

.REM 1

IDENTIFICATION

PRODUCT CODE: AC-E845I-MC
PRODUCT NAME: CXDMBIO DM11-BB 16-LNE MO
PRODUCT DATE: SEPTEMBER 1978
MAINTAINER: DEC/X11 SUPPORT GROUP

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1. ABSTRACT

DMB IS AN I/O MODULE THAT EXERCISES UP TO 4 DM11-BB'S.
IT UTILIZES MAINTENANCE MODE AND SCAN ENABLE TO FULLY TEST THE SCAN LOGIC.

2. REQUIREMENTS

HARDWARE: ONE TO FOUR DM11-BB'S

STORAGE:: DMB REQUIRES:

- 1: DECIMAL WORDS: 324
- 2: OCTAL WORDS: 0504
- 3: OCTAL BYTES: 1211

NOTE : ALL NECESSARY CABLES AND TURN-AROUND
CONNECTORS MUST BE INSTALLED.

3. PASS DEFINITION

ONE PASS IS COMPLETED WHEN THE TEST SEQUENCE HAS BEEN RUN ON
16 LINES IN EACH OF THE DM11-BB'S 1000(10) TIMES.

4. EXECUTION TIME

RUNNING ALONE WITH ONLY ONE DM11-BB ON A PDP 11/05 TAKES APPROXIMATELY
ONE-HALF MINUTE PER PASS.

5. CONFIGURATION REQUIREMENTS

A. DEFAULT PARAMETERS:

DEVADR: 1, VCT: 1, BR1: 4, DVID1: 1

B. REQUIRED PARAMETERS:

DEVADR: ADDRESS OF THE FIRST DM11-BB FOR THIS MODULE

VECTOR: THE VECTOR ADDRESS OF THE FIRST DM11-BB IN THIS MODULE.

(NOTE: A MAX. OF 4 DM11-BB CAN BE FITTED INTO ONE
MODULE. IF YOU HAVE FOR EXAMPLE 8 DM11-BB'S,
YOU HAVE TO RUN 2 MODULES. THE VECTOR FOR
THE SECOND MODULE IS THE VECTOR ADDRESS OF THE
5TH DM11-BB.)

DVID1: IF MORE THAN 1 DM11-BB IS TO BE RUN, DVID1 MUST BE
SET UP ACCORDINGLY.

DWBI DEC/X11 SYSTEM EXERCISER MODULE
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SR1:

= 0
= 1
= 2

DISPLACEMENT BETWEEN ADJACENT VECTORS IS TWO WORDS.
DISPLACEMENT BETWEEN ADJACENT VECTORS IS EIGHT WORDS. (2040 FRONT END)
DISPLACEMENT BETWEEN ADJACENT DEVICE ADDRESSES IS 16 WORDS. (DV11 SYSTEM)

6. DEVICE/OPTION SETUP

MAKE SURE ALL CABLES AND TURN-AROUND CONNECTORS ARE INSTALLED.

7. MODULE OPERATION

- A. TEST FOR THE NUMBER OF DM11-BB'S REQUIRED TO BE TESTED.
- B. SET UP INTERRUPT SERVICE VECTORS.
- C. ENABLE ALL LINES ON ONE DM11-BB.
- D. SET INTERRUPT ENABLE AND MAINTENANCE MODE.
- E. ENABLE SCANNER TO SCAN ALL 16 LINES.
- F. AN INTERRUPT WILL OCCUR FOR THE FIRST LINE. CHECK THE CONTENTS OF THE CSR. IF OK ENABLE SCANNER TO CAUSE THE NEXT LINE TO INTERRUPT. REPEAT FOR ALL 16 LINES.
- G. REPEAT STEPS C THRU F FOR THE OTHER DM11-BB'S.
- H. REPEAT THE SEQUENCE C THRU G 1000(10) TIMES, THEN DO AN ENDPAS CALL.

