DataGeneral

TECHNICAL STATEMENT

TEXT LISTING

068-001679-00

PROGRAM

DCU-200 RELIABILITY TEST

TEXT TAPE

097-001679-00

ABSTRACT

THE DCU 50/200 RELIABILITY EXERCISER IS A STANDALONE PROGRAM DESIGNED TO EXERCISE UP TO 4 DCU-50 OR DCU-200 (OR MIXED) PROCESSORS IN THE SAME HOST IN A SEQUENCE OF RANDOMLY SELECTED TESTS. THE DCU'S MUST BE SELECTED WITH DIFFERENT DEVICE CODES.

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 0001 .MAIN MACRO REV 03.00              14:49:27 05/25/79
01
02
03
04
05
06
07              ;*****************************************************************
08              ;
09              ; PROGRAM NAME: MDCU.TX                    PART NUMBER:097-001679
10              ;
11              ;
12              ; DESCRIPTION: DCU 200 RELIABILITY
13              ;              TEST TEXT FILE
14              ;
15              ;
16              ; REVISION HISTORY:
17              ;
18              ;       REV.            DATE
19              ;
20              ;       00              5/25/79         INITIAL RELEASE
21              ;
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31              ;               NOTICE
32              ;
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41              ; ANY LICENSE TO MAKE, USE, OR SELL EQUIPMENT OR
42              ; SOFTWARE MANUFACTURED IN ACCORDANCE HEREWITH.
43              ;*****************************************************************
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 0002 .MAIN
01
02              ;
03              ;       DCU RELIABILITY
04              ;
05              ;1.     PROGRAM NAME    DCU.TX
06
07              ;2.     REVISION HISTORY
08
09              ;3.0    MACHINE REQUIREMENTS
10              ;        NOVA/ECLIPSE FAMILY PROCESSOR
11              ;        CONSOLE DEVICE
12              ;        1 TO 4 DATA CONTROL UNITS (DCU)
13              ;        DCU-50 OR DCU-200 IN ANY MIX,SELECTED AT DIFFERENT
14              ;        DEVICE CODES.
15              ;        16K READ/WRITE MEMORY
16
17              ;
18              ;3.1    OPTIONAL HARDWARE SUPPORTED:
19              ;        TESTS FOR MMPU1 OPERATION WITH DCU (ECLIPSE)
20
21              ;4.0    INTRODUCTION
22              ;        THE DCU 50/200 RELIABILITY EXERCISER IS A STANDALONE
23              ;        PROGRAM DESIGNED TO EXERCISE UP TO 4 DCU-50 OR DCU-200
24              ;        (OR MIXED) PROCESSORS IN THE SAME HOST IN A SEQUENCE OF
25              ;        RANDOMLY SELECTED TESTS. THE DCU'S MUST BE SELECTED WITH
26              ;        DIFFERENT DEVICE CODES.
27              ;        THE PROGRAM HAS THE FOLLOWING FEATURES:
28              ;
29              ;        ..FACILITY TO RUN,SIMULTAINEOUSLY UP TO 4 DCUS.
30              ;        ..ACCOMIDATION OF EITHER DCU-50 OR DCU-200 OR MIXED.
31              ;        ..EXTENSIVE TESTING USING PROGRAMS RESIDENT IN LOCAL DCU
32              ;        MEMORY.
33              ;        ..AN OCTAL EDITOR WHICH MAY BE USED FROM THE HOST COMPUTER
34              ;        OR FROM ANY DCU.
35              ;        ..ENGLISH PRINTOUTS OF ERRORS.
36              ;        ..SOFT SWITCH PACKAGE FOR USE ON MACHINES WITHOUT CONSOLES.
37              ;        ..A MAPPED DATA CHANNEL TEST FOR SYSTEMS USING MMPU1
38              ;
39              ;5.     RESTRICTIONS    NONE
40
```

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10003 .MAIN
01              ;
02              ; 6.     OPERATING PROCEDURE:
03              ; 6.1     TURN POWER ON
04              ; 6.2     LOAD THE PROGRAM VIA THE BINARY LOADER OR DTOS TAPE
05              ; 6.3     SET SWITCHES TO 000200 (BINARY LOADER ONLY)
06              ; 6.4     PRESS START (BINARY LOADER ONLY)
07              ;
08              ; 6.4.1   THE PROGRAM WILL RESPOND BY REQUESTING THE OPERATOR
09              ;         TO TYPE THE NUMBER OF DCUS TO BE TESTED, THE PROGRAM
10              ;         WILL ACCEPT A NUMBER BETWEEN 1 AND 4.
11              ;
12              ;
13              ; 6.4.2 THE PROGRAM WILL NEXT ASK THE OPERATOR
14              ;         TO TYPE THE DEVICE CODE. A 2 DIGIT OCTAL NUMBER FOL=
15              ;         LOWED BY A CARRIAGE RETURN IS EXPECTED.  THIS QUESTION
16              ;         WILL BE REPEATED FOR THE NUMBER OF DCU'S IN QUESTION 1.
17              ;         THE PROGRAM WILL ACCEPT ANY NUMBER BETWEEN 1 AND 76.
18              ;         THE CODES SHOULD , OF COURSE BE UNIQUE.
19              ;
20              ; 6.4.3 THE PROGRAM WILL THEN DO SOME SIZING OF THE DCU'S AND
21              ;        PRINT THAT IT HAS DETERMINED THEY HAVE 1K OR 4K
22              ;        LOCAL MEMORY. 1K OR 4K MUST BE SELECTED FOR EACH DCU.
23              ;
24              ; 6.4.4 THE PROGRAM WILL THEN ASK TO TYPE A 1 IF A
25              ;        MANUAL TEST SELECTION IS DESIRED.  TYPING ANY
26              ;        OTHER CHARACTER, SUCH AS A RETURN WILL RESULT IN
27              ;        ALL TESTS SEQUENCING AUTOMATICALLY.
28              ;
29              ; 6.4.5 IF THE OPERATOR HAS ELECTED TO RUN THE MANUAL TEST
30              ;        SELECTION THE PROGRAM WILL PRESENT EACH TEST FOR
31              ;        SELECTION , THE OPERATOR MAY SELECT A PROGRAM BY
32              ;        TYPING A SPACE,TYPING ANY OTHER CHARACTER WILL DELETE
33              ;        THE TEST FROM THE RUN LIST.
34              ;
35              ; 6.5    WHEN OPERATOR INPUT IS COMPLETE, EXECUTION OF THE
36              ;        TEST PROGRAM BEGINS. WHEN A COMPLETE PASS IS MADE
37              ;        WITH ALL LINES TESTED , THE WORD "PASS" WILL BE
38              ;        TYPED ON THE CONSOLE DEVICE.
39              ;
40              ;
41              ;        THE TEST NAME AND DEVICE CODE IS PRINTED ON THE
42              ;        FIRST PASS THROUGH EACH TEST.IF DESIRED TO CONTINUE
43              ;        THIS PRINT OUT SWITCH 7 MAY BE SET. SEE SECTION ON
44              ;        SWITCH SELECTIONS.
45              ;
46              ;
47              ; 6.6    RESTART PROCEDURE
48              ;         THE PROGRAM MAY BE RESTARTED AT 200 FOR REPEAT
49              ;         EXECUTION. THIS MAY BE DONE MANUALLY OR VIA ^ R
50              ;         OR ^D.
51              ;
52              ;
53              ; 6.6.1 THE MESSAGE TYPE 1 FOR NEW PARAMETERS WILL APPEAR
54              ;          ON RESTART. TYPING A 1 WILL PRODUCE ALL OF THE
55              ;          QUESTIONS INITIALLY ANSWERED. TYPING ANY OTHER
56              ;          CHARACTER WILL BEGIN TESTS USING THE PREVIOUSLY
57              ;          GIVEN PARAMETERS.
```

```
10004 .MAIN
01              ;6.6    SPECIAL NOTES/SPECIAL FEATURES
02              ;
03              ;
04              ;6.6.1  ON ALL INPUT REQUESTS THE OPERATOR MAY ELECT
05              ;       TO ALTER FLOW OF THE PROGRAM BY STRIKING A
06              ;       CONTROL O,P,R OR D.
07              ;
08              ;6.7    ODT START
09              ;        ODT MAY BE STARTED WITHOUT ANSWERING THE INITIAL QUESTIONS
10              ;       BY STARTING AT LOCATION 300.
11              ;
12              ;
13              ;7.     RUN TIME
14              ;        THE PROGRAM RUNS CONTINOUSLY UNTIL MANUALLY
15              ;        STOPPED. A PASS MESSAGE WILL BE PRINTED EVERY
16              ;       32 TEST COMPLETIONS. TESTS WILL RUN FASTER WHEN
17              ;       MORE DCUS ARE BEING TESTED,BECAUSE OF CONCURRENT
18              ;       TESTING. EACH PASS MESSAGE SHOULD BE LESS THAN 5
19              ;       MINUTES.
```

```
!0005 .MAIN
01
02              :8.     OPERATING MODES/SWITCHES
03              :
04              :8.1    ODT PACKAGE
05              :       AN OCTAL DEBUG TOOL EXISTS WHICH MAY BE RUN IN THE
06              :       HOST OR IN EACH DCU TO AIDE IN THE DEBUGGING OF ERRORS.
07              :       THIS IS A SINGLE PACKAGE AND MAY BE ENABLED FOR ONLY ONE
08              :       DCU OR THE HOST. WHEN ENABLED THE HOST INTERRUPT SYSTEM
09              :       IS DISABLED AND ANY ERROR MESSAGES WILL BE SUSPENDED.
10              :       THEY WILL HOWEVER RESUME ONCE THE OTD MODE IS CONTINUED.
11              :
12              :8.1.1  INITIATING ODT
13              :        ODT IS INITIATED BY STRIKING CONTROL O WHEN A TEST IS
14              :       RUNNING OR THE INPUT QUESTIONS ARE BEING ASKED.
15              :        ODT MAY ALSO BE INITIATED BY STARTING AT LOCATION 300.
16              :
17              :        AFTER INITIATION THE PROGRAM WILL ASK IF THE ODT IS TO
18              :       BE IN THE HOST COMPUTER OR IN A DCU.
19
20              :       IF A HOST ODT IS SELECTED ,CONTROL WILL BE TRANSFERED TO THAT
21              :       ODT.
22
23              :       IF A DCU ODT IS SELECTED. THE PROGRAM WILL ASK FOR THE DEVICE
24              :       CODE OF THE DCU, AND THEN TRANSFER CONTROL TO THAT DCU. IT WILL
25              :       STOP OPERATIONS WHICH MAY BE GOING ON IN OTHER DCUS.
26              :
27              :       ANOTHER CONTROL O WILL ENVOKE THE PREVIOUS ODT CALL , WITHOUT
28              :       THE QUESTIONS. ANOTHER ODT MAY BE SELECTED VIA CONTROL P, THE
29              :       QUESTIONS WILL REPEAT.
30              :       ALL OTHER ODT COMMANDS WILL REMAIN AS STANDARD.SEE BELOW
31              :
32              :8.1.2  OCTAL DEBUG TOOL (ODT)
33              :
34              :       ON ENTERING ODT THE ADDRESS OF THE LOCATION HAVING THE
35              :       NEXT INSTRUCTION TO BE EXECUTED WILL BE TYPED-OUT.
36              :
37              :8.1.2.1        CONVENTIONS AND SYMBOLS
38              :
39              :       THE FOLLOWING CONVENTIONS ARE USED BY THE ODT:
40              :
41              :?      PRESSING ANY ILLEGAL KEY CAUSES THE ODT TO RES-
42              :       POND WITH A "?".
43              :@      ODT IS READY AND AT YOUR SERVICE.
44              :
```

