOW ERROR
43                ;
44                ;       UPON A STACK OVERFLOW CONDITION THE
45                ;       STACK INTERRUPT HANDLER WILL PRINT THE
46                ;       FOLLOWING ERROR MESSAGE:
47                ;
48                ;       STACK OVERFLOW ERROR @ XXXXX
49                ;
50                ;       SP      FP      STADR
51                ;       YYYYY   ZZZZZ   SSSSS
52                ;
53                ;       AND THEN IF NOT RETURNABLE TO DTOS, HALT.
54                ;
55                ;       WHERE,  XXXXX   IS THE ADDRESS OF THE INTERRUPT
56                ;               YYYYY   IS THE STACK POINTER
57                ;               ZZZZZ   IS THE FRAME POINTER
58                ;               SSSSS   IS THE STACK BASE ADDRESS(CURRENTLY)
```

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```
!0010 C3MRT
01                ;
02                ;5.4.5  RELOCATED CODE ERROR
03                ;
04                ; UPON DETECTION OF AN ERROR BY A RELOCATED TEST
05                ; THE RELOCATED CODE IS COMPARED TO THE ORIGINAL
06                ; COPY. IF A DIFFERENCE IS FOUND THE FOLLOWING
07                ; INFORMATION IS TYPED:
08                ;
09                ; RELOCATED CODE ERROR
10                ; EXPECTED ACTUAL ADDR-E ADDR-A
11                ; XXXXX YYYYY QQQQQ ZZZZZ
12                ;
13                ; WHERE,
14                ;  XXXXX  IS THE ORIGINAL WORD
15                ;  YYYYY  IS THE RELOCATED WORD
16                ;  QQQQQ  IS THE ADDRESS OF ORIGINAL
17                ;  ZZZZZ  IS THE ADDRESS OF RELOCATED WORD
18                ;
19                ; WHEN THIS OCCURS THE ERROR WAS
20                ; PROBABLY CAUSED BY THE MODIFICATION OF THE
21                ; RELOCATED CODE.
```

```
10011 C3MRT
01                ;6.0    DIAGNOSTIC LINKER
02                ;
03                ;6.1    PROGRAM INITIALIZE
04                ;THE DIAGNOSTIC LINKER INITIALIZES ITSELF
05                ;AND INDIVIDUAL TESTS IN THE FOLLOWING
06                ;SEQUENCE:
07                ;   1. SYSTEM IS RESET,
08                ;   2. ANY OTHER NECESSARY CONSTANTS
09                ;        ARE INITIALIZED
10                ;      (MEM ALLOCATION TABLES)
11                ;   3. INTERRUPT VECTOR TABLES ARE SET UP TO
12                ;      PROCESS UNEXPECTED DEVICE INTERRUPTS
13                ;   4. MEMORY IS SIZED IN 1K INCREMENTS
14                ;       FROM 0 TO 32K AND BUILD A 2 WORD
15                ;      BIT MAP OF EXISTING CONTIGUOUS
16                ;      MEMORY
17                ;
18                ;   5. THE (EXIST)MEMORY SIZED BIT TABLE IS MOVED TO THE
19                ;      AVAILABLE (AVALM)MEMORY BIT TABLE AND EACH BIT
20                ;      CORRESPONDING TO 1K OF UITILIZED
21                ;      MEMORY IS REMOVED FROM THE TABLE
22                ;      SO THAT IT WILL NOT BE ASSIGNED
23                ;      AS A SCRATCH AREA TO ANY TEST.
24                ;      (INCLUDES PROGRAM STORAGE, MEMORY ALLOC.
25                ;      TABLES, INTERRUPT MASKS AND STACK AREA AND
26                ;      THE LAST 1K OF MEMORY TO PRESERVE THE
27                ;       LOADER)
28                ;   6. EACH TEST IS ENTERED IN SEQUENCE AT ITS
29                ;      INIT. ENTRY POINT. OPTION TESTS DETERMINE
30                ;      IF THE DEVICE THEY ARE ASSOC. WITH EXISTS
31                ;      OR NOT AND PASS INTERRUPT SERVICE PARAM'S
32                ;      TO THE LINKER.
33                ;        (DEV#, MASK AND INTERRUPT SERVICE
34                ;      ADDRESS)
35                ;   7. LINKER THEN TYPES THE SYSTEM SIZE
36                ;      INFORMATION ALONG WITH THE PROGRAM
37                ;      RUN LIST.  THE OPERATOR
38                ;      CAN SELECT OR DELETE SPECIFIC TESTS
39                ;      IF START WAS 202 OR 204 .
