

TEXT LISTING

068-000515-01

PROGRAM

S-130 WRITABLE CONTROL  
STORE DIAGNOSTIC; PART 3

TEXT TAPE

097-000515-01

ABSTRACT

THIS PROGRAM IS 1 OF 5 DESIGNED TO TEST THE FUNCTIONAL OPERATION OF THE WRITABLE CONTROL STORE OPTION (WCS). THIS PROGRAM SHOULD NOT BE RUN UNTIL ALL THE C.P. AND I/O TEST PROGRAMS HAVE BEEN SUCCESSFULLY EXECUTED. THE LAST STEP IN THE TEST PROCEDURE SHOULD BE THE EXECUTION OF ALL THE WCS TEST PROGRAMS WITH THE CAT/KITTEN RUNNING IN THE BACKGROUND.

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0001 WCS          MACRO REV 06.30      08:45:44 02/22/79      10002 WCS
01                                     01
02                                     .TITLE WCS
03                                     :
04                                     : ECLIPSE WRITABLE CONTROL STORE TEST
05                                     : PART 3
06                                     :
07 *****
08 : NAME: EMLWCS.TX          PART NUMBER: 097-000515
09 :
10 :
11 : DESCRIPTION: S=130 WRITABLE CONTROL STORE DIAGNOSTIC; PART 3
12 : TEXT FILE
13 :
14 :
15 : REVISION HISTORY:
16 :
17 : REV.      DATE
18 :
19 : 00      05/20/77
20 : 01      11/11/77
21 :
22 : COPYRIGHT © DATA GENERAL CORPORATION. 1977
23 : ALL RIGHTS RESERVED.
24 : *****
25 : *****

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4.0	ERROR DESCRIPTION
4.1	NORMAL
	UPON THE DETECTION OF AN ERROR, THE CARRY, PC AND THE AC'S WILL BE PRINTED AND THEN THE PROGRAM WILL LOOP ON THE FAILING TEST. THE ADDRESS OF THE TEST FAILING IS CONTAINED IN LOCATION 201. CONSULT THE LISTING FOR A DETAILED TEST DESCRIPTION.
4.2	ABNORMAL
	THERE ARE SEVERAL TYPES OF UNEXPECTED FAILURES WHICH WILL CAUSE A PROGRAM HALT. THEY ARE AS FOLLOWS:
	UNEXPECTED INTERRUPT
	STACK OVERFLOW OR UNDERFLOW
	THE CAUSE OF ANY OF THESE FAILURES SHOULD BE CORRECTED BEFORE RESUMING TESTING.
5.0	PROGRAM DESCRIPTION
5.1	COMMON SUBROUTINE CALLS
	THE DIAGNOSTIC IS COMPRISED OF A SERIES OF SHORT TESTS. BASICALLY, EACH TEST CONSISTS OF A SETUP PROCEDURE, ONE OR MORE EVALUATING CASES WITH ERROR CALLS, AND A LOOP CAPABILITY. EACH PARTICULAR TEST CASE IS DESCRIBED IN THE LISTING. THE COMMON ROUTINES FOR SETUP (SETUP), ERROR CALLS (EHALT), AND LOOP (LOOP) ARE DESCRIBED HERE ALONG WITH OTHER COMMONLY USED ROUTINES.
	SETUP
	EACH TEST BEGINS WITH A CALL TO SETUP. THIS ROUTINE SETS THE LOOP ADDRESS.
	RESETS CERTAIN ERROR SWITCHES AND ITERATION COUNTS, AND INITIALIZES THE USER STACK.
	EHALT
	THIS ROUTINE IS CALLED WHEN AN ERROR IS DETECTED. INITIALLY IT WILL CAUSE A PROGRAM HALT. IT WILL THEN PERFORM SPECIFIC FUNCTIONS AS SELECTED VIA THE SWITCH REGISTER.
	LOOP
	THIS ROUTINE IS CALLED AT THE END OF EACH TEST SEQUENCE. IT IS USED TO ITERATE THE SEQUENCE 3 TIMES IF NO ERROR HAS BEEN DETECTED. IF AN ERROR HAS BEEN DETECTED, IT IS USED TO MAINTAIN THE SCOPE LOOP AND INTERROGATE THE SWITCHES, ETC. THE USER STACK IS ALSO INITIALIZED.
	ARL
	LOAD EVERY LOCATION IN THE WCS RAM WITH THE MICRO-WORD THAT FOLLOWS THE CALL.
	SRL
	LOAD ONE LOCATION IN THE WCS RAM WITH THE MICRO-WORD WHICH FOLLOWS THE CALL. THE LAST ENTRY IN THE MICRO-ORDER STRING DENOTES THE ADDRESS INTO WHICH THE MICRO-WORD WILL BE LOADED.
	FE-G.
	SRL AR PC ACS A1 F0 L N S N N W JUMP 0 10 0 4377
	THE SPECIFIED MICRO-WORD FOLLOWING THE SRL CALL WOULD BE LOADED INTO LOCATION #377 OCTAL IN THE WCS RAM.
	5.2 TEST DESCRIPTION
	EACH TEST STARTS VIA A CALL SETUP TO INITIALIZ
	THE STATE OF THE C.P.
	THE AC'S ARE SET UP TO THEIR TEST VALUES. THE DEC1 AND DEC2 ROMS ARE PRE-LOADED AS REQUIRED, AND A "TEST" MICRO-ROUTINE IS LOADED INTO THE WCS RAM. IN MOST CASES THIS "TEST" MICRO-ROUTINE STARTS AT LOCATION 0-AN XOP1 IS THEN EXECUTED TO ENTER WCS. THE "TEST" MICRO-ROUTINE IS EXECUTED AND WCS IS EXITED. THE PROGRAM THEN CHECKS FOR EXPECTED RESULTS.
	5.3 ERROR ANALYSIS
	WCS ENTRY ERROR
	IF A DEC1 ADDRESSING ERROR OCCURS WHILE ATTEMPTING TO ENTER WCS VIA AN XOP1 INSTRUCTION, THE PROGRAM WILL PROBABLY EXECUTE ONE MICRO-INSTRUCTION IN WCS RAM AND RETURN TO THE LOCATION OF THE XOP1+1. THE PROGRAM MUST BE MICRO-INSTRUCTED STARTING AT THE XOP1 INSTRUCTION TO TRACE THE FAILING FLOW.
	WCS EXIT ERROR
	IF AN ERROR OCCURS IN AN ATTEMPT TO EXIT WCS, THE TEST WOULD RETURN TO THE LOCATION SPECIFIED BY THE PC.
	EXPECTED RESULTS INCORRECT
	IF THE "TEST" MICRO-ROUTINE CAN BE EXECUTED IN WCS AND A SUCCESSFUL EXIT IS MADE BACK TO THE TEST PROGRAM, BUT THE RESULTS ARE INCORRECT, THE "TEST" MICRO-ROUTINE MUST BE CAREFULLY EXAMINED TO DETERMINE ITS PROPER EXECUTION.





