

.REM-

IDENTIFICATION  
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PRODUCT CODE: AC-F428A-MC  
PRODUCT NAME: CXMNEA0 MNCDO MODULE  
PRODUCT DATE: SEPTEMBER 1978  
MAINTAINER: DEC/X11 SUPPORT GROUP

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1.0 ABSTRACT  
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THE MNE IS AN IOMOD THAT EXERCISES THE MNCDO DIGITAL OUTPUT.  
THE MODULE CONSISTS OF A READ-WRITE SECTION OF THE INTERNAL  
DATA PATH'S OF THE MNCDO LOGIC. UP TO 8 MNCDO'S CAN BE EXERCISED  
WITH THIS MODULE. THE "MNR" MODULE CAN BE ENABLED TO USE THE  
MNCDO TO WRAP-AROUND DATA INTO THE MNCDO. IF YOU HAVE SELECTED  
THAT OPTION, YOU SHOULD DESELECT "MNF" MODULE.

2.0 REQUIREMENTS  
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HARDWARE: ONE MNCDO (DIGITAL OUT).

STORAGE: MNE REQUIRES:  
DECIMAL WORDS: 407  
OCTAL WORDS: 627  
OCTAL BYTES: 1456

3.0 PASS DEFINITION  
-----

1000 OCTAL PASSES THRU THE LOGIC AND INTERRUPT TESTS.

4.0 EXECUTION TIME  
-----

ONE PASS OF THE MNE MODULE RUNNING ALONE TAKES APPROXIMATELY ONE  
MINUTE.

5.0 CONFIGURATION REQUIREMENTS  
-----

DEFAULT PARAMETERS:

DEVADP: 171260, VECTOR 340, PR1: 4

DEVCNT: 1, SR1: N/A

REQUIRED PARAMETERS:

NONE.

6.0 DEVICE/OUTPUT SET-UP  
\*\*\*\*\*

NONE IF THE "MNR" MODULE IS NOT SELECTED TO RUN WRAP-AROUND MODE.  
THIS MODULE MUST BE DESELECTED IF "MNR" IS IN WRAP-AROUND MODE  
AND THE BUS ADDRESS AND VECTOR IS THE DEFAULT VALUE.

7.0 MODULE OPERATION  
\*\*\*\*\*

THE MODULE PERFORMS THE FOLLOWING TESTS:

FLOAT A 1 ACROSS THE DATA OUTPUT REGISTER  
FLOAT A 0 ACROSS THE DATA OUTPUT REGISTER  
VERIFY BYTE OPERATION OF THE DATA OUTPUT REGISTER  
READ-WRITE TEST OF BIT 6 OF THE STATUS REGISTER  
READ-WRITE TEST OF BIT 4 OF THE STATUS REGISTER  
READ-WRITE TEST OF BIT 3 OF THE STATUS REGISTER  
OUTPUT DONE FLAG CAN SET  
OUTPUT DONE FLAG CAN BE WRITTEN TO A ZERO  
OUTPUT DONE FLAG CLEARS WHEN THE DATA OUTPUT REGISTER IS LOADED  
OUTPUT DONE FLAG GENERATES AN INTERRUPT

8.0 OPERATION OPTIONS  
\*\*\*\*\*

LOCATION DVID1 CAN BE MODIFIED TO SELECT ADDITIONAL UNITS.

