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IDENTIFICATION  
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PRODUCT CODE: AC-E833F-MC  
PRODUCT NAME: CXCBFCO CB11-HA MODULE  
PRODUCT DATE: SEPTEMBER 1978  
MAINTAINER: DEC/X11 SUPPORT GROUP

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1. ABSTRACT

CBC IS AN IOMOD THAT WILL EXERCISE UP TO "16" (DECIMAL) CBC11A INTERRUPT MODULES HAVING CONTIGUOUS UNIBUS ADDRESSES. NON-CONTIGUOUS GROUPS OF INTERRUPT MODULES MAY BE EXERCISED BY CONFIGURING A CBC MODULE FOR EACH GROUP. THE MODULE SIMPLY TESTS THE ABILITY OF THE MAINTENANCE TRANSITION ENABLE BIT #13 OF THE CONTROL AND STATUS REGISTER TO ENACTIVATE AND DEACTIVATE ALL THE TRANSITION STATE REGISTERS SELECTED FOR TEST. IF ANY LINES FAIL TO SET OR CLEAR PROPERLY THE ERROR IS REPORTED VIA THE CONSOLE TTY. NOTE RESTRICTIONS (ITEM #6)

2. REQUIREMENTS

HARDWARE: A CBC11 INTERFACE WITH AT LEAST ONE INTERRUPT MODULE.

STORAGE:: CBC REQUIRES:

- 1. DECIMAL WORDS: 433
- 2. OCTAL WORDS: 0661
- 3. OCTAL BYTES: 1542

3. PASS DEFINITION:

EACH PASS OF CBC RESULTS IN 20 ITERATIONS OF THE BASIC TEST SEQUENCE WHICH CLEARS AND SETS ALL TRANSITION STATE REGISTERS SELECTED FOR TEST THRU ALL DATA PERMUTATIONS WITHIN THE DATA TABLE.

4. EXECUTION TIME

CBC RUNNING ALONE ON A PDP 11/05 SYSTEM WITH ONE INTERRUPT MODULE TAKES LESS THAN 60 SECONDS TO COMPLETE ONE PASS.

NOTE:

ALL DEVICES SELECTED FOR TEST MUST RESPOND IN REAL TIME. FAILURE TO RESPOND WILL RESULT IN ERROR REPORTS.

5. CONFIGURATION PARAMETERS

DEFAULT PARAMETERS:

DVADR: 164000

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VECTOR: (FUNCTION OF DEVICE RESPONSE)  
BRI:

REQUIRED PARAMETERS:  
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FOR EACH COPY OF CBC CONFIGURED THE USER MUST SPECIFY:  
DEVADR: THE FIRST ADDRESS OF THE FIRST INTERRUPT MODULE  
REGISTER IN A CONTIGUOUS GROUP.

NOTE:  
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"VCTR:" THE DEVICE VECTOR ADDRESS IS SWITCH SELECTABLE  
AND SUPPLIED BY THE DEVICE(S). A VECTOR ADDRESS IS EXPECTED  
TO BE IN THE 100 THRU 774 (OCTAL) RANGE.

BRI: THE DEVICE PRIORITY (BUS REQUEST) LEVEL FOR  
"ALL" DEVICES TO BE TESTED BY THIS MODULE.  
I.E. MUST BE SET TO HIGHEST BR LEVEL WITHIN  
THE CURRENT GROUP OF DEVICES SELECTED FOR TEST.

DVID1: A BIT MAP ENTRY OF (CONTIGUOUS) DEVICES SELECTED  
FOR THE CURRENT TEST SEQUENCE  
DEFAULT VALUE = 11111111 TEST DEVICE 0  
TO TEST ADDITIONAL DEVICES:  
MAP VALUE = 000006  
BIT 1 = 1 TEST DEVICE 1 (DVADR +10)  
BIT 2 = 1 TEST DEVICE 2 (DVADR +20)  
ETC.

6. DEVICE OPTION SETUP  
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RESTRICTION:  
-----

ALL EXTERNAL LINES ENTERING THE INTERRUPT MODULE  
INPUTS FROM THE REAL WORLD (USER INTERFACE) MUST  
BE DISCONNECTED.

ALL DEVICE ADDRESSES SHOULD FALL INTO THE  
VECTOR RANGE. ALL DEVICE  
VECTOR ADDRESSES SHOULD FALL INTO THE 100 THRU  
774 (OCTAL) RANGE.