```



```
10012 C3MRT
01                ;6.2    PROGRAM RUN
02                ;
03                ;       ONCE THE LINKER HAS COMPLETED ALL
04                ;       INITIALIZATION THE FOLLOWING SERIES
05                ;       OF OPERATIONS ARE LOOPED THROUGH:
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.
```

```
01              ;6.3    INDIVIDUAL TEST DESCRIPTIONS
02              ;
03              ;6.3.1  CHECKERBOARD RAN
04              ;
05              ;THIS MEMORY CHECKER BOARD TEST IS A SUBSET OF OTHER MEMORY
06              ;CHECKERBOARDS.  A COMPLETE TEST OF AN AVAILABLE SCRATCH
07              ;AREA IS COMPRISED OF THE FOLLOWING SEQUENCE:
08              ;
09              ;CB.TK=0        ;REQUEST 1 TO 20K OF SCRATCH, RANDOMLY RE-
10              ;               ;LOCATE THE EXECUTE PORTION OF CHECKERBOARD
11              ;               ;INTO SCRATCH AND GENERATE THE CHECKERBOARD
12              ;               ;PATTERN
13              ;
14              ;CB.TK=1        ;DISTURB PASS-COMPLIMENT A SINGLE BIT IN EACH
15              ;               ;OF THE FIRST 16 WORDS OF SCRATCH, SHUFFLE THESE
16              ;               ;WORDS 16 TIMES SUCH THAT THEY END UP IN THEIR
17              ;               ;ORIGINAL POSITION, RE-COMPLIMENT THE SINGLE
18              ;               ;BIT IN EACH WORD-PROCEED WITH EACH GROUP OF
19              ;               ;16 WORDS UNTIL ALL MEMORY HAS BEEN EXERCISED.
20              ;
21              ;CB.TK=2        ;CHECK PASS-COMPARE EACH WORD IN SCRATCH WITH
22              ;               ;THE PATTERN EXPECTED
23              ;
24              ;CB.TK=3        ;FAST CHECKSUM MEMORY TO ENSURE THAT ALL DATA
25              ;               ;IS INTACT (RETURNS TO CHECK PASS IF CHECK-
26              ;               ;SUM DOES NOT AGREE.)
27              ;
28              ;
```



```
01              ;6.3.2  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              ;6.3.3  ARITHMETIC TEST
31              ;
32              ;THE MULTIPROGRAMMING RELIABILITY ARITHMETIC TEST WAS
33              ;DERIVED FROM THE STAND ALONE ARITHMETIC TEST.  THIS TEST
34              ;REQUIRES 2K OF SCRATCH FOR EXECUTION.  THE EXECUTE POR-
35              ;TION OF THE TEST IS RANDOMLY RELOCATED WITHIN AVAILABLE
36              ;SCRATCH. AT THE END OF EACH EXECUTION PASS SCRATCH
37              ;AREA IS RANDOMLY RELEASED OR HELD.  IF HELD, THE NEXT TIME
38              ;THE TEST IS ENTERED, THE EXECUTABLE PORTION OF THE TEST WILL
39              ;AGAIN BE RANDOMLY RELOCATED WITHIN SCRATCH FOR EXECUTION.
40              ;
41              ;6.3.4  MUL/DIV TEST
42              ;
43              ;  THIS TEST WAS DERIVED FROM THE STAND ALONE
44              ;  MUL/DIV TEST.
45              ;  NO TEST RELOCATING IS DONE IN THIS TEST.
```

```
!0015 C3MRT
01
02                ;**.NOLOC STKTS
03                ;6.3.5  STACK ERROR TEST
04                ;
05                ; THIS TEST VERIFIES THE OPERATION OF THE
06                ; HARDWARE STACK BY FORCEING STACK OVERFLOW ERRORS
07                ; AND REALLOCATING THE STACK THROUGH OUT MEMORY.
08                ;
09                ;6.3.6  REAL TIME CLOCK
10                ;
11                ; THE REAL TIME CLOCK RUNS AT 416.66 HERTZ. RUNTIME ALONG
12                ;WITH ACCUMULATED ERROR COUNT ARE PRINTED AT 5 MINUTES
13                ;15 MINUTES, 30 MINUTES AND EVERY 30  MINUTES OF RUNTIME
14                ;THEREAFTER.  THIS TYPEOUT ALSO OCCURS AFTER EVERY ERROR
15                ;TYPEOUT OR IF A TTY KEY WITH SW 4=1 IS TYPED.