9.0 NON-STANDARD PRINTOUTS  
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ALL PRINTOUTS HAVE THE STANDARD FORMATS DESCRIBED IN THE DEC/X11  
DOCUMENT.

```
141 00000000 047115 040505 040
142 00000000 000000 000000
143 00000005 171260 000000
144 00000006 171260 000000
145 00000100 000340 000000
146 00000102 200 000000
147 00000103 000 000000
148 00000104 000001 000000
149 00000106 000000 000000
150 00000200 000000 000000
151 00000202 000000 000000
152 00000204 000000 000000
153 00000206 140000 000000
154 00000300 000244 000000
155 00000302 000224 000000
156 00000303 000000 000000
157 00000306 001000 000000
158 00000400 000000 000000
159 00000402 000000 000000
160 00000404 000000 000000
161 00000406 000000 000000
162 00000500 000000 000000
163 00000502 000000 000000
164 00000504 000000 000000
165 00000506 000000 000000
166 00000600 000000 000000
167 00000602 000000 000000
168 00000604 000000 000000
169 00000700 000000 000000
170 00000702 000000 000000
171 00000704 000000 000000
172 00000706 000000 000000
173 00000710 000000 000000
174 00000712 000000 000000
175 00000714 000000 000000
176 00000716 000000 000000
177 00000718 000000 000000
178 00000720 000000 000000
179 00000722 000000 000000
180 00000724 000000 000000
181 00000726 000000 000000
182 00000728 000000 000000
183 00000730 000000 000000
184 00000732 000000 000000
185 00000734 000000 000000
186 00000736 000000 000000
187 00000738 000000 000000
188 00000740 000000 000000
189 00000742 000244 000000
190 00000744 000000 000000
191 00000746 000000 000000
192 00000748 000000 000000
193 00000750 000000 000000
194 00000752 000000 000000
195 00000754 000224 000000
196 *****

.LIST
MC/CMD,MD
.NLIST
.MTITLE MNEA DEC/X11 SYSTEM EXERCISER MODULE
.DDXCOM VERSION 6 23-MAY-78
.LIST
BIN
*****
REGIN:
MODNAM: .ASCII /MNEA / ;MODULE NAME.
XFLAG: .BYTE OPEN ;USED TO KEEP TRACK OF WBUFF USAGE
ADDR: 171260+0 ;1ST DEVICE ADDR.
VECTOR: 340+0 ;1ST DEVICE VECTOR.
BR1: .BYTE PRTY4+0 ;1ST BR LEVEL.
BR2: .BYTE PRTY0+0 ;2ND BR LEVEL.
DVID1: 0+1 ;DEVICE INDICATOR 1.
SR1: OPEN ;SWITCH REGISTER 1
SR2: OPEN ;SWITCH REGISTER 2
SR3: OPEN ;SWITCH REGISTER 3
SR4: OPEN ;SWITCH REGISTER 4
*****
STAT: 140000 ;STATUS WORD.
INIT: START ;MODULE START ADDR.
SPOINT: MODSP ;MODULE STACK POINTER.
PASCNT: 0 ;PASS COUNTER.
ICOUNT: 0 ;# OF ITERATIONS PER PASS=1000
SOFCNT: 0 ;LOC TO SAVE TOTAL SOFT ERRORS
HRDCNT: 0 ;LOC TO SAVE TOTAL HARD ERRORS
SOPPAS: 0 ;LOC TO SAVE SOFT ERRORS PER PASS
SYSCNT: 0 ;LOC TO SAVE HARD ERRORS PER PASS
RANNUM: 0 ;# OF SYS ERRORS ACCUMULATED
CONFIG: 0 ;HOLDS RANDOM # WHEN RAND MACRO IS CALLED
RES1: 0 ;RESERVED FOR MONITOR USE
RES2: 0 ;RESERVED FOR MONITOR USE
SVR0: OPEN ;LOC TO SAVE R0.
SVR1: OPEN ;LOC TO SAVE R1.
SVR2: OPEN ;LOC TO SAVE R2.
SVR3: OPEN ;LOC TO SAVE R3.
SVR4: OPEN ;LOC TO SAVE R4.
SVR5: OPEN ;LOC TO SAVE R5.
SVR6: OPEN ;LOC TO SAVE R6.
CSRA: OPEN ;ADDR OF CURRENT CSR.
SBADR: OPEN ;ADDR OF GOOD DATA, OR
ACSR: OPEN ;CONTENTS OF CSR.
WASADR: OPEN ;ADDR OF BAD DATA, OR
ASTAT: OPEN ;STATUS REG CONTENTS.
ERRTYP: OPEN ;TYPE OF ERROR
ASB: OPEN ;EXPECTED DATA.
AWAS: OPEN ;ACTUAL DATA.
RSTPT: RESTRT ;RESTART ADDRESS AFTER END OF PASS
WDTO: OPEN ;WORDS TO MEMORY PER ITERATION
WDFR: OPEN ;WORDS FROM MEMORY PER ITERATION
INTR: OPEN ;# OF INTERRUPTS PER ITERATION
IDNUM: 0 ;MODULE IDENTIFICATION NUMBER=0
MODSP: 0
*****
```