7. MODULE OPERATION  
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TEST SEQUENCE

A. SET UP THE PASS COUNTER FOR 20 ITERATIONS.

- 157 B. GET DVID1 TO FIND OUT HOW MANY INTERRUPT MODULES TO TEST.
- 158 C. SET ASSOCIATED TRANSITION ENABLE REGISTER TO CURRENT DATA
- 159 CONFIGURATION VERIFY RESULTS (ALL TEST DEVICES).
- 160 D. SET ASSOCIATED CONTROL AND STATUS REGISTER BIT(S) 14,13
- 161 VERIFY RESULTS. (ALL TEST DEVICES).
- 162 TOGGLE - (NEG)
- 163 E. DELAY LONG ENOUGH FOR INPUT DELAY NETWORK
- 164 6.4 MILLISECONDS OR LONGER.
- 165 F. CLEAR ASSOCIATED CONTROL AND STATUS REGISTER BIT#13
- 166 VERIFY RESULTS. (ALL TEST DEVICES).
- 167 TOGGLE + (POS)
- 168 G. DELAY LONG ENOUGH FOR INPUT DELAY NETWORK
- 169 6.4 MILLISECONDS OR LONGER.
- 170 H. VERIFY TRANSITION STATE REGISTER RESULTS
- 171 I. CLEAR ASSOCIATED TRANSITION ENABLE REGISTER.
- 172 VERIFY RESULTS. (ALL TEST DEVICES).
- 173 J. MODIFY DATA INDEX TO NEXT PATTERN.
- 174 K. REPEAT ITEMS "C" THRU "J" FOR ALL DATA
- 175 ENTRIES IN CONTROL DATA BUFFER.
- 176 L. REPEAT ITEMS "D." THRU "K." 20 TIMES.
- 177 M. REPORT END OF PASS, RESTART AT "A."

8. SUBROUTINES  
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BRK: TIMER TO PREVENT CONTROL AND STATUS  
REGISTER BIT#13 MAINTENANCE TRANSITION  
TOGGING DURING TRANSITION DELAY INTERVAL  
(6.4 MILLISECONDS OR LONGER).

9. OPERATION OPTIONS  
-----

- A. THE USER CAN MODIFY THE FOLLOWING LOCATIONS TO  
ALTER CONFIGURATION (TEST) REQUIREMENTS:

NOTE:

IT IS THE USERS RESPONSIBILITY TO ENTER  
THE CORRECT VALUES ASSOCIATED WITH EACH  
DEVICE. CAREFUL SELECTION CANNOT BE OVER  
STRESSED, FOR AN ERRONEOUS SELECTION WILL  
RESULT IN ERROR REPORTS.

SYMBOLIC  
(LOCATION) (SIGNIFICANCE)