16                ;
17                ;6.3.7  TELETYPE TEST
18                ;
19                ;THE TELETYPE TEST PRINTS A SINGLE LINE CONSISTING OF THE
20                ;CHARACTERS SPACE TO Z.  THE TEST WILL ALSO ECHO CHARACTERS
21                ;AS TYPED.
22                ;
```



```
!0016 C3MRT
01                ;7.0 ODT EDITOR
02                ;7.1    REQUESTING THE ODT EDITOR
03                ;       TO ENTER THE ODT TYPE A CONTROL O ON
04                ;       THE TTI. THIS CAN BE DONE AT ANY POINT IN THE
05                ;       PROGRAM.
06                ;7.2    RESPONSE
07                ;       ON ENTERING THE ODT A CARRIGE RETURN, LINE FEED
08                ;       AND AN @ IS TYPED ON THE TTO.
09                ;
10                ;7.3 CONVENTIONS AND SYMBOLS IN COMMAND LINES
11                ; ======================================
12                ;
13                ; CR    PRESSING THE RETURN KEY IS REPRESENTED BY CR .
14                ;
15                ; LF    PRESSING THE LINE FEED KEY IS REPRESENTED BY LF .
16                ;
17                ;?      PRESSING AN ILLEGAL KEY CAUSES THE ODT TO RESPONSE WITH
18                ;       A ?.
19                ;
20                ;@      ODT IS READY AND AT YOUR SERVICE.
21                ;
22                ;
23                ;7.4 COMMAND STRUCTURE
24                ;  =================
25                ;
26                ;       AN ODT COMMAND HAS THE GENERAL FORMAT:
27                ;
28                ;               [ARGUMENT][COMMAND]
29                ;
30                ;       ARGUMENT MAY BE ONE OF THE FOLLOWING:
31                ;
32                ;       ADR     AN OCTAL ADDRESS OR AN EXPRESSION OF THE FORM:
33                ;               X+X+X....
34                ;               WHERE EACH X IS AN OCTAL INTEGER, SEPARATED
35                ;                FROM THE FOLLOWING X BY EITHER +(PLUS)
36                ;               OR -(MINUS). LEADING ZEROS NEED NOT BE TYPED.
37                ;
38                ;       N       AN OCTAL INTEGER.
39                ;
40                ;       A COMMAND IS A SINGLE TELETYPE CHARACTER
41                ;
42                ;       CHARACTERS USED TO OPEN/CLOSE LOCATIONS INCLUDE:
43                ;       "/"  "CR"  "LF"  "^"
44                ;
45                ;       CHARACTERS USED TO ENTER/EXIT ODT INCLUDE:
46                ;       "^O"(CTRL O)  "R"  "P"
47                ;
48                ;       CHARACTERS USED TO MODIFY CURRENT ARGUMENTS ARE:
49                ;       "RUBOUT"  "+" "-" AND THE INTEGERS 0 TO 7
50                ;
51                ;       THE CHARACTER "=" ALLOWS THE CURRENT ARGUMENT TO BE
52                ;       EXAMINED WITHOUT OPENING OR CLOSING THE CURRENT LOC.
53                ;
```

```
!0017 C3MRT
01                ;
02                ;
03                ;7.5 COMMANDS TO OPEN A LOCATION
04                ;  ----------------------
05                ;
06                ;
07                ;       THE MEMORY LOCATION TO BE OPENED IS TYPEDOUT.
08                ;ADR/   OPEN THE LOCATION AND PRINT ITS CONTENTS
09                ;./     OPEN THE LOCATION CURRENTLY POINTED BY THE POINTER
10                ;        AND PRINIT ITS CONTENTS.
11                ;.+ADR/ ADD ADR TO THE POINTER, OPEN THE LOCATION AND
12                ;       PRINT ITS CONTENTS.
13                ;.-ADR/ SUBTRACT ADR FROM THE POINTER, OPEN THE LOCATION AND
14                ;       PRINT ADDR CONTENTS.
15                ;       CLOSE THE OPEN LOCATION WITH OR WITHOUT
16                ;       MODIFICATION OF ITS CONTENTS.
17                ;       CLOSE THE OPEN LOCATION WITH OR WITHOUT
18                ;       MODIFICATION OF ITS CONTENTS AND OPEN THE
19                ;       SUCCEDING LOCATION.