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197
198 000224* 000006* OCSR: ADDR
199 000226* 000007* OCSR1: ADDR+1 ;HIGH BYTE ADDRESS
200
201 000230* 000010* DOR: ADDR+2
202 000232* 000011* DOR1: ADDR+3 ;HIGH BYTE ADDRESS
203
204 000234* 000010* DODINV: VECTOR
205 000236* 000012* DODINS: VECTOR+2
206
207 000240* 000000* TEMP: 0
208 000242* 000001* TEMP1: 1
209 010000* HITDAT=R1T12 ;MAINT INPUT INHIBIT
210 004000* R1TEXT=R1T11 ;MAINT INPUT STROBE
211 000244*
212 000244*
213 000244* 012767 000001 177770 COM1: MOV #R10,TEMP1 ;LOAD UNIT SELECT POINTER
214 000252* 012700 000224* MOV #OCSR,R0 ;LOAD ADDRESS POINTER
215 000256* 016701 177524 MOV ADDR,R1 ;LOAD INITIAL BUS ADDRESS
216 000262* 010120 1S: MOV R1,(R0)+ ;LOAD DEVICE ADDRESS
217 000264* 005201 INC R1 ;UPDATE BUS ADDRESS VALUE
218 000266* 020027 000234* CMP R0,#DOR1+2 ;TEST IF DONE WITH BUS ADDRESSES
219 000272* 001373 BNE 1S ;RR IF NOT
220 000274* 016701 177510 MOV VECTOR,P1 ;LOAD VECTOR POINTER
221 000300* 010120 36: MOV R1,(R0)+ ;LOAD DEVICE VECTOR ADDRESS
222 000302* 005721 TST (R1)+ ;UPDATE BUS VECTOR VALUE
223 000304* 010110 MOV R1,(R0) ;LOAD 2ND ADDR.
224
225 ;VERIFY A MNCDO ADDRESS RESPONSE
226
227 000306* 016767 177712 177564 D00: MOV OCSR,CSPA ;LOAD BUS ADDRESS IF AN ERROR
228 000314* 005777 177704 TST @OCSR ;TEST OUTPUT STATUS REGISTER
229 000320* 005777 177704 TST @R0R ;TEST OUTPUT DATA REGISTER
```

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230 000324*
231
232 000324* 012767 000001 177550 D01: ;FLOAT A 1 ACROSS THE MNCDO DATA REGISTER
233 000332* 016777 177544 177670 1S: MOV #R10,ACSR ;LOAD EXPECT BIT
234 000340* 017767 177664 177536 MOV ACSR,@DOR ;LOAD MNCDO DATA REGISTER
235 000346* 026767 177530 177530 MOV @DOP,ASTAT ;READ MNCDO DATA REGISTER
236 000354* 001403 CMP ACSR,ASTAT ;COMPARE
237 BEQ 2S ;RR IF SAME
238 000356* 104405 000000* 000000 ;*****
239 HRDERS,BEGIN,NULL ;MNCDO DATA REGISTER FAILED TO HOLD A FLOATING 1
240 000364*
241 000364* 104407 000000* 2S: BREAKS,BEGIN ;TEMPORARY RETURN TO MONITOR....
242 000370* 104407 000000* BREAKS,BEGIN ;THEN CONTINUE AT NEXT INSTRUCTION.
243 000374* 006367 177502 ASL ACSR ;CHANGE THE DATA
244 000400* 001354 BNE 1S ;RR IF MORE DATA
245 000402*
246
247 000402* 012767 000001 177630 D02: ;FLOAT A 0 ACROSS THE MNCDO DATA REGISTER
248 000410* 016767 177624 177464 1S: MOV #R10,TEMP ;LOAD INITIAL BIT
249 000416* 005167 177460 COM ACSR ;COMPLEMENT
250 000422* 016777 177454 177600 MOV ACSR,@DOR ;LOAD MNCDO DATA REGISTER
251 000430* 017767 177574 177446 MOV @DOP,ASTAT ;READ MNCDO DATA REGISTER
252 000436* 026767 177440 177440 CMP ACSR,ASTAT ;COMPARE
253 000444* 001403 BEQ 2S ;RR IF SAME
254 ;*****
255 000446* 104405 000000* 000000 HRDERS,BEGIN,NULL ;MNCDO DATA REGISTER FAILED TO HOLD A FLOATING 0
256 ;*****
257 000454*
258 000454* 104407 000000* 2S: BREAKS,BEGIN ;TEMPORARY RETURN TO MONITOR....
259 000460* 104407 000000* BREAKS,BEGIN ;THEN CONTINUE AT NEXT INSTRUCTION.
260 000464* 006367 177550 ASL TEMP ;CHANGE THE DATA
261 000470* 001347 BNE 1S ;RR IF MORE DATA
262 000472*
263
264 000472* 012777 177777 177530 D03: ;VERIFY BYTE OPERATION ON THE MNCDO DATA REGISTER
265 000500* 012767 000377 177374 1S: MOV #-1,@DOR ;LOAD MNCDO DATA REGISTER
266 000506* 105077 177520 MOV #377,ACSR ;LOAD EXPECTED
267 000512* 017767 177512 CLR @DOR1 ;CLEAR HIGH BYTE
268 000520* 026767 177356 177356 MOV @DOR,ASTAT ;READ MNCDO DATA REGISTER
269 000526* 001403 CMP ACSR,ASTAT ;COMPARE
270 BEQ 2S ;RR IF SAME
271 000530* 104405 000000* 000000 ;*****
272 HRDERS,BEGIN,NULL ;CLEARING HIGH BYTE CHANGED LOW BYTE
273 ;*****
274 000536* 012777 177777 177464 2S: MOV #-1,@DOR ;LOAD MNCDO DATA REGISTER
275 000544* 012767 177400 177330 MOV #17400,ACSR ;LOAD EXPECTED
276 000552* 105077 177452 CLR @DOR ;CLEAR LOW BYTE