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!0006 .MAIN
01              :8.1.2.2        COMMAND STRUCTURE
02              :       AN ODT COMMAND HAS THE FOLLOWING FORMAT:
03              :       [ARGUMENT][COMMAND]
04              :       AN ARGUMENT MAY BE ONE OF THE FOLLOWING:
05              :"EXP"  AN OCTAL EXPRESSION CONSISTING OF OCTAL NUMBERS
06              :       SEPARATED BY PLUS (+) OR MINUS (-) SIGNS. LEAD-
07              :       ING ZEROS NEED NOT BE TYPED.
08              :"ADR"  AN ADDRESS IS THE SAME AS AN EXPRESSION EXCEPT
09              :       THAT BIT 0 IS NEGLECTED.
10              :       A COMMAND IS A SINGLE TELETYPE CHARACTER
11              :       TYPED IN JUST BEFORE THE COMMAND WAS ISSUED.
12              :
13              :
14              :
15              :8.1.2.3        ODT COMMANDS
16              :       THE LOCATIONS THAT CAN BE EXAMINED AND MODIFIED BY THE
17              :       USER ARE CALLED CELLS. THESE CELLS ARE OF TWO TYPES:
18              :       INTERNAL CPU CELLS AND MEMORY LOCATIONS.
19              :
20              :8.1.2.3.1      OPENING INTERNAL CELLS
21              :       THE COMMAND TO OPEN ONE OF THE INTERNAL REGISTERS IS OF
22              :       THE FORM "NA" WHERE N IS ANY OCTAL EXPRESSION BETWEEN
23              :       0 AND 7
24              :0-3    FOR ACCUMULATORS 0-3
25              :4      FOR PC OF THE NEXT INSTRUCTION TO BE EXECUTED IN
26              :       THE EVENT OF A "P" COMMAND.
27              :5      CPU AND TTO STATUS
28              :       BIT     INTERPRETATION
29              :       15      STATUS OF TTO DONE FLAG
30              :       14      STATUS OF INTERRUPTS (ION FLAG)
31              :       13      STATUS OF CARRY BIT
32              :6      ADDRESS OF THE LOCATION HAVING THE BREAK POINT (IF
33              :       ANY)
34              :7      INSTRUCTION AT THE BREAK POINT LOCATION
35              :
36              :OTHER COMMANDS TO OPEN CELLS ARE:
37              :
38              :"ADR"/ OPEN THE CELL AND PRINT ITS CONTENTS
39              :./     OPEN THE CELL CURRENTLY POINTED TO BY THE POINTER
40              :       AND PRINT ITS CONTENTS.
41              :.+"ADR"/  ADD "ADR" TO THE POINTER, OPEN THE CELL
42              :       AND PRINT ITS CONTENTS.
43              :.-"ADR"/  SUBTRACT "ADR" FROM THE POINTER, OPEN
44              :       THE CELL AND PRINT ITS CONTENTS.
45              :"CR"   THE RETURN KEY IS USED TO CLOSE THE OPEN CELL
46              :       WITH OR WITHOUT MODIFICATION.
47              :"LF"   LINE FEED IS USED TO CLOSE THE OPEN CELL WITH OR
48              :       WITHOUT MODIFICATION AND TO OPEN THE SUCCEEDING
49              :       CELL.
50              :^      CLOSE THE OPEN CELL WITH OR WITHOUT MODIFICATION
51              :       AND OPEN THE PRECEDING CELL
52              :/      CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
53              :       OPEN THE CELL POINTED TO BY ITS CONTENTS.
54              :+"ADR"/  CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
55              :       OPEN THE CELL POINTED TO BY ITS CONTENTS + "ADDR".
56              :-"ADR"/  CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
57              :       OPEN THE CELL POINTED TO BY ITS CONTENTS - "ADR".
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!0007 .MAIN
01              ;
02              ;8.1.2.3.2      MODIFICATION OF A CELL
03              ;       ONCE A CELL HAS BEEN OPENED ITS CONTENTS CAN BE MODIFIED
04              ;       BY TYPING THE NEW VALUE THE CELL IS TO CONTAIN IN THE
05              ;       FORM OF AN OCTAL EXPRESSION FOLLOWED BY "CR" OR "LF".
06              ;       IF A + OR - IS TYPED AS THE FIRST CHARACTER OF THE EX-
07              ;       PRESSION THEN THE VALUE OF THE EXPRESSION IS ADDED TO OR
08              ;       SUBTRACTED FROM THE OLD CONTENTS OF THE CELL. THE
09              ;       ADDRESS ITSELF OR AN EXPRESION RELATIVE TO THE ADDRESS
10              ;       CAN BE DEPOSITED BY TYPING A "." OR ".+/-OCTAL EXPRESS-
11              ;       ION". A RUBOUT COMMAND GIVEN RIGHT AFTER OPENING A CELL
12              ;       ALLOWS THE MODIFICATION OF ITS CONTENTS AS IF THEY WERE
13              ;       TYPED IN JUST BEFORE THE COMMAND WAS ISSUED.
14              ;
15              ;8.1.2.3.3      OTHER ODT COMMANDS
16              ;RUBOUT  THIS KEY IS USED TO DELETE ERRONEOUSLY TYPED
17              ;       DIGITS. EACH TIME THE KEY IS PRESSED THE RIGHT MOST
18              ;       DIGIT IS DELETED AND ECHOED ON THE TERMINAL. IF
19              ;       THE RUBOUT KEY IS PRESSED RIGHT AFTER OPENING A
20              ;       CELL THEN IT DELETES THE RIGHT MOST DIGIT OF THE CELLS
21              ;       CONTENTS. THIS ALLOWS THE MODIFICATION OF THE CELL
22              ;       AS IF ITS CONTENTS WERE TYPED IN JUST BEFORE THE
23              ;       KEY WAS PRESSED.
24              ;"ADR"B INSERT A BREAK POINT AT LOCATION "ADR".
25              ;       ONLY ONE BREAK POINT CAN BE INSERTED AND ANY
26              ;       ENTRY TO ODT AFTER EXECUTING A BREAK POINT WILL
27              ;       CAUSE IT TO BE DELETED.
28              ;D      DELETE THE BREAK POINT IF ANY.
29              ;P      RESTART THE EXECUTION OF THE PROGRAM AT LOCATION
30              ;       POINTED BY 4A.
31              ;"ADR"R START EXECUTING THE PROGRAM AT "ADR" AFTER AN
32              ;       IO-RESET.
33              ;K      KILL THE STRING TYPED SO FAR. THE ODT RESPONDS
34              ;       WITH A "?" AND THE OPEN CELL IS CLOSED WITHOUT
35              ;       MODIFICATION.
36              ;=      PRINT THE OCTAL VALUE OF THE INPUT ONLY.
37              ;       THIS WILL CLOSE ANY OPEN CELLS WITHOUT
38              ;       MODIFICATION AND WILL NOT OPEN A CELL
39              ;
40              ;
41              ;
42              ;
43              ;
44              ;
```