20                ;/      CLOSE THE OPEN LOCATION WITHOUT MODIFYING
21                ;       ITS CONTENTS AND OPEN THE CELL POINTED
22                ;       BY ITS CONTENTS
23                ;+ADR/  CLOSE THE OPEN LOCATION WITHOUT MODIFYING
24                ;       ITS CONTENTS AND OPEN THE LOCATION POINTED
25                ;       BY ITS CONTENTS+ADR
26                ;-ADR/  CLOSE THE OPEN LOCATION WITHOUT MODIFYING ITS
27                ;       CONTENTS AND OPEN THE LOCATION POINTED BY
28                ;       ITS CONTENTS-ADR.
29                ; ^     CLOSE THE CURRENT LOCATION AND OPEN ".-1"
30                ;
31                ; LF    CLOSE THE CURRENT LOCATION AND OPEN ".+1"
32                ;
33                ;
```



```
!0018 C3MRT
01                ;
02                ;
03                ;7.6 OTHER COMMANDS
04                ;  --------------
05                ;
06                ;RUBOUT THE RUBOUT KEY IS USED TO DELETE ERRONEOUSLY TYPED
07                ;       DIGITS EACH TIME THE RUBOUT KEY IS PRESSED, THE RIGHT
08                ;       MOST DIGIT IS DELETED AND ECHOED ON THE TERMINAL.
09                ;       IF THE RUBOUT KEY IS PRESSED RIGHT AFTER OPENING A CELL
10                ;       THEN IT ALLOWS THE MODIFICATION OF THE CONTENTS AS IF
11                ;       THEY WERE TYPED JUST BEFORE THE KEY WAS PRESSED.
12                ;
13                ;P      RESTART THE EXECUTION OF THE PROGRAM AT THE LOCATION
14                ;       POINTED BY SAVED AC5 .
15                ;
16                ;ADRR   START EXECUTING THE USERS PROGRAM AT LOCATION ADR AFTER
17                ;       AN IO RESET.
18                ;
19                ;K      KILL THE STRING TYPED SO FAR. ODT RESPONDS WITH A ? AND
20                ;       THE OPEN LOCATION IS CLOSED WITHOUT MODIFICATION.
21                ; =     PRINT THE CURRENT ARGUMENT  (I.E.  TYPING ".=" WILL
22                ;       PRINT THE ADRS OF THE LAST OPENED LOCATION)
23                ;
24                ;7.7 MODIFICATION OF A LOCATION
25                ;  ----------------------
26                ;
27                ;       ONCE A LOCATION HAS BEEN OPENED ITS CONTENTS CAN BE
28                ;       MODIFIED IN ONE OF THE FOLLOWING WAYS:
29                ;
30                ;    1) TYPE THE OCTAL NUMBER OR A STRING OF NUMBERS SEPERATED
31                ;       BY + OR -, FOLLOWED BY CR , OR LF . IN THIS CASE THE SUM
32                ;       OF THE TOTAL NUMBERS TYPED-IN WILL BE DEPOSITED. LEADING
33                ;       ZEROS NEED NOT BE TYPED.
34                ;
35                ;     2)        TYPE + OR - FOLLOWED BY A NUMBER OR A STRING OF NUMBERS
36                ;       SEPERATED BY + OR -, FOLLOWED BY CR , OR LF . IN THIS
37                ;       CASE SUM OF THE TOTAL NUMBERS TYPED IN WILL BE ADDED TO
38                ;       OR SUBTRACTED FROM THE PREVIOUS CONTENTS OF THE LOCATION.
39                ;       LEADING ZEROS NEED NOT BE TYPED.
40                ;
41                ;     3)        ADDRESS ITSELF OR AN OCTAL NUMBER RELATIVE TO THE
42                ;       ADDRESS OF THE LOCATION CAN BE DEPOSITED IN A MEMORY
43                ;       LOCATION BY TYPING A . OR .+ADR FOLLOWED BY A CR , OR LF .
44                ;     4)        A RUBOUT COMMAND GIVEN RIGHT AFTER OPENING A
45                ;       LOCATION ALLOWS THE MODIFICATION OF ITS CONTENTS
46                ;       AS IF THEY WERE TYPEDIN JUST BEFORE THE COMMAND
47                ;       WAS ISSUED.
```

**00000 TOTAL ERRORS, 00000 PASS 1 ERRORS

ARITH	000000	2/07	8/02	14/30
CBRDS	000000	2/05	7/20	13/03
FPYTS	000001	2/10	9/01	15/23
FXYTS	000001	2/13		
IOTST	000001	2/15	9/01	16/01
LPTTS	000001	2/14	9/01	15/23
MUDVT	000000	2/08	8/14	14/41
PEDSK	000001	2/11	9/01	16/01
PXDSK	000001	2/12		
SCMTS	000000	2/06	7/35	14/01
STKTS	000000	2/09	8/23	