277 000556* 017767 177446 MOV @DOR,ASTAT ;READ MNCDO DATA REGISTER
278 000564* 026767 177312 177312 CMP ACSR,ASTAT ;COMPARE
279 BEQ 3S ;RR IF SAME
280 ;*****
281 000574* 104405 000000* 000000 HRDERS,BEGIN,NULL ;CLEARING LOW BYTE CHANGED HIGH BYTE
282 ;*****
283 000602* 104407 000000* 3S: BREAKS,BEGIN ;TEMPORARY RETURN TO MONITOR....
284 000606* 104407 000000* BREAKS,BEGIN ;THEN CONTINUE AT NEXT INSTRUCTION.
285 000612*
286 D04:
```

```
286 ;TEST THAT BIT6 OF MNCDO STATUS REGISTER IS READ-WRITE
287 MOV #BIT6,ACSP ;LOAD EXPECTED
288 MOV ACSP,@OCSR ;LOAD BIT6 INTO MNCDO STATUS REGISTER
289 MOV @OCSR,ASTAT ;READ MNCDO STATUS REGISTER
290 CMP ACSP,ASTAT ;TEST THAT IT SET
291 BEQ 1S ;BR IF SAME
292 ;*****
293 HRDERS,REGIN,NULL ;BIT6 OF MNCDO STATUS REGISTER FAILED TO SET
294 ;*****
295 BIC ACSP,@OCSR ;CLEAR THAT BIT
296 MOV @OCSR,ASTAT ;READ MNCDO STATUS REGISTER AGAIN
297 CMP ACSP,ASTAT ;TEST THE BIT
298 BNE 2S ;BR IF CLEARED
299 ;*****
300 HRDERS,REGIN,NULL ;BIT6 OF MNCDO STATUS REGISTER FAILED TO CLEAR
301 ;*****
302 BREAKS,REGIN ;TEMPORARY RETURN TO MONITOR....
303 BREAKS,REGIN ;THEN CONTINUE AT NEXT INSTRUCTION.
304
305 D05:
306 ;TEST THAT BIT4 OF MNCDO STATUS REGISTER IS READ-WRITE
307 MOV #BIT4,ACSP ;LOAD EXPECTED
308 MOV ACSP,@OCSR ;LOAD BIT4 INTO MNCDO STATUS REGISTER
309 MOV @OCSR,ASTAT ;READ MNCDO STATUS REGISTER
310 CMP ACSP,ASTAT ;TEST THAT IT SET
311 BEQ 1S ;BR IF SAME
312 ;*****
313 HRDERS,REGIN,NULL ;BIT4 OF MNCDO STATUS REGISTER FAILED TO SET
314 ;*****
315 BIC ACSP,@OCSR ;CLEAR THAT BIT
316 MOV @OCSR,ASTAT ;READ MNCDO STATUS REGISTER AGAIN
317 CMP ACSP,ASTAT ;TEST THE BIT
318 BNE 2S ;BR IF CLEARED
319 ;*****
320 HRDERS,REGIN,NULL ;BIT4 OF MNCDO STATUS REGISTER FAILED TO CLEAR
321 ;*****
322 BREAKS,REGIN ;TEMPORARY RETURN TO MONITOR....
323 BREAKS,REGIN ;THEN CONTINUE AT NEXT INSTRUCTION.
324
```

```
325 001016* 104405 000000* 000000 D06:
326 ;TEST THAT BIT3 OF MNCDO STATUS REGISTER IS READ-WRITE
327 MOV #BIT3,ACSP ;LOAD EXPECTED
328 MOV ACSP,@OCSR ;LOAD BIT3 INTO MNCDO STATUS REGISTER
329 MOV @OCSR,ASTAT ;READ MNCDO STATUS REGISTER
330 CMP ACSP,ASTAT ;TEST THAT IT SET
331 BEQ 1S ;BR IF SAME
332 ;*****
333 HRDERS,REGIN,NULL ;BIT3 OF MNCDO STATUS REGISTER FAILED TO SET
334 ;*****
335 BIC ACSP,@OCSR ;CLEAR THAT BIT
336 MOV @OCSR,ASTAT ;READ MNCDO STATUS REGISTER AGAIN
337 CMP ACSP,ASTAT ;TEST THE BIT
338 BNE 2S ;BR IF CLEARED
339 ;*****
340 HRDERS,REGIN,NULL ;BIT3 OF MNCDO STATUS REGISTER FAILED TO CLEAR
341 ;*****
342 BREAKS,REGIN ;TEMPORARY RETURN TO MONITOR....
343 BREAKS,REGIN ;THEN CONTINUE AT NEXT INSTRUCTION.
344
345 D07:
346 ;VERIFY THAT MNCDO DONE FLAG SETS
347 CLR @OCSR ;CLEAR CLEARED FLAG
348 MOV #BIT7,ACSP ;LOAD EXPECTED
349 CLR @OOR ;ENABLE
350 MOVR #BIT0,@OCSR1 ;GENERATE MAINT. REPLY
351 MOV @OCSR,ASTAT ;READ OUTPUT STATUS REGISTER
352 CMP ACSP,ASTAT ;COMPARE
353 BEQ D010 ;BR IF SAME
354 ;*****
355 HRDERS,REGIN,NULL ;OUTPUT DONE FLAG FAILED TO SET
356 ;*****
357 ;VERIFY THAT MNCDO DONE FLAG CLEARS WHEN WRITTEN TO A 0
358 CLR @OOR ;ENABLE
359 MOVR #BIT0,@OCSR1 ;GENERATE MAINT. REPLY
360 CLR ACSP ;CLEAR EXPECTED
361 CLR @OCSR ;CLEAR OUTPUT DONE FLAG
362 MOV @OCSR,ASTAT ;READ STATUS
363 BEQ D011 ;BR IF SAME
364 ;*****
365 HRDERS,REGIN,NULL ;WRITING OUTPUT FLAG TO A ZERO FAILED TO CLEAR OUTPUT 00
366 ;*****
367
368 D010:
369 ;VERIFY THAT MNCDO DONE FLAG CLEARS WHEN OUTPUT DATA REGISTER IS WRITTEN
370 CLR @OOR ;ENABLE
371 MOVB #BIT0,@OCSR1 ;GENERATE MAINT. REPLY
372 CLR ACSP ;CLEAR EXPECTED
373 CLR @OOR ;WRITE THE OUTPUT DATA REGISTER
374 MOV @OCSR,ASTAT ;READ OUTPUT STATUS REGISTER
375 BEQ D012 ;BR IF CLEARED
376 ;*****
377 HRDERS,REGIN,NULL ;OUTPUT DONE FLAG FAILED TO CLEAR
378 ;*****
379 ;WHEN OUTPUT DATA REGISTER WAS WRITTEN
```