```
!0008 .MAIN
01              ;8.2    SWITCH SETTINGS
02              ;
03              ;       LOCATION "SWREG" IS USED TO SELECT THE PROGRAM OPTIONS
04              ;       (NOT SYSTEM CONFIGURATION). WHILE RUNNING UNDER DTOS,
05              ;       THIS LOCATION WILL BE LOADED BY THE MONITOR.
06              ;       HOWEVER UNDER STAND ALONE AND PROGRAM LOAD MODES THIS
07              ;       LOCATION WILL BE SET ACCORDING TO THE ANSWERS SUPPLIED
08              ;       BY THE OPERATOR. IN ANY CASE THE OPTIONS CAN BE CHANGED
09              ;       OR VERIFIED BY USING ONE OF THE COMMANDS GIVEN IN SEC.
10              ;       8.2.1.
11              ;
12              ;
13              ;8.2.1  SWITCH OPTIONS
14              ;       DIFFERENT BITS AND THEIR INTERPRETATION AT LOCATION
15              ;       "SWREG" IS AS FOLLOWS:
16              ;
17              ;  BIT  OCTAL   BINARY  INERPRETATION
18              ;       VALUE   VALUE
19              ;
20              ;  1            0       CONTINUE FROM ERROR
21              ;       40000   1       LOOP ON ERROR
22              ;
23              ;  2            0       PRINT TO CONSOLE
24              ;       20000   1       ABORT PRINT OUT TO CONSOLE
25              ;
26              ;  3                    NOT DEFINED
27              ;
28              ;
29              ;  4            0       ALLOW END OF PASS PRINT OUT
30              ;       04000   1       SUPPRESS END OF PASS PRINT OUT
31              ;
32              ;  5            0       DO NOT PRINT ON THE LINE PRINTER
33              ;       02000   1       PRINT ON THE LINE PRINTER
34              ;
35              ;  6                    NOT DEFINED
36              ;
37              ;
38              ;  7            0       DO NOT PRINT SUMMARY AND/OR
39              ;                       PASSING OF EACH SUBTEST
40              ;       00400   1       PRINT SUMMARY AND/OR
41              ;                       PASSING OF EACH SUBTEST
42              ;
43              ;  8            0       DO NOT STOP ON EACH ERROR
44              ;
45              ;               1       STOP ON EACH ERROR AND WAIT FOR A
46              ;                       KEY TO BE STRUCK.
47              ;
48              ;
49              ;8.2.2  SWITCH COMMANDS
50              ;       ONCE THE PROGRAM STARTS EXECUTING THE STATE OF ANY OF
51              ;       THE BITS CAN BE CHANGED BY HITTING KEYS 1-9, A-F. THE
52              ;       PROGRAM WILL CONTINUE RUNNING AFTER UPDATING THE OPTIONS.
53              ;       EACH KEY WILL COMPLEMENT THE STATE OF THE BIT AFFILIAT-
54              ;       ED WITH IT, THUS BIT 4 CAN BE ALTERED BY HITTING KEY 4.
55              ;       SETTING OF ANY BIT OF LOCATION "SWREG" WILL SET BIT 0.
56              ;       (DEFAULT MODE IS DEFINED AS ALL BITS OF SWREG SET TO 0)
57              ;       THE PROGRAM CAN BE LOCKED INTO SWITCH MODIFICATION MODE
58              ;       BY TYPING A 0, IN WHICH CASE MORE THAN ONE BIT CAN BE
59              ;       CHANGED BEFORE  CONTROL IS ALLOWED TO RETURN TO THE
60              ;       MAIN PROGRAM.
```