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DVADR: THE ADDRESS OF THE FIRST INTERRUPT MODULE  
REGISTER IN A CONTIGUOUS GROUP.  
BR1: THE (BUS REQUEST) DEVICE PRIORITY LEVEL FOR  
"ALL" DEVICES TO BE TESTED BY THIS MODULE.  
DVID1: A BIT MAP SELECTION OF DEVICES SELECTED FOR  
TESTING IN THE CURRENT TEST CYCLE.  
10. NON-STANDARD PRINTOUTS  
-----  
NONE: ALL PRINTOUTS HAVE THE STANDARD DEC/X11 FORMATS.

```

229          000062          SPSIZ = 50
230          ;              CH11-HA EXERCISER MODULE
231
232          000000          IDNUM: 35          ;MODULE IDENTIFICATION NUMBER=35
233          000000          MODUL: 140000,CBCF,164000,774,100,,35 ;MODULE STACK STARTS HERE.
234          ;              TITLE CRCF DEC/X11 SYSTEM EXERCISER MODULE
235          ;              DDXCOM VERSION 6 23-MAV-78
236          ;              LIST BIN
237          ;*****
238          000000          BEGIN:
239          000000          MODNAM: -ASCII /CBCF / ;MODULE NAME
240          000000          XFLAG: 1 BYTE OPEN          ;USED TO KEEP TRACK OF WBUF USAGE
241          000004          ADDR: 164000+0          ;1ST DEVICE ADDR
242          000010          VECTOR: 774+0          ;1ST DEVICE VECTOR.
243          000012          BR1: -BYTE PRTY7+0          ;1ST BR LEVEL.
244          000013          BR2: -BYTE PRTY+0          ;2ND BR LEVEL.
245          000014          DIV1: +1          ;DEVICE INDICATOR 1.
246          000016          SR1: OPEN          ;SWITCH REGISTER 1.
247          000020          SR2: OPEN          ;SWITCH REGISTER 2.
248          000022          SR3: OPEN          ;SWITCH REGISTER 3.
249          000024          SR4: OPEN          ;SWITCH REGISTER 4.
250          ;*****
251          000026          140000          STAT: 140000          ;STATUS WORD.
252          000030          000270          INADR: START          ;MODULE START ADDR.
253          000032          000270          SP0INT: MODSP          ;MODULE STACK POINTER.
254          000034          000000          PASCNT: 0          ;PASS COUNTER.
255          000036          000144          ICNT: 100          ;# OF ITERATIONS PER PASS=100.
256          000040          000000          ICOUNT: 0          ;LOC TO COUNT ITERATIONS
257          000042          000000          SDFCNT: 0          ;LOC TO SAVE TOTAL SOFT ERRORS
258          000044          000000          HRDCNT: 0          ;LOC TO SAVE TOTAL HARD ERRORS
259          000046          000000          SDFPAS: 0          ;LOC TO SAVE SOFT ERRORS PER PASS
260          000050          000000          HRDPAS: 0          ;LOC TO SAVE HARD ERRORS PER PASS
261          000052          000000          SVSCNT: 0          ;# OF SYS ERRORS ACCUMULATED
262          000054          000000          RANNUM: 0          ;HOLDS RANDOM # WHEN RAND MACRO IS CALLED
263          000056          000000          CONFCG: 0          ;RESERVED FOR MONITOR USE
264          000058          000000          RES1: 0          ;RESERVED FOR MONITOR USE
265          000060          000000          RES2: 0          ;RESERVED FOR MONITOR USE
266          000062          000000          SVR0: OPEN          ;LOC TO SAVE R0.
267          000064          000000          SVR1: OPEN          ;LOC TO SAVE R1.
268          000066          000000          SVR2: OPEN          ;LOC TO SAVE R2.
269          000068          000000          SVR3: OPEN          ;LOC TO SAVE R3.
270          000072          000000          SVR4: OPEN          ;LOC TO SAVE R4.
271          000074          000000          SVR5: OPEN          ;LOC TO SAVE R5.
272          000076          000000          SVR6: OPEN          ;LOC TO SAVE R6.
273          000100          000000          CSRA: OPEN          ;ADDR OF CURRENT CSR.
274          000102          000000          SRDR: OPEN          ;ADDR OF GOOD DATA OR
275          000104          000000          ACSR: OPEN          ;CONTENTS OF CSR.
276          000106          000000          WASADR: OPEN          ;ADDR OF BAD DATA, OR
277          000108          000000          ASADR: OPEN          ;STATUS REG CONTENTS.
278          000110          000000          ERRTYP: OPEN          ;TYPE OF ERROR
279          000112          000000          ASB: OPEN          ;EXPECTED DATA.
280          000114          000000          AWAS: OPEN          ;ACTUAL DATA
281          000116          000000          RSTRT: RSTRT          ;START ADDRESS AFTER END OF PASS