DO7	001120R	347*													
DVID1	000014R	154*	405												
ENDITS=	104413	197*	407												
ENDS =	104410	197*													
ERRTYP	000106R	187*													
EXIT# =	104400	197*	391												
FINISH	001376P	402*													
GETPAS=	104415	197*													
GWBUF#	104414	197*													
HPDCNT	000044R	167*													
HPDRS=	104405	197*	238	255	271	280	293	300	313	320	333	340	355	365	
		376													
HRDPAS	000050R	169*													
ICONT	000036R	164*													
ICOUNT	000040P	165*													
IDNUM	000122R	194*													
INIT	000030P	161*													
INTR	000120R	193*													
MAP22#	104416	197*													
MODNAM	000000R	148*													
MODSP	000224R	162*	195*												
MSG# =	104403	197*													
MSG# =	104402	197*													
MSG# =	104401	197*													
NULL	= 000000	197*	238	255	271	280	293	300	313	320	333	340	355	365	
		376													
OC6R	000224R	198*	214	227	228	288*	289	295*	296	308*	309	315*	316	328*	
		329	335*	336	347*	351	361*	362	373	387*	393*	399*	410		
OC6R1	000226R	199*	350*	359*	370*	386*									
OPEN	= 000000	149	155	156	157	158	175	176	177	178	179	180	181	182	
		184	186	188	189	191	192	193	197*						
		197*													
OTOA#	= 104420	197*													
PASCNT	000034R	163*													
PIRQ#	= 000004	197*	395												
POPSP	= 005726	197*													
POPSP2=	022626	197*													
PRTY	= 000000	197*													
PRTY0	= 000000	153	197*												
PRTY1	= 000040	197*													
PRTY2	= 000100	197*													
PRTY3	= 000140	197*													
PRTY4	= 000200	152	197*												
PRTY5	= 000240	197*													
PRTY6	= 000300	197*													
PRTY7	= 000340	197*													
PS	= 177776	197*													
PSW	= 177776	197*													
PUSH	= 005746	197*													
PUSH2	= 024646	197*													
RAND#	= 104417	197*													
RANNUM	000054P	171*													
RESTRT	000244R	190	211*												
RES1	000056P	173*													
RES2	000060P	174*													
RSTRT	000112R	190*													
SBADP	000102P	183*													