```
 0009 .MAIN
01              ;
02              ;8.2.2.1        OTHER COMMANDS
03              ;
04              ;"CR"   A "RETURN" CAN BE TYPED TO CONTINUE THE PROGRAM
05              ;       AFTER ITS LOCKED IN A SWITCH MODIFICATION MODE
06              ;
07              ; ^D    THIS COMMAND GIVEN AT ANY TIME WILL RESET "SWREG"
08              ;       TO DEFAULT MODE AND RESTART THF PROGRAM.
09              ;
10              ; ^R    THIS COMMAND GIVEN AT ANY TIME WILL RESTART THE
11              ;       PROGRAM. SWITCHES ARE LEFT WITH THE VALUES THEY
12              ;       HAD BEFORE THE COMMAND WAS ISSUED.
13              ;
14              ; ^O    THIS COMMAND GIVEN AT ANY TIME WILL CAUSE THE
15              ;       PROGRAM CONTROL TO GO TO ODT.
16              ;
17              ; ^P ** THIS COMMAND WILL INITATE AN ODT REQUEST FOR NEW
18              ;       PARAMETERS. IT IS USED TO CHANGE THE ODT TO A
19              ;       DIFFERENT (HOST OR DCU) PROCESSOR.
20              ;
21              ; M     THIS COMMAND GIVEN AT ANY TIME WILL PRINT THE
22              ;       CURRENT OPERATING MODES.
23              ;
24              ;
25              ;** THIS COMMAND IS NOT FOUND IN OTHER ODT'S.
26              ;
```