282          000118          000000          WDT0: OPEN          ;WORDS TO MEMORY PER ITERATION
283          000120          000000          WDFP: OPEN          ;WORDS FROM MEMORY PER ITERATION
284          000122          000000          INTR: OPEN          ;# OF INTERRUPTS PER ITERATION

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285          000122          000035          IDNUM: 35          ;MODULE IDENTIFICATION NUMBER=35
286          000062          000062          ;MODULE STACK STARTS HERE.
287
288          -REPT          SPSIZ
289          -NLST
290          -WORD          0
291          -LIST
292          -ENDR
293
294          000270          MODSP:
295          ;*****
296          ;***** MODULE INITIALIZATION *****
297
298          000270          012767          000002          177622          START: MOV #2,INTR          ;AT LEAST 2 INTERRUPTS/ITERATION
299          000272          012767          000001          177610          MOV #1,WDT0          ;AT LEAST 2 WORDS TO MEM/ITERATION
300          000304          012767          000001          177604          MOV #1,WDFP          ;AT LEAST 2 WORDS FROM MEM/ITERATION
301          000312          016700          177476          MOV DIVD1,R0          ;SET DVC TO R0
302          000316          001002          BNE 1S          ;IF SET UP OK - BRANCH
303          000324          006200          000000          IS: ENDS,BEGIN
304          000326          001412          ASR R0          ;ANY LEFT?
305          000330          062767          000002          177562          REFRST          ;NO - BRANCH OUT
306          000336          062767          000001          177550          ADD #2,INTR          ;2 MORE INTERRUPTS/ITERATION
307          000344          062767          000001          177544          ADD #1,WDFP          ;1 MORE WORD FROM MEM
308          000352          000764          BR 1S          ;GO CHECK FOR MORE
309          000354          016706          177452          RSTRT: MOV SP0INT,R6          ;SET UP STACK
310
311          000360          012767          000016          001024          IS: MOV #16,SCNT          ;SCAN COUNT=16
312          000366          016767          177422          001004          MOV DIVD1,BLOCK          ;RECORD SELECTED ACTIVITY
313          000374          016702          177406          MOV ADDR,R2          ;DEVICE ADDRESS
314          000400          016705          177410          MOV DIVD1,R5          ;DEVICE ACTIVITY
315          000404          012746          177777          MOV #-1,-(SP)          ;DELIMIT
316          000410          005046          CLR -(SP)          ;DELIMIT CONTROL SCAN
317          000412          005046          CLR -1          ;INIT DEVICE COUNT
318          000414          005067          000754          CLR DECNT          ;INIT CURRENT CONTROL SCAN DELIMIT
319          000420          005016          L00: CLR (SP)          ;ACTIVITY TO "C" AND TEST
320          000422          006005          ROR R5          ;(NONE) BRANCHES
321          000424          103041          BCC L04          ;CONTROL ENTRY
322          000426          010216          MOV #2,(SP)          ;SCAN ADDRESS
323          000430          010667          000750          MOV SP,CNTLX          ;CLR CSR REG
324          000434          005012          CLR (R2)          ;CLR TER REG
325          000436          005062          000006          CLR 6(R2)          ;CLR TSR REG
326          000442          005762          000004          TST 4(R2)
327
328          ;          DEVICE VECTOR ASSIGNMENT CODE
329
330          000446          011203          MOV (R2),R3          ;FETCH VECTOR RESPONSE
331          000450          032703          177003          BIT #177003,R3          ;CHECK LEGAL FIELDS
332          000454          001411          BEQ L02          ;(OK) BRANCHES
333          000456          004767          000644          JSR PC,ERR          ;SETUP ERROR ACSR CCSR
334
335          000462          012767          000015          177416          L11: MOV #15,ERRTYP          ;WRONG VECTOR ADDRESS
336          ;*****
337          000470          104405          000000          000000          HDRS,BEGIN,NULL          ;ILLEGAL VECTOR RESPONSE
338          ;*****
339
340          000476          000414          BR L04          ;DO NXT DEV

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439 ;*****