SOFcnt	000042P	166*													
SOFERS=	104406	197*													
SOPPAS	000046P	168*													
SPOINT	000032R	162*													
SPSIZ =	000040	1*	195												
SR1	000016P	155*													
SR2	000020P	156*													
SR3	000022R	157*													
SR4	000024R	158*													
START	000244R	161	212*												
STAT	000026P	160*													
SVR0	000062R	175*													
SVR1	000064R	176*													
SVR2	000066P	177*													
SVR3	000070R	178*													
SVR4	000072P	179*													
SVR5	000074R	180*													
SVR6	000076R	181*													
SYSCNT	000052R	170*													
TEMP	000240R	207*	247*	248	260*	412									
TEMP1	000242R	208*	213*	402*	403	405									
TRDFD=	000022	197*													
VECTOR	000010P	151*	204	205	220										
WASADR	000104R	185*													
WDFR	000116P	192*													
WDT0	000114R	191*													
XFLAG	000005P	149*													

. ABS. 000000 000  
 001456 001

ERRORS DETECTED: 0  
 DEFAULT GLOBALS GENERATED: 0

XMNEA0, XMNEA0/SOL/CRF:SYM=PDXC00, XMNEA0  
 RUN-TIME: 1 1 .2 SECONDS  
 RUN-TIME RATIO: 64/3=16.3  
 CORE USED: 7K (13 PAGES)