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0011 MCS
01 000013 .DUSR RC=13 :RIGHT,CRY ENAB-SHIFT0
02 000014 .DUSR SW=14 :SWAP BYTES
03
04
05 :
06 : LOAD FIELD OF ROM WORD
07 L=1 :SHIFT<0-15> - AREG<0-15> (4)
08
09 :
10 : CARRY FIELD OF ROM WORD
11 N=0 :NO EFFECT
12 SET=1 :1 - CARRY
13 CLR=2 :0 - CARRY
14 ALC=3 :ENABLE ALC LOGIC
15
16 :
17 : MA FIELD OF ROM WORD
18
19 :
20 000001 .DUSR S=1 :ALU<1-15> - LA<1-15>,START MEMORY (5)
21
22 :
23 : MBUS FIELD OF ROM WORD
24
25 :
26 : RMODE=1 :READ,NO RELEASE (6)
27 WRITE=2 :WRITE AND RELEASE
28 READ=3 :READ AND RELEASE
29
30 :
31 : RAND1 FIELD OF ROM WORD
32
33 :
34 : DCH=1 :ALLOW DATA CHANNEL BREAK
35 SCND=2 :CARRY XOR ALU0 SAVE XOR CRYOIC - QBIT,
36 :ALU0 - ALU0 SAVE (7)
37
38 :
39 : IOTR=3 :I/O TRANSFER (6)
40 IOPS=4 :I/O PULSE (6)
41 CND=6 :CONSOLE DATA SWITCHES - MEM<0-15>
42 STIR=7 :MEM<0-15> - IR<0-15> (7)(8)
43
44 :
45 : RAND2 FIELD OF ROM WORD
46
47 :
48 : BMEM=1 :BREG<0-15> - MEM<0-15>
49 DECL=2 :CARRY - CIN:SHIFT<12-15> - AREG<12-15>
50 LCNT=3 :ALU<12-15> - COUNT<12-15>
51 PFL=4 :SYSRST IF PMR FF=1
52 IOFF=5 :0 - ION
53 CNIN=6 :CONSOLE FUNCTION CODE - MEM<1-4> (6)
54 LPST=7 :LOAD PROCESSOR STATE
55
56 :
57 : STATE CHANGE FIELD OF ROM WORD (9)
58
59 :
60 : LOIR=0 :PHANTOM;MEM-IR,17-COUNT,1-QBIT,
:0-ALU0 SAVE,0 - ION PEND (6)(10)
:DECODE 1
:DEC1=1