8. OPERATOR OPTIONS

NONE

9. NON-STANDARD PRINTOUTS

NONE

```
000000' IOMOD <DMBI > 1,1,4,2000,27
000000' MODULE 140000,DMB1,1,4,2000,27
; TITLE DMBI DEC/X11 SYSTEM EXERCISER MODULE
DOXCOM VERSION 6 23-MAY-78
;*****LIST BIN*****
000000' BEGIN:
000000' 046504 044502 040 MODNAM: .ASCII /DMBI / ;MODULE NAME.
000005' 000 XFLAG: .BYTE OPEN ;USED TO KEEP TRACK OF WBUFF USAGE
000006' 000001 ADDR: 1+0 ;1ST DEVICE ADDR.
000010' 000001 VFCR: 1+0 ;1ST DEVICE VFCR.
000012' 000 BR1: .BYTE PRTY4+0 ;1ST BR LEVEL.
000013' 000 BR2: .BYTE PRTY+0 ;2ND BR LEVEL.
000014' 000001 DVID1: +1 ;DEVICE INDICATOR 1.
000016' 000000 SR1: OPEN ;SWITCH REGISTER 1
000020' 000000 SR2: OPEN ;SWITCH REGISTER 2
000022' 000000 SR3: OPEN ;SWITCH REGISTER 3
000024' 000000 SR4: OPEN ;SWITCH REGISTER 4
;*****
000026' 140000 STAT: 140000 ;STATUS WORD.
000030' 000224 INIT: START ;MODULE START ADDR.
000032' 000224 SPOINT: MODSP ;MODULE STACK POINTER.
000034' 000000 PASCNT: 0 ;PASS COUNTER.
000036' 002000 ICOUNT: 2000 ;# OF ITERATIONS PER PASS=2000
000040' 000000 SPCNT: 0 ;LCC TO COUNT ITERATIONS
000042' 000000 HRDCNT: 0 ;LCC TO SAVE TOTAL SOFT ERRORS
000044' 000000 SPPAS: 0 ;LCC TO SAVE TOTAL HARD ERRORS
000046' 000000 HRDPAS: 0 ;LCC TO SAVE SOFT ERRORS PER PASS
000050' 000000 SPSCHT: 0 ;LCC TO SAVE HARD ERRORS PER PASS
000052' 000000 RANNUM: 0 ;# OF SYS ERRORS ACCUMULATED
000054' 000000 CONFIG: 0 ;HOLDS RANDOM # WHEN RAND MACRO IS CALLED
000056' 000000 RES1: 0 ;RESERVED FOR MONITOR USE
000060' 000000 RES2: 0 ;RESERVED FOR MONITOR USE
000062' 000000 SVR0: OPEN ;LCC TO SAVE R0.
000064' 000000 SVR1: OPEN ;LCC TO SAVE R1.
000066' 000000 SVR2: OPEN ;LCC TO SAVE R2.
000070' 000000 SVR3: OPEN ;LCC TO SAVE R3.
000072' 000000 SVR4: OPEN ;LCC TO SAVE R4.
000074' 000000 SVR5: OPEN ;LCC TO SAVE R5.
000076' 000000 SVR6: OPEN ;LCC TO SAVE R6.
000100' 000000 CSRA: OPEN ;ADDR OF CURRENT CSR.
000102' 000000 SBADR: OPEN ;ADDR OF GOOD DATA, OR
000104' 000000 ACSR: OPEN ;CONTENTS OF CSR.
000106' 000000 MABADR: OPEN ;ADDR OF BAD DATA, CR
000108' 000000 ASTAT: OPEN ;STATUS REG CONTENTS.
000110' 000000 ERRTP: OPEN ;TYPE OF FRCP.
000112' 000000 ASB: OPEN ;EXPECTED DATA.
000114' 000000 AWAS: OPEN ;ACTUAL DATA.
000116' 000266 RSTRT: OPEN ;RESTART ADDRESS AFTER END OF PASS
000118' 000000 WDT0: OPEN ;WORDS TO MEMORY PER ITERATION
000120' 000000 WDFR: OPEN ;WORDS FROM MEMORY PER ITERATION
000122' 000027 INTR: OPEN ;# OF INTERRUPTS PER ITERATION
IDNUM: 27 ;MODULE IDENTIFICATION NUMBER=27
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000040 .REPT SPSIZ ;MODULE STACK STARTS HERE.
;*****
000224' MODSP:
;*****
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205 ;DEFINITIONS
206 CLRMUX=002000 ;CLEAR MULTIPLEXER
207 CLRSCN=004000 ;CLEAR SCAN CIRCUIT