```
10010 .MAIN
01              ;
02              ;
03              ;9.  PROGRAM DESCRIPTION/THEORY OF OPERATION
04
05
06              ;  THE PROGRAM CONSISTS OF FOUR BASIC TESTS ; MMPU1 MAP TEST,
07              ;  A CHECKERBOARD WITH DISTURB TEST, NOVA LOGIC TEST AND
08              ;  ARITHMETIC TEST. A UTILITY ODT PACKAGE IS PROVIDED FOR USE
09              ;  IN DEBUGGING COMPLEX PROBLEMS.
10
11              ;  THE CHECKERBOARD,LOGIC AND ARITHMETIC TESTS ARE RUN IN TWO
12              ;  WAYS. THE FIRST IS RUN IN PLACE IN THE LISTING (HOST RUN)
13              ;  USING THE DATA CHANNEL FOR EACH INSTRUCTION. THE SECOND IS
14              ;  RUN WITH THE TESTS RELOCATED TO LOCAL MEMORY.
15              ;
16              ;9.1    TEST SEQUENCES
17              ;   TESTS MAY BE MANUALLY SELECTED OR AUTOMATICALLY SEQUENCED.
18              ;
19              ;  THE MMPU1 TEST IS CONDITIONED UPON THE PROGRAM DETERMINATION
20              ;  OF THE EXISTANCE OF AN MMPU1 IN THE SYSTEM. THE PROGRAM
21              ;  SIZES FOR AN MMPU1 BY USING THE "READ LAST BLOCK" COMMAND
22              ;  AND STATUS INFORMATION RETURNED FROM A "DOC  X,3  DIC X,3"
23              ;  SEQUENCE. IF THE PROGRAM DOES NOT FIND AN MMPU1  PRESENT
24              ;  THE MMPU1 TEST WILL NOT BE RUN.
25              ;
26              ;9.2    AUTO SEQUENCING
27              ;  THE TESTS ARE INITIALLY RUN FROM THE HOST COMPUTER ONE AT
28              ;  A TIME IN EACH DCU WITH THE OTHER DCU'S HALTED. THE MMPU1
29              ;  TEST IS RUN FIRST,IF AN MMPU1 IS FOUND, THEN THE CHECKER-
30              ;  BOARD,LOGIC TEST  AND ARITHMETIC TEST.
31              ;
32              ;  THESE PROGRAMS RUN IN THE DCU USING THE CODE IN THE HOST
33              ;  WHICH IS FETCHED FROM THE HOST VIA THE DATA CHANNEL.
34              ;  THE DCU LOCAL MEMORY IS USED FOR LOADS AND STORES IN THE
35              ;  CHECKERBOARD TEST AND USED FOR LOCAL CONSTANTS IN THE OTHER
36              ;  TWO TESTS.
37              ;
38              ;  AFTER COMPLETION OF THE HOST RUN TESTS THE TESTS ARE
39              ;  RELOCATED INTO LOCAL MEMORY AND RUN AS LOCAL TESTS. AT THE
40              ;  END OF EACH TEST A MESSAGE IS PRINTED INDICATING COMPLETION
41              ;  OF THE INITIAL TEST. THIS MESSAGE WILL DISCONTINUE AFTER
42              ;  THE INITIAL SEQUENCE UNLESS SWITCH 7 IS SET.
43              ;
44              ;  WHEN THE INITIAL SEQUENCE IS COMPLETED THE LOCAL DCU
45              ;  INTERRUPT SYSTEMS WILL BE ENABLED AND THE DCU REAL TIME
46              ;  CLOCKS WILL BE TURNED ON. IF A SINGLE DCU IS SELECTED ALL
47              ;  TESTS EXCEPT THE MAP AND CHECKERBOARD LOCAL WILL BE RUN
48              ;  IN RANDOM SEQUENCE.
49              ;
50              ;
51              ;  IF MORE THAN ONE DCU IS SELECTED A RANDOM LOCAL TEST WILL
52              ;  BE SELECTED AND STARTED FOR EACH DCU, SO THE DCU'S RUN
53              ;  SIMULTANEOUSLY.
54              ;  ONCE THESE TESTS HAVE BEEN STARTED THE PROGRAM RUNS IN A
55              ;  CAUSE AND EFFECT MODE. IT WILL RESTART A NEW RANDOMLY
56              ;  SELECTED TEST WHEN A DCU COMPLETES ITS CURRENT TEST.
57              ;  WHILE WAITING FOR THE TESTS TO EXPIRE THE HOST WILL
58              ;  GENERATE RANDOM NUMBERS, PERFORM CROSS INTERRUPT TESTS
59              ;  AND WATCH FOR TIMEOUTS ON EACH DCU.
```

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10011 .MAIN
01
02              ;  THE MMPU1 TEST WILL RUN AUTOMATICALLY ONLY THE INITIAL PASS.
03              ;  IT DOES NOT RUN WITH THE DCU INTERRUPTS ON.
04
05              ;        MANUAL SEQUENCING
06              ;
07              ; ANY TESTS MAY BE SELECTED OR DELETED FROM A LIST OF TEST
08              ; USING A MANUAL SELECTION OPTION. THIS OPTION IS ELECTED
09              ; WHEN STARTING THE PROGRAM BY TYPING A 1 WHEN THE MANUAL
10              ; SELECTION QUESTION IS ASKED.
11              ; THIS FEATURE MAY BE USEFUL FOR REFINING THE NATURE OF A
12              ; FAILURE. IE AN INTERRUPT PROBLEM MAY BE DIAGNOSED BY
13              ; ATTEMPTING TO RUN WITH WITHOUT INTERRUPTS ENABLED.
14
15              ;9.3    TEST DESCRIPTIONS
16
17
18              ;ALL TESTS RUN UNDER CONTROL OF A TEST SEQUENCER AN A
19              ;BACKGROUND MONITOR. ONCE A TEST IS INITIATED IT WILL
20              ;  RUN TO COMPLETION OR UNTIL AN ERROR IS DETECTED.
21              ;
22              ;  THE HOST MONITORS PROGRESS BY AN INTERRUPT HANDLER FROM
23              ;  THE DCU'S. A DCU MAY INTERRUPT FOR ONE OF 5 REASONS
24              ;  0     TEST HAS COMPLETED
25              ;  1     TEST HAS DETECTED AN ERROR
26              ;  2     TEST HAS RECEIVED AND INTERRUPT
27              ;  3     DCU ODT WANTS SERVICE.
28              ;  4     INITIATE DCH MAP CHECK
29              ;
30              ;  WHEN THE DCU WISHES SERVICE IT REQUESTS AN INTERRUPT FROM
31              ;  THE HOST. AND HALTS WITH ONE OF THE NUMBERS 0-4 AS DESCRIBED
32              ;  ABOVE IN THE MEMORY LOCATION PRECEEDING THE HALT. (THIS
33              ;  ALLOWS THE HOST TO USE COMMON SERVICE CODE.)
34              ;
35              ;  THE HOST WHEN IT SEES THE INTERRUPT DETERMINES IF IT IS
36              ;  AN INTERRUPT FROM A LEGAL DCU AND DOES ALL ITS DCU SERVICE
37              ;  TO THAT DEVICE BEFORE REENABLING ITS INTERRUPTS.
38              ;
39              ;  AN ADDITIONAL FEATURE IS THAT PRIOR TO DISMISSAL OF
40              ;  EACH INTERRUPT THE HOST WILL STORE A JUMP TO A TRAP
41              ;  ADDRESS IN LOCATION ZERO. WHEN NOVAS LOOSE THEIR PC
42              ;  THEY SOMETIMES END UP IN LOCATION ZERO.
43              ;  THIS JMP 0 PROTECTION IS INSTALLED IN BOTH THE HOST AND
44              ;  THE DCU'S.
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10012 .MAIN
01              ;
02              ; 9.4   MMPU1 TEST
03              ;  THIS TEST ENABLES THE DATA CHANNEL MAP OF THE ECLIPSE.
04              ;  INITIALLY IT SETS UP THE 4 DATA CHANNEL MAPS MAPPING
05              ;  ALL LOGICAL PAGES TO PHYSICAL PAGE 20 (40,000). THEN
06              ;  IT WILL THEN ASSIGN THE DATA CHANNEL MAPS ACCORDING TO
07              ;  THE FOLLOWING TABLE:
08              ;
09              ;       MAP     LOGICAL         PHYSICAL
10              ;       A       40000           30000   (14)
11              ;       B       40000           32000   (15)
12              ;       C       40000           34000   (16)
13              ;       D       40000           36000   (17)
14              ;
15              ;  THE TEST IS RUN WITH ONLY ONE DCU AT A TIME. AFTER
16              ;  THE HOST COMPUTERS LOADS THE MMPU1 DATA CHANNEL MAPS
17              ;  THE TEST BEGINS WITH DCU STORING A PATTERN AT LOGICAL
18              ;  LOCATION 40000 TO 41777, USING MAP A.
19              ;