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0012 MCS
01 000002 .DUSR DEC2=2
02 000005 .DUSR JUMPS
03 000007 .DUSR NILDIR=7
04
05 000010 .DUSR ALU1=10
06 000011 .DUSR ALU1=11
07 000012 .DUSR ALU1=12
08 000013 .DUSR ALU0=13
09 000014 .DUSR CRY1=14
10 000015 .DUSR CRY1=15
11 000016 .DUSR DCRY=16
12 000017 .DUSR CRYO=17
13 000020 .DUSR AUTIX=20
14
15 000021 .DUSR IRSB01=21
16 000022 .DUSR A0B01=22
17 000023 .DUSR ACEG1=23
18
19 000024 .DUSR ACEG0=24
20
21 000025 .DUSR CNTN0=25
22 000026 .DUSR LINK=26
23 000027 .DUSR NC=27
24 000030 .DUSR INTR=30
25 000031 .DUSR IOSKPB=31
26 000032 .DUSR CONRG=32
27 000033 .DUSR LOCKB=33
28 000034 .DUSR QBIT=34
29 000035 .DUSR CARRY=35
30 000036 .DUSR A0=36
31 000037 .DUSR ALU=37
32 000050 .DUSR LEAP0=50
33 000051 .DUSR LEAP1=51
34 000052 .DUSR LEAP2=52
35 000053 .DUSR LEAP3=53
36 000054 .DUSR WCA0=54
37 000055 .DUSR WCA0=55
38 000056 .DUSR BUSMD=56
39 000057 .DUSR BUSMD=57
40 000060 .DUSR M0PAD=60
41 000061 .DUSR M0BUS=61
42 000062 .DUSR M0PAD=62
43 000063 .DUSR M0BUS=63
44 000064 .DUSR M0PAD=64
45 000065 .DUSR M0BUS=65
46 000066 .DUSR M0PAD=66
47 000067 .DUSR M0BUS=67
48 000070 .DUSR JUMPER1=70
49 000071 .DUSR JUMPER2=71
50 000072 .DUSR BUSMD=72
51 000073 .DUSR SLEAP=73
52 000074 .DUSR HOP=74
53 000075 .DUSR M0BUS=75
54 000076 .DUSR M0PAD=76
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NOTES PERTAINING TO MICRO-ORDERS ABOVE.  
1-COUNT MUST BE > 7

0013 WCS

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2.CIN=(DECL AND CARRY)OR(ALC AND IRT)  
3.LINK MODIFIED BY LEFT AND RIGHT SHIFTS  
4.UNLESS ALC WITH IRI2=1  
5.ALLOWS DCH BREAK UNLESS STIR OR SCND  
6.DO NOT ALLOW DCH BREAK  
7.DISABLE DCH BREAK  
8.DO NOT CODE WITH ACEQI OR ACEQD  
9.FALSE ADDRESS IS IN CURRENT PAGE, TRUE ADDRESS  
MAY CHANGE CURRENT PAGE  
10-INHIBITED BY HALT/STOP (IF RBUFS5=0), INTERRUPT WAITING,  
OR REXAM  
OR REXAM  
14.DO NOT CODE WITH STIR  
FOR A COMPLETE DESCRIPTION OF THE MICRO-ORDERS,  
PLEASE CONSULT THE DATA GENERAL  
USERS MANUAL "S-130 MICROPROGRAMMING WCS FEATURE"  
015-69-00

10014 WCS

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I=0 TESTER DESCRIPTION

9.1 TEST BOARD COMMANDS

IORST - CLEAR THE TESTER  
NIOC 0 - CLEAR THE TESTER(NEW MODE)  
INTA - READ THE DATA BUFFER (NOT NEW MODE)  
DIC - READ THE PULSE DETECTORS  
DIB - READ THE DATA BUFFER  
DOA - READ THE DCH ADDRESS BUFFER (NEW MODE)  
DOM - LOAD THE DATA BUFFER  
OUC - LOAD THE DATA AND DCH ADDRESS BUFFERS

9.2 FUNCTION REGISTER BIT ASSIGNMENTS

BIT 0 SET DCH SYNC  
BIT 1 SET DCH MODE 0  
BIT 2 SET DCH MODE 1  
BIT 3 SET PI SYNC  
BIT 4 BUSY (IF NOT NEW MODE)  
BIT 5 DONE (IF NOT NEW MODE)  
BIT 6 NEW MODE  
BITS 7-9 THE # OF RGENB PULSES BETWEEN  
SUCCESSIVE DCH CYCLES.  
BITS 10-15 # OF DCH CYCLES