208 STEP=000400 ;STEP COMMAND FOR SCANNER
209 BUSY=20 ;BUSY FLAG FOR DM11-BB
210 INTENA=001000 ;INTERRUPT ENABLE
211 INTENA=000100 ;INTERRUPT ENABLE
212 SCNENA=40 ;ENABLE SCANNER
213 DONE=200 ;DONE FLAG
214
215 000224 012767 000020 177666 START: MOV #16,,INTR ;16 INTERRUPTS PER ITERATION
216 000233 016700 177556 MOV DVID1,R0 ;SAVE DVC
217 000236 001002 BNF 15 ;BR IF ANY DEVS SELECTED
218 000244 104400 000000 ENDS,BEGIN
219 000244 104400 15: ;GET RID OF FIRST DEV
220 000246 103376 BSC 15 ;LOOP TILL DONE
221 000250 006200 2S: ASR R0 ;START SEARCH FOR NEXT DEV
222 000253 103003 BCC 3S ;NCT HERE- CHECK FOR MORE
223 000254 005700 000020 177636 ADD #16,,INTR ;DOUBLE INTR
224 000254 005700 TST R0 ;ANY MORE DEVS
225 000264 001371 BNE 2S ;BR IF YES
226 000266 016767 177522 RESTRT: MOV DVID1,SW.DMBR ;SAVE DVID1
227 000274 016700 177514 MOV DVID1,#0 ;SEE HOW MANY UNITS NEEDED TO RE TESTED
228 000300 012701 177774 1S: MOV #4,R1 ;SET UP MAX COUNT FOR DM11BB
229 000304 012702 001056 MOV #SCRAB,#2 ;R2 HAS THE LINK TABLE ADDRESS
230 000310 032767 000002 177500 BIT #BIT1,SRI ;R2 NODD DEV ADP DISPLACEMENT?
231 000316 001402 2S: REQ 2S ;BR IF NCT
232 000320 012702 001106 MOV #SRTRA,R2 ;R2 GETS NEW LINK TABLE ADDR
233 000320 012702 177460 MOV VECTOR,#3 ;R3 HAS THE 1ST VECTOR
234 000330 012702 3S: MOV #2,(R3)+ ;SET UP VECTOR LINKAGE
235 000333 062702 000006 ADD #2 ;UPDATE LINK TABLE ADDRESS
236 000336 116723 177450 MOVVB BR1,(R3)+ ;SET UP BR LEVEL
237 000344 105723 TSTB (R3) ;UPDATE THE POINTER
238 000348 005700 000001 177444 BIT #BIT0,SP1 ;EIGHT WORDS BETWEEN VECTORS?
239 000352 001402 BNE 4S ;BR IF NCT
240 000354 062703 000014 ADD #14,R3 ;UPDATE VECTOR POINTER
241 000360 006000 ROR #0 ;SELECTING NEXT DEVICE?
242 000362 002404 BEQ LOOP ;NO- GO TO TEST SEQUENCE
243 000364 002404 INC #2 ;HAVE WE SET UP MORE THAN 4?
244 000366 100760 BMT 3S ;BR IF NCT
245 000370 104410 000000 ENDS,REGIN ;DVID1 INCORRECT
246
247 000374 016702 177406 LOOP: MOV ADDR,#2 ;R2 HAS THE ADDRESS OF THE 1ST CSR
248 000400 012767 000001 000530 MOV #1,MARK ;MARK INDICATES UNIT UNDER TEST
249 000406 036767 000524 000526 DMBTOP: BIT MARK,SW.DMBR ;THIS DM11-BB SELECTED?
250 000414 001573 DBB0T BEQ DMB0T ;BR IF NO
251 000416 012712 006000 MOV #CLPMUX+CLRSCN,(#2) ;CLEAR MULTIPLEXER AND SCAN LOGIC
252 000420 005004 CLR R4
253 000424 001411 000020 1S: BIT #BUSY,(#2) ;CLEAR ALL MULTIPLEXER FLIP FLOPS?
254 000430 001411 BEQ 2S ;YES- CONTINUE
255 000432 104407 000000 BREAKS,REGIN ;TEMPORARY RETURN TO MONITOR....
256 000436 104407 000000 BREAKS,REGIN ;THEN CONTINUE AT NEXT INSTRUCTION.
257 000440 005304 DEC P4 ;COUNT TO TIMEOUT IF HUNG
258 000444 004767 BNE PC_ERR ;LOOP
259 000446 004767 JSR PC_ERR
260 000452 012767 000016 177426 MOV #16,ERRTYP ;BUSY WILL NOT CLEAR
```