20              ;  FROM THERE ON THE TEST IS INTERACTIVE WITH THE DCU
21              ;  STORING DIFFERENT PATTERNS AT THE SAME LOGICAL ADDRESS
22              ;  USING DIFFERENT DCHH MAPS. THE DCU CODE IS RELOCATED
23              ;  INTO LOCAL MEMORY AT LOCATION 1000 TO AVOID DATA CHANNEL
24              ;  CONFLICTS WITH THE MAP ON. THE  MAP IS DISABLED FOR
25              ;  COMMUNICATIONS BETWEEN THE HOST AND THE DCU.
26
27              ;  INITIALLY A 063077 IS STORED IN MEMORY LOCATIONS
28              ;  30000 TO 41777.
29              ;
30              ;  THE PATTERNS USED ARE SHOWN BELOW:
31              ;
32              ;       MAP             PATTERN
33              ;       A               125252
34              ;       B               052525
35              ;       C               177777
36              ;       D               000000
37              ;
38              ;       PHY LOC         063077
39              ;       40000
```

```
!0013 .MAIN
01
02                ;
03                ;  10.  ERROR REPORTING
04                ;
05                ;  ANY ERROR, EXCEPT INPUT SYNTAX WILL RESULT IN STANDARD
06                ;  INFORMATION INDICATING DCU DEVICE CODE, WHICH TEST IS
07                ;  BEING RUN, AND WHAT IS TO FOLLOW SUCH AS CONTINUE EXECUTION,
08                ;  OR LOOPING THROUGH TEST.
09                ;
10                ;  ERRORS FALL INTO SEVERAL DIFFERENT CATEGORIES:
11                ;
12                ;10.1   INITIALIZATION ERRORS
13                ;  THESE OCCUR WHEN THE PROGRAM IS BEING STARTED AND
14                ;  THE DCU'S CANNOT CONTINUE UNTIL THE PROBLEM IS SOLVED.
15                ;  IN MOST INSTANCES THE HARDWARE IS SELECTED WRONG OR
16                ;  THERE IS SOME OTHER GROSS PROBLEM. THE USER SHOULD
17                ;  REPEAT THE DIAGNOSTIC TESTS (DCU DIAG) TO ISOLATE THE
18                ;  FAILURE.
19                ;
20                ;10.2   TEST DETECTED ERRORS
21                ;  THESE ARE FAILURES IN WHICH THE TEST HAS FOUND AN ERROR
22                ;  WHILE THE TEST IS RUNNING IN THE DCU. THE ERROR REPORT
23                ;  WILL IDENTIFY ALL OF THE AC'S,LOGICAL PC, LISTING PC AND
24                ;  READ SWITCH 1 TO DETERMINE WHETHER TO LOOP ON THE TEST OR
25                ;  TO CONTINUE ON. THE DEFALT CASE BEING TO CONTINUE ON.
26                ;
27                ;10.3   MISCELLANEOUS ERRORS
28                ;  THESE ARE MAINLY TIMEOUT ERRORS WHICH INDICATE THAT A
29                ;  DCU FUNTION HAS NOT OCCURED IN A SPECIFIC TIME. IE. DCU
30                ;  FAILED TO START. ALTHOUGH EACH ERROR IS DIFFERENT A MESSAGE
31                ;  WILL BE PRINTED INDICATING THE FAILING SYMPTOM.
32                ;
33                ;
34                ;10.4   ERROR PROCEDURE
35                ;  WHEN A TEST WITHIN A DCU DETECTS AN ERROR IT INITIATES
36                ;  A CROSS INTERRUPT TO THE HOST AND HALTS WITH THE LOCATION
37                ;  PRECEDING THE HALT =1. THIS INDICATES TO THE HOST THAT
38                ;  THE DCU HAS DETECTED AN ERROR. WHEN THE HOST BEGINS TO SERVICE
39                ;  THIS INTERRUPT IT WILL CONTINUE THE DCU, WHICH WILL STORE
40                ;  THE PC AND AC'S IN A COMMON SET OF LOCATIONS, AND HALT
41                ;  AGAIN. WHEN THE HOST SEES THIS SECOND HALT IT WILL PRINT
42                ;  OUT THE STATISTICS INDICATING THE FAILING TYPE OF TEST,
43                ;  AND THE PC ETC. AND THEN CONTINUE THE DCU. THIS TIME THE
44                ;  DCU WILL PRINT FURTHER INFORMATION PERTAINING TO THIS TEST
45                ;  AND HALT AGAIN. WHEN THE HOST SEES THIS FINAL HALT IT WILL
46                ;  CONTINUE THE DCU AND RENABLE INTERRUPTS TO SERVICE THE NEXT
47                ;  DCU REQUEST. THE FAILING DCU WILL READ THE SWITCH REGISTER
48                ;  AND LOOP OR RESTART ACCORDING TO SWITCH 1.
49                ;  ALL OF THIS IS NECESSARY TO KEEP THE DCU'S AND HOST FROM
50                ;  REENTERING NON REENTRANT CODE.
51                ;
52                ;10.5   ERROR REPORTING
53                ;  ANY ERROR, EXCEPT INPUT SYNTAX WILL RESULT IN STANDARD
54                ;  INFORMATION INDICATING DCU DEVICE CODE, WHICH TEST IS
55                ;  BEING RUN, AND WHAT IS TO FOLLOW SUCH AS CONTINUE EXECUTION,
56                ;  OR LOOPING THROUGH TEST.
```

```
!0014 .MAIN
01
02                ;10.6   ERROR PRINTOUTS DCU DETECTED ERRORS
03                ;  SAMPLE PRINTOUT:
04                ;
05                ; ** MMPU1 DCH TEST ERROR
06                ;GOOD   BAD     ADDR    MAP
07                ;XXXXX  YYYYY   ZZZZZ   B
08                ;XXXXX  YYYYY   ZZZZZ   B
09                ;
10                ;
11                ;THIS TEST PRINTS OUT THE FIRST FOUR MAP ERRORS
12                ;THEN JUST COUNTS THE REST AND PRINTS THE COUNT
13                ;THE TEST WILL PRODUCE ERRORS ON MAP B,C AND D
14                ;IF THE SPECIAL MAP CONNECTIONS ON THE BACKPANEL
15                ;FOR THE DCU ARE NOT INSTALLED.
16                ;
17                ;
18                ;
19                ;  *** ERROR IN
20                ;  LOCAL RUN CHECKERBOARD
21                ;  DCU AT DEVICE CODE = XX
22                ;  GOOD          BAD     ADDR    ERRLOC
23                ;  AAAAAA        BBBBBB  CCCCC   DDDDD
24                ;  CB TASK   4
25                ;  CURRENT PROG LOC  ZZZZZZ     LISTING LOC     QQQQQQ
26                ;
27                ;  THIS TEST HAS A SINGLE ERROR DETECTION LOCATION
28                ;  IF A DATA ERROR HAS BEEN DETECTED THE ERROR PRINTOUT
29                ;  WILL SHOW THE COMPARISON OF GOOD/BAD AND THE ADDRESS
30                ;  WHICH THE ERROR WAS DETECTED. SINCE THE TEST HAS A
31                ;  BIT SHUFFLE DISTURB SECTION THE ERROR ADDRESS MAY
32                ;  NOT BE EXACTLY THE ADDRESS AT WHICH THE ERROR OCCURED.
33                ;
34                ;  *** ERROR IN
35                ;  HOST RUN LOCIC TEST
36                ;  DCU AT DEVICE CODE = XX
37                ;  AC0     AC1     AC2     AC3     CRY
38                ;  AAAAA   BBBBB   CCCCC   DDDDD   00000
39                ;  TEST CATEGORY IS      NO LOAD
40                ;  CURRENT PROG LOC  ZZZZZZ     LISTING LOCATION QQQQQQ
41                ;
42                ;
43
```

```
10015 .MAIN
01
02              ;10.7 MISC ERRORS AND INTERPRETATIONS:
03              ;
04              ;** INTERRUPT FROM UNKNOWN DEVICE  22
05              ;
06              ; THE PROGRAM HAS MASKED OUT INTERRUPTS FROM ALL DEVICES
07              ; EXCEPT THE DCU SO THIS IS AN UNLIKELY MESSAGE. IT MEANS
08              ; THAT AN INTA FAILED TO RETURN THE CORRECT DEVICE CODE
09              ; OR A FORIEGN DEVICE INTERRUPTED AND REFUSED TO BEMAKSED
10              ; OUT.
11              ;
12              ;** DCU FAILED TO START
13              ;** DCU FAILED TO STOP