9.3 PULSE DETECTOR BIT ASSIGNMENTS

BIT 0 IOPLS  
BIT 1 INTA (INTA + DCHP)  
BIT 2 MSKO  
BIT 3 DCHI  
BIT 4 OVFL0-NOT USED ON ECLIPSE  
BIT 5 OCHO  
BIT 6 DCHA  
BIT 7 RGENB  
BIT 8 DOA  
BIT 9 DOB  
BIT 10 DDC  
BIT 11 DIA  
BIT 12 DIB  
BIT 13 DIC (NOT SET IF DEV. CODE=0)  
BIT 14 STRT  
BIT 15 CLR

PLEASE NOTE THAT DCH PRIORITY MUST BE WIRED  
TO THE SLOT IN WHICH THE I=0 TESTER IS RESIDENT.  
FAILURE TO DO THIS WILL CAUSE ERRORS WITH ANY  
TESTS WHICH ARE TESTING THE INTA PULSE DETECTOR  
AND/OR DATA CHANNEL.



0015 WCS

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110.0 SOFTWARE DEBUGGING AIDS

01 : DUE TO THE DIFFICULTY IN DYNAMICALLY CHECKING  
02 : THE OUTPUTS OF THE RAMS, A SERIES OF SHORT  
03 : DEBUGGING ROUTINES HAVE BEEN INCLUDED AT THE  
04 : END OF THE TEST PROGRAM STARTING AT THE  
05 : LOCATION TAGGED "AIDS". THESE ROUTINES MAY BE  
06 : USED ALONG WITH THE MICRO-INSTRUCT  
07 : CAPABILITY TO STATICALLY CHECK THE OUTPUT  
08 : OF ANY RAM.

111.0 RUNNING WITH CAT/KITTEN

01 : THE PROGRAM MAY BE EXECUTED WITH THE CAT/KITTEN IN THE  
02 : BACKGROUND VIA PRECEDING THE EDTOS COMMAND WITH THE  
03 : LETTER "C", SUCH AS "CLOAD".  
04 :  
05 : THE DEVICE CODE FOR WCS MAY BE ADDED TO THE EDTOS  
06 : EQUIPMENT TABLE VIA AN "ADD -," COMMAND.

01 : IF THE CAT/KITTEN IS SELECTED, THE FIRST PASS WILL BE A  
02 : NORMAL RUN, AND SUBSEQUENT PASSES WILL BE WITH THE  
03 : CAT/KITTEN IN THE BACKGROUND.

01 : IF AN ERROR OCCURS AFTER THE FIRST PASS, THE NORMAL  
02 : ERROR INFORMATION WILL BE PRINTED, BUT NO HALT WILL  
03 : OCCUR. THE PROGRAM WILL CONTINUE TESTING AS DIRECTED  
04 : BY THE SETTING OF THE SWITCHES.

01 : IF RESTART IS REQUIRED USE THE FOLLOWING  
02 : SPECIAL RESTART LOCATIONS:

170 START WITHOUT CAT/KITTEN  
171 START WITH CAT/KITTEN

01 : IN ALL CASES, A CAT/KITTEN RUN SHOULD NOT BE ATTEMPTED  
02 : UNTIL THE PROGRAM EXECUTES SUCCESSFULLY IN  
03 : NORMAL MODE.

01 : WHEN RUNNING WITH THE CAT/KITTEN, THE PROGRAM WILL  
02 : PRINT IT'S NORMAL PASS MESSAGE AND THE  
03 : CAT/KITTEN WILL PRINT THE LETTER "P" AS IT'S  
04 : PASS MESSAGE.

01 : PLEASE NOTE THAT CERTAIN TESTS CANNOT BE EXECUTED WITH  
02 : THE CAT/KITTEN SO THAT THESE TESTS WOULD BE EXECUTED  
03 : DURING THE FIRST PASS AND BYPASSED DURING THE SECOND  
04 : AND SUBSEQUENT PASSES.

10016 WCS

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12.0 PROGRAM TEST SEQUENCE

01 : THE PROGRAM TEST SEQUENCE IS AS FOLLOWS.

01 : SHIFT FIELD  
02 : STATE CHANGE FIELD  
03 : RAND2 FIELD  
04 : RAND1 FIELD  
05 : RAND2 FIELD

10017 MCS

\*\*00000 TOTAL ERRORS, 00000 PASS 1 ERRORS