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261 ;*****
262 000460 104405 000000 000000 HDRERS,BEGIN,NULL ;BUSY NEVER CLEARED
263 ;*****
264 000466 000526 000020 2S: BR DROP
265 000470 012703 MOV #16,,#0 ;R0 HAS THE MAX # OF LINES
266 000474 005012 CLR (#2) ;CLEAR CSR
267
268 ;ENABLE ALL LINES
269 000476 012762 000001 000002 SCNTIA: MOV #12,(#2) ;SET LINE ENABLE FLIP FLOP
270 000480 052712 DEC STEP,(#2) ;GO TO NEXT LINE
271 000510 005300 BNE SCNTIA ;DEC LINE COUNTER
272 000512 001371 BNF SCNTIA ;LAST LINE? BRANCH BACK IF NOT
273 000514 012767 171340 000330 MOV #171340,PATTEN ;SET UP EXPECTED CSR COMMENTS
274 000516 012767 000020 000324 MOV #16,LINE ;SETUP #0 TO HAVE MAX. #OF LINES
275 000520 012712 001117 SCNTIB: BLS #SCNENA+INTENA+17,(#2) ;SET INTERRUPT ENABLER AND MAINTENANCE MOD
276 000534 052712 000040 CLR #SCNENA,(#2) ;START SCANNER
277 000540 005067 000400 BRKCNTR ;SETUP WATCHDOG TIMER
278
279 000544 104407 000000 1S: BREAKS,REGIN ;TEMPORARY RETURN TO MONITOR....
280 000550 104407 000000 BREAKS,REGIN ;THEN CONTINUE AT NEXT INSTRUCTION.
281 000554 005767 000366 TST INTFLG ;INT OCCURRED?
282 000560 001023 BNE DMSEV ;YES- GO SERVICE
283 000562 005367 000356 DEC BRKCNTR ;NO- TIMEOUT?
284 000566 001366 BNE 1S ;NO- CONTINUE TIMING
285 000570 004767 000354 JSR PC_ERR ;SETUP FOR ERROR PRINTOUT
286 000574 012767 000003 177304 MOV #2,ERRTYP ;NO INTERRUPT OCCURRED
287 ;*****
288 000602 104405 000000 000000 HDRERS,BEGIN,NULL ;NO INTERRUPT OCCURRED
289 ;*****
290 000610 000455 BR DROP
291
292 ;ENTER HERE ON DM11-BB INTERRUPT
293 000612 011567 000322 DMBINT: MOV (R5),UNIT ;STORE UNIT OFFSET
294 000616 012609 177777 000320 MOV (SP),RS ;RESTORE RS
295 000620 012609 MOV #1,INTFLG ;INDICATE INTERRUPT OCCURRED
296 000626 000002 RTI
297
298 ;DM11-BB DEFERRED SERVICING
299 000630 005067 000312 DMSEV: CLR INTFLG
300 000634 062767 177146 ADD ADDR,UNIT ;SETUP DM11BB CSR ADDRESS
301 000642 020267 000272 CMP R2,UNIT
302 000646 001411 BEQ 1S
303 000650 004767 000774 JSR PC_ERR ;WRONG VECTOR ADDRESS
304 000654 012767 000015 177224 MOV #15,ERRTYP
305 ;*****
306 000662 104405 000000 000000 HDRERS,BEGIN,NULL ;DM11-BB INTERRUPTED TO WRONG ADDRESS
307 ;*****
308 000670 000425 1S: BR DROP
309 000674 105712 TSTB (#2) ;IS DONE BIT SET?
310 000678 001411 BNE 2S ;YES- BRANCH
311 000676 004767 000246 JSR PC_ERR ;INTERRUPT WITH DONE NCT SET
312 000702 012767 000011 177176 MOV #11,ERRTYP ;ILLEGAL INTERRUPT
313 ;*****
314 000710 104405 000000 000000 HDRERS,BEGIN,NULL ;INTERRUPT WITH DONE NOT SET
315 ;*****
316 000716 000412 BR DROP