14              ;
15              ; A NUMBER OF TIMES THE PROGRAM WHEN RUNNING WILL START
16              ; A DCU AND STOP IT. AFTER EACH START THE PROGRAM CHECKS
17              ; TO SEE THAT THE DCU ACTUALLY STARTED. IF THIS MESSAGE
18              ; OCCURS AT THE BEGINING OF THE PROGRAM IT USUSALLY MEANS
19              ; THAT THE DEVICE CODE SELECTION WAS SPECIFIED WRONG.IN THIS
20              ; CASE THE PROGRAM WILL ASK TO BE REINITIALIZED.
21              ;
22              ; ** DCU IS HUNG UP.
23              ;
24              ; THE PROGRAM EXPECTS ON EACH DCU TEST TO HAVE THE DCU
25              ; EVENTUALLY HALT INDICATING A DCU DETECTED ERROR OR
26              ; COMPLETION OF A TEST.
27              ;
28              ;
29              ; ** ILLEGAL DCU ODT CALL
30              ;
31              ; THE DCU WHEN USING THE ODT PACKAGE IS REQUIRED TO MAKE
32              ; ODT CALLS BY DOING A JSR THROUGH LOCATION 5 (IOM?O) IN
33              ; LOCAL MEMORY. THE HOST CHECKS TO SEE THAT THIS CALL IS
34              ; MADE BY FETCHING AC3 AND LOOKING FOR A JSR@ IOM?O PRIOR
35              ; TO THE CALL.
36              ;
37              ;
38              ; ** UNEXPLAINED TEST HALT
39              ; ** DCU HALTED IN LOCAL MEMORY AFTER INTERRUPT
40              ;
41              ; THE PROGRAM GOES INTO A BACKGROUND ROUTINE WHILE
42              ; THE DCU(S) ARE RUNNING THEIR TESTS. IN THIS MODE IT
43              ; LOOKS TO SEE IF ANY DCU HAS HALTED. THE DCU(S) ARE
44              ; REQUIRED TO REQUEST A HOST INTERRUPT PRIOR TO HALTING.
45              ; THEY ARE ALSO FORBIDDEN TO HALT IN LOCAL MEMORY.
46              ;
47              ;
48              ; ** DCU INTERRUPTED BUT FAILED TO STOP
49              ;
50              ; IF THE DCU SHOULD ALWAYS HALT AFTER INITIATING A CROSS
51              ; INTERRUPT TO THE HOST. THE HOST CHECKS FOR THIS CONDITION
52              ; WHEN IT SEES THE INTERRUPT.
53
```

```
10016 .MAIN
01              ; **ILLEGAL DCU JUMP TO ZERO
02              ; **ILLEGAL HOST JUMP TO ZERO
03              ;
04              ; THE INTERRUPT LOCATION (LOC 0) IN EVERY PROCESSOR
05              ; BOTH HOST AND DCU IS RESTORED WITH A JMP TO A TRAP
06              ; LOCATION AFTER RESTORING AN INTERRUPT. THIS  TRAP
07              ; IS AN ATTEMPT TO WARN THE USER THAT THE PROCESSOR
08              ; HAS LOST ITS PC.
09              ;
10              ; ** TOO MANY MISC ERRORS
11              ;
12              ; IF THERE ARE TOO MANY MISC TYPE OF ERRORS THE
13              ; OPERATOR IS REQUIRED TO STRIKE A KEY TO CONTINUE.
14              ;
15              ; ** DCU FAILED TO INTERRUPT.
16              ;
17              ; PART OF THE CROSS INTERRUPT TEST REQUIRES THAT THE
18              ; DCU INTERRUPT THE HOST BACK AFTER RECEIVING A CROSS
19              ; INTERRUPT.
20              ;
21              ; ** DCU FAILED TO DISMISS HOST INTERRUPT
22              ;
23              ; IF THE DCU CANNOT DISMISS THE HOST INTERRUPT IT WILL
24              ; BE INTERRUPTED REPEATEDLY. THIS IS DETECTED BY REQUIREING
25              ; THE DCU TO INTERRUPT THE HOST AND HAVE TO HOST RESET
26              ; A BIT IN THE DEVICE TABLE. IF THE DCU CANNOT GET
27              ; FAR ENOUGH TO DO THIS THE PROGRAM ASSUMES IT CANNOT
28              ; DISMISS THE INTERRUPT.
29              ;
30              ;
31              ; **DCU HUNG IN RTC TEST
32              ;
33              ; **DCU TIMED OUT OF RTC TEST
34              ;
35              ; THE DCU RUNS ITS OWN RTC TEST AT THE COMPLETION OF
36              ; THE FIRST SEQUENCE OF TESTS (IF THE INTERRUPT TESTS
37              ; ARE SELECTED). BOTH THE DCU AND THE HOST TIME OUT
38              ; THIS EVENT. IF THE DCU SHOULD GET LOST THE HOST
39              ; TIME OUT WILL PREVAIL. IF THE DCU SHOULD TIME OUT
40              ; IT PROBABLY MEANS THAT THE RTC IS NOT CONNECTED.
41              ;
42              ; ** DCU INTERRUPTED BY DEVICE CODE IN AC0.
43              ;
44              ; A STRANGE DEVICE ON THE DCU I/O BUS WHOSE DEVICE
45              ; CODE IS IN AC0 HAS INTERRUPTED THE DCU.
46              ;
47              ;
```

```
!0017 .MAIN
01
02              ;11.    DEBUG HELP
03
04              ;       THE DATA CONTROL UNIT (DCU) IS A NOVA PROCESSOR WHICH
05              ;       EXECUTES ALL OF THE NOVA INSTRUCTION SET, WITH THE EX-
06              ;       CEPTIONS LISTED BELOW. THE DCU RESIDES ON A SINGLE PC
07              ;       BOARD INSIDE A NOVA OR ECLIPSE COMPUTER.
08              ;
09              ;       THE DCU DOES NOT SUPPORT THE FOLLOWING NOVA FEATURES:
10              ;        A.     IT HAS NO OPERATORS CONSOLE AND MUST RELY ON
11              ;               CONTROL FROM THE HOST COMPUTER (SEE HOST DOA
12              ;               SECTION.)
13              ;        B.     AUTO INDEXING USING THE AUTO INCREMENT AUTO
14              ;               DECREMENT LOCATIONS 20-37 IS NOT SUPPORTED.
15              ;               AN INDIRECT REFERENCE THROUGH THESE LOCATIONS
16              ;               DOES NOT MODIFY THE LOCATION.
17              ;
18              ;        C.     LOCAL DATA CHANNEL (DMA) ACTIVITY. ANY DEVICE
19              ;               ON THE DCU I/O BUS MUST COMMUNICATE USING ONLY
20              ;               THE PROGRAMMED I/O COMMANDS
21              ;
22              ;
23              ;       THE DCU HAS TWO FORMS OF  MEMORY,LOCAL AND HOST/SHARED.
24              ;
25              ;        LOCAL- DCU LOCAL  MEMORY IS MEMORY WHICH IS ONLY
26              ;        ACCESSIBLE TO THE DCU AND RESIDES IN THE LOWEST
27              ;        LOGICAL ADDRESS SPACE, EITHER 0-1777 OR 0-7777.
28              ;        WHEN THE DCU IS OPERATING IN THIS MEMORY THERE IS
29              ;        NO INTERACTION WITH THE HOST.
30              ;
31              ;        HOST/SHARED- THE REMAINING LOGICAL MEMORY, EITHER
32              ;       2000-77777 OR 10000-77777 IS SHARED WITH THE HOST
33              ;       COMPUTER. THE DCU MAY REFERENCE THIS MEMORY WITH THE
34              ;       HOST VIA ITS DATA CHANNEL INTERFACE. ANY MEMORY REFERENCE
35              ;       TO THIS SPACE (EITHER PROGRAM OR DATA) WILL RESULT
36              ;       IN AT LEAST ONE DATA CHANNEL TRANSFER.
37              ;
38              ;       THERE ARE TWO SETS OF I/O COMMANDS INVOLVING THE
39              ;       DCU. THEY ARE THE HOST COMMANDS TO THE DCU AND THE
40              ;       LOCAL COMMANDS ECECUTED BY THE DCU.
41              ;
42              ;11.1   HOST TO DCU COMMANDS:
43              ;
44              ;       DCU DEVICE CODE -       PRIMARY         34
45              ;                               SECONDARY       1-76 *
46              ;       DCU PRIORITY MASK BIT-  4
47              ;
48              ;
49              ;