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17 000720 021267 000126 2S: CMP (R2),PATTEN ;CSR HAS THE EXPECTED CONTENTS?
18 000721 001420 ;BEQ SCNID ;CSR CONTENTS CORRECT
19 000722 004767 000216 JSR R7,ERR ;SETUP FOR ERROR REPORT
20 000723 005067 177150 CLR ERR,TYPE ;UNKNOWN ERROR
21 000724 000000 000000 ;*****
22 000736 104405 000000 000000 HDRS,BEGIN, NULL ;CSR CONTENTS INCORRECT
23 000737 000000 000000 ;*****
24 000744 000000 000000 DROP: MSGNS,BEGIN,DROPH ;ASCII MESSAGE CALL WITH COMMON HEADER
25 000745 104403 000000 001170 BIC MARK,SW,DMBB ;DROP THIS DEVICE
26 000746 044767 000160 000162 BNE DMBBOT ;GO TO INITIATE ANOTHER DM11-BP
27 000747 001011 000000 ENDS,BEGIN ;ALL UNITS HAVE BEEN DROPPED
28 000748 104410 000000
29 000766 042712 000240 SCNID: BIC #SCNENA+DONE,(R2) ;CLEAR SCAN ENABLE AND DONE
30 000767 005267 000054 INC PATTEN ;UPDATE EXPECTED RESULT- THE LAST
31 000768 001517 000052 DEC LINE ;FOUR BITS OF THE CSR CONTAIN THE LINE #
32 000769 001517 000052 BNE SCNTIC ;COUNT 16 LINES
33 000770 001517 000052 ADD #10,R2
34 000771 001517 000052 BIT #11,SR1 ;FORM NEW CSR ADDRESS
35 000772 001517 000052 BEQ IS ;16 WORDS BETWEEN DMF'S ?
36 000773 001517 000052 ADD #30,R2 ;NO, CONTINUE
37 000774 001517 000052 ASL MARK ;YES, FORM THE PROPR ADDRESS
38 000775 001517 000052 BCC SCNTID ;LAST DM11-BB ?
39 000776 001517 000052 ENDSIT$,BEGIN ;SIGNAL END OF ITERATION.
40 000777 001517 000052 2S: JMP LOOP ;PCNITOR SHALL TEST END OF PASS
41 000778 001517 000052
42 001042 000167 177466 SCNTIC: JMP SCNTIB
43 001046 000167 177334 SCNTID: JMP DMBTOP
44 001052 000000 PATTEN: 0
45 001054 000000 LINE: 0
46 001056 004567 177530 ;JSR LINKAGE TABLE TO LINK DEVICE INTRN TO REGISTER OFFSETS
47 001057 000000 JSRTAB: JSR R5,DMBINTP ;1ST DM11-BB ISR ROUTINE
48 001058 004567 177522 JSR R5,DMBINTR ;2ND DM11-BB ISR ROUTINE
49 001059 000010 177514 JSR R5,DMBINTR ;3RD DM11-BB ISR ROUTINE
50 001060 000020 177506 JSR R5,DMBINTR ;4TH DM11-BB ISR ROUTINE
51 001104 000030 ;THIS TABLE USED WHEN ADDR DISPLACEMENT IS 16. WORDS
52 001106 004567 177500 JSRTBA: JSR R5,DMBINTP ;1ST DM11-BB ISR ROUTINE
53 001112 000000 JSR R5,DMBINTR ;2ND DM11-BB ISR ROUTINE
54 001114 004567 177472 JSR R5,DMBINTR ;3RD DM11-BB ISR ROUTINE
55 001120 000040 177464 JSR R5,DMBINTR ;4TH DM11-BB ISR ROUTINE
56 001122 004567 177464 JSR R5,DMBINTR
57 001126 000100 177456 JSR R5,DMBINTR
58 001130 004567 177456 JSR R5,DMBINTR
59 001134 000140 JSR R5,DMBINTR
60 001134 000140
61 001134 000140
62 001134 000140
63 001134 000140
64 001134 000140
65 001134 000140
66 001134 000140
67 001134 000140
68 001134 000140
69 001134 000140
70 001134 000140
71 001134 000140
72 001134 000140