50              ;*      MAY BE JUMPERED TO ANY DEVICE 1-76
```

```
!0018 .MAIN
01              ;11.1.1 DOA AC,DCU      BITS 0-3 AND 5-12 ARE IGNORED.
02              ;
03              ;                       BIT 4 SETS THE OPERATING MODE AS FOLLOWS:
04              ;                       0       NORMAL MODE
05              ;                       1       DIAGNOSTIC MODE
06              ;
07              ;                       BITS 13-15 ARE DEFINED AS FOLLOWS:
08              ;                       100             STOP
09              ;                       001             CONTINUE
10              ;                       010             START AT HTDCU REG.
11              ;
12              ;                       THE OTHER COMBINATIONS ARE RESERVED
13              ;                       AND SHOULD NOT BE USED.
14              ;
15              ;11.1.2 DIA AC,DCU      READ DIAGNOSTIC DATA, THE DATA IS
16              ;                       16 PROCESSOR STATES AS FOLLOWS WITH
17              ;                       0 INDIATING A LOW SIGNAL.
18              ;                 BIT   NAME
19              ;                 0     SET CARRY
20              ;                 1     .NOT.SET SKIP
21              ;                 2     PUSLE
22              ;                 3     .NOT.DEFER
23              ;                 4     CPUCLK
24              ;                 5     SCWRITE
25              ;                 6     DP2
26              ;                 7     DP1
27              ;                 8     1RADR0
28              ;                 9     1RADR1
29              ;                 10    1RADR2
30              ;                 11    2WRADR0
31              ;                 12    2WRADR1
32              ;                 13    1WADR0
33              ;                 14    1WADR1
34              ;                 15    COMADR2
35              ;
36              ;
37              ;11.1.3 DOB AC,DCU      LOAD THE HTDCU REGISTER, ALL 16
38              ;                       BITS ARE LOADED INTO THE HTDCU
39              ;                       REGISTER.
40              ;
41              ;
42              ;11.1.4 DIB AC,DCU      READ PROGRAM COUNTER, THE CONTENTS
43              ;                       OF THE DCU  PROGRAM COUNTER ARE READ
44              ;                       IF THE DCU IS STOPPED IN BITS 1-15
45              ;                       BIT 0 IN MEANINGLESS. IF THE DCU IS
46              ;                       RUNNING ALL THE BITS ARE UNDIFINED.
47              ;
48              ;
49              ;11.1.5 DIC AC,DCU      THIS WILL RESET THE DCU,AND FORCE
50              ;                       ALL I/O DEVICES TO RESET.
51              ;
```

```
10019 .MAIN
01              ;11.1.6         START PULSE
02              ;
03              ;               AN I/O START TO THE DCU WILL SET THE
04              ;               DCU FLAG TO A 1. THIS FLAG WILL PRO-
05              ;               DUCE A DCU INTERRUPT REQUEST,FROM  THE
06              ;               CROSS INTERRUPT FEATURE.
07              ;
08              ;               CLEAR PULSE
09              ;               AN I/O CLEAR TO THE DCU WILL CLEAR THE
10              ;               INTERRUPT REQUEST FROM THE HOST, WHICH IS
11              ;               INITIATED BY THE HOST CROSS INTERRUPT.
12              ;
13              ;               IO PULSE "P"
14              ;               AN I/O PULSE TO THE DCU WILL STEP THE
15              ;               INTERNAL DCU CLOCK WHEN THE DCU IS IN THE
16              ;               DIAGNOSTIC MODE.
17              ;
18              ;
19              ;11.1.7         EFFECT OF BUSY AND DONE.
20              ;               THE HOST CAN TEST THE DCU STATE TO SEE IF
21              ;               IT IS RUNNING BY TESTING THE I/O BUSY
22              ;               FLAG.IF THE BUSY FLAG IS SET THE DCU IS
23              ;               RUNNING, IF THE BUSY FLAG IS CLEARED THE
24              ;               DCU IS HALTED
25
26              ;               THE DCU DONE FLAG IS SET WHEN THE DCU
27              ;               REQUESTS AN INTERRUPT VIA THE CROSS IN-
28              ;               TERRUPT REQUEST. THIS FLAG IS CLEARED
29              ;               WITH AN IORESET OR CLEAR PULSE TO THE
30              ;               THE DCU.
31
32              ;
```

```
10020 .MAIN
01              ;11.2.  LOCAL INSTRUCTIONS
02              ;       THESE INSTRUCTIONS ARE ONES WHICH ARE EXECUTED
03              ;       WITHIN THE DCU.
04              ;
05              ;       THE DCU CONTAINS A CROSS INTERRUPT FACILITY AND
06              ;       A REAL TIME CLOCK.
07              ;       THE CROSS INTERRUPT FACILITY ALLOWS THE DCU TO
08              ;       PRODUCE AN INTERRUPT REQUEST IN THE HOST VIA
09              ;       A "START" PULSE FROM THE DCU TO DEVICE 76 (DPU)
10              ;       THIS REQUEST CAN ONLY BE CLEARED BY THE HOST.
11
12              ;       THE DCU REAL TIME CLOCK IS ENABLED BY THE DCU
13              ;       WITH A DOA INSTRUCTION. ONCE ENABLED IT WILL
14              ;       PRODUCE INTERRUPTS AT A RATE DETERMINED BY THE
15              ;       JUMPERS ON THE DCU BOARD. WHEN ENABLED THE FIRST
16              ;       INTERRUPT MAY OCCUR ANY TIME, FOLLOWED BY INTER-
17              ;       RUPTS AT THE REGULAR RATE.
18              ;       THE STATUS OF THE CLOCK MAY BE TESTED BY THE DCU
19              ;       BY LOOKING AT THE BUSY FLAG FOR DPU. WHEN THE BUSY
20              ;       FLAG IS ZERO THE RTC IS REQUESTING AN INTERRUPT.
21              ;       THE INTERRUPT REQUEST MAY BE RESET BY ISSUING AN
22              ;       I/O PULSE.
23              ;       THE DEVICE CODE OF THE HOST  IS         76
24              ;               PRIORITY MASK BIT IS            4
25              ;
26              ;       DOA AC,DPU      REAL TIME CLOCK CONTROL
27              ;                       BITS 0-14 ARE UNDEFINED,
28              ;                       BIT 15 WILL TURN ON OR OFF AN IN-
29              ;                       TERNAL REAL TIME CLOCK IN THE DCU
30              ;
31              ;
32              ;       DIA AC,DPU      READ HTDCU REGISTER, ALL 16
33              ;                       BITS OF THE HTDCU REGISTER ARE READ.
34              ;
35              ;       DOC AC,DPU      SELECT DATA CHANNEL MAP.
36              ;                       BITS 12-15 SELECT THE DATA CHANNEL
37              ;                       MAP ACCORDING TO THE FOLLOWING TABLE
38              ;                       0000    MAP A
39              ;                       0001    MAP B
40              ;                       0010    MAP C
41              ;                       0011    MAP D
42              ;
43              ;                       ALL OTHERS UNDEFINED
44              ;
45              ;
```

!0021 .MAIN
01