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73 001136 000000 ;VARIABLES
74 001140 000000 MARK: 0
75 001142 000000 UNIT: 0 ;STORES OFFSFT OF UNIT THAT INTERRUPTED
76 001144 000000 SW,DMBB: 0 ;WATCHDOG TIMER COUNTER
77 001144 000000 BRGWT: 0 ;INDICATES INTERRUPT OCCURRED
78 001146 000000 INTFLG: 0
79
80
81 001150 010267 176724 ;ERROR REPORTING ROUTINE
82 001154 011267 176722 ERR: MOV R2,CSRA
83 001160 016267 000002 176716 MOV R2,ACSR ;SET UP CONTENTS OF CSR TO BE PRINTED
84 001166 000207 RTS PC ;STATUS OF LINE REGISTER
85
86 001170 001174 177777 DROPH: .WORD DROPHS,-1
87 001174 047125 052111 042040 DROPHS: .ASCIZ /UNIT DROPPED/
88 001202 047522 050120 042105
89 001210 000001
90 001210 000001

```

.END

SOPPAS	000046R	171#			
SPDINT	000032R	165#			
SPSTZ =	000040		198		
SR1	000016R	158#	230	238	336
SR2	000020R	159#			
SR3	000022R	160#			
SR4	000024R	161#			
START	000274R	164		215#	
STAT	000026R	163#			
STEP =	000400	208#	270		
SVR0	000062R	178#			
SVR1	000064R	179#			
SVR2	000066R	180#			
SVR3	000070R	181#			
SVR4	000072R	182#			
SVR5	000074R	183#			
SVR6	000076R	184#			
SW_DMB	001142R	226*	249	326*	376#
SVSCNT	000052R	173#			
TRPDFD=	000022	205#			
UNIT	001140R	293#	300*	301	375#
VECTOR	000010R	154#	233		
WASADR	000104R	188#			
WDFR	000116R	195#			
WDTO	000114R	194#			
XFLAG	000005R	152#			

. ABS. 000000 000
001211 001

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

XDMBIO, XDMBIO/SOL/CRF:SYM=DDXCOM, XDMBIO
RUN-TIME: 1 1.3 SECONDS
RUN-TIME RATIO: 10/3=3.1
CORE USED: 7K (13 PAGES)