440 ;
441 ;***** MODULE DEVICE DATA VERIFICATION *****
442 ;
443 ENTERED UPON COMPLETION OF SERVICE
444 ;
445 VERIFY:
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481 ;*****
482 ;
483 ;***** MODULE DEVICE INTERRUPT SERVICE *****
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537 ;*****
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539 ;*****
540 ;
541 ;***** MODULE UTILITIES *****
542 ;
543 ;
544 ;
545 ;BRK:
546 ; DEVICE SERVICE DELAY BREAK FOR APPROXIMATELY 100 MICRO SECONDS MIN
547 ; 64 BREAKS EQUALS 6.4 MILLISECOND MINIMUM. NOTE THAT THIS TIME (MIN)
548 ; IS REDUCED TO 1 MILLISECOND (MIN) ON FINAL INTERRUPT
549 ; SERVICE DURING "HISR" SERVICE EXECUTION
550 001300 016767 000064 000070 BRK: MOV TIME,BKCNT ;DING/DONG
551 001306 000000 000000 000000 STALL: BREAKS,BEGIN ;TEMPORARY RETURN TO MONITOR.
552 001312 104407 000000 000000 BREAKS,BEGIN ;THEN CONTINUE AT NEXT INSTRUCTION.
553 001312 104407 000000 000000 DEC BKCNT
554 001316 005367 000054 DEC BKCNT
555 001322 001371 BNE STALL ;AGAIN
556 001324 000207 RTS PC ;EXIT
557
558 001326 010267 176546 ERR: MOV R2,CSRA
559 001332 010367 176544 MOV R3,ACSR
560 001336 000207 RTS PC
561
562 001340 010267 176534 DERR: MOV R2,CSRA
563 001344 016767 000022 176530 MOV WORK,ACSR
564 001352 010067 176526 MOV R0,ASADR
565 001356 010467 176524 MOV R4,ASB
566 001362 010367 176522 MOV R3,AWAS
567 001366 000207 RTS PC
568
569 ;*****
570 ;
571 ;***** MODULE CONTROL CONSTANTS *****
572 ;
573 ;
574 001370 000100 TIME: 64. ; 6.4 MILLISECOND (MIN) BREAK COUNT
575 ;
576 ;***** MODULE DYNAMIC CONTROL ENTRIES *****
577 ;
578 001372 000000 WORK: 0 ; FLOATING DATA TABLE CURRENT ADDRESS
579 001374 000000 DECN1: 0 ; NUMBER OF DEV RUNNING
580 001376 000000 BKCH1: 0 ; DYNAMIC 6.4 MILLISECOND COUNTER
581 001400 000000 BLOCK: 0 ; ORIGINAL DEVICE SELECTION MAP
582 001402 000000 CNTLD: 0 ; FLOATING DATA TABLE BASE ADDRESS
583 001404 000000 CNTLX: 0 ; FLOATING SCAN TABLE BASE ADDRESS
584 001406 000000 HANSCT: 0 ; INTERRUPT SERVICE ANTIHANG CONTROL COUNTER
585 001410 000000 CNTX16: 0 ; MULTIPLE SCAN COUNTER
586 001412 000000 SCNT: 0 ; SUB SCAN CONTROL COUNTER

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587 ;*****
588 ;
589 ;***** MODULE DATA CONFIGURATION TABLE *****
590 ;
591 ;
592 001414 177776 DTABLE: 177776
593 001416 177775 177775
594 001420 177773 177773
595 001422 177767 177767
596 001424 177757 177757
597 001426 177737 177737
598 001430 177677 177677
599 001432 177577 177577
600 001434 177377 177377
601 001436 176777 176777
602 001440 175777 175777
603 001442 174777 174777
604 001444 173777 173777
605 001446 157777 157777
606 001450 137777 137777
607 001452 077777 077777
608 001454 125252 125252
609 001456 052525 052525
610 001460 100000 100000
611 001462 400000 400000
612 001464 200000 200000
613 001466 100000 100000
614 001470 400000 400000
615 001472 200000 200000
616 001474 2000 2000
617 001476 1000 1000
618 001500 004000 4000
619 001502 000100 100
620 001504 000400 400
621 001506 000200 200
622 001510 000040 40
623 001512 000020 20
624 001514 000010 10
625 001516 000001 1
626 001520 000004 4
627 001522 177777 177777
628 001524 011111 011111
629 001526 123456 123456
630 001530 065432 065432
631 001532 122222 122222
632 001534 176543 176543
633 001536 000000 0
634 001540 000000 0
-FND

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SRADR	000102R	274#								
SRK1	000766R	407#	423#							
SRNT	001412R	311*	355*	586#						
SERVC	000706R	378#	405#							
SOPCNT	000042R	257#								
SOPERS=	104406	293#								
SOPPAS	000046R	250#								
SPOINT	000032R	253#	309#							
SPSIZ =	000062	1#	229#	286						
SR1	000016R	246#								
SR2	000010R	249#								
SR3	000022R	248#								
SR4	000024R	249#								
SRALL	001066R	551#	555							
START	000270R	252#	297#							
STAT	000026R	251#								
SVRO	000062R	266#								
SVR1	000064R	267#								
SVR2	000066R	268#								
SVR3	000070R	269#								
SVR4	000072R	270#								
SVR5	000074R	271#								
SVR6	000076R	272#								
SYSCNT	000052R	261#								
S10	000712R	406#	472#							
S11	000746R	412#	476#							
S12	000762R	414#	421#							
S13	000776R	425#	437#							
S14	001020R	438#	436#							
S15	001034R	429#	438#							
S16	001040R	426#	574#							
TIME	001370R	550#								
TRPDFD=	000022	293#								
VECTOR	000010R	242#								
VERPV	001044R	446#								
V10	001054R	451#	468							
V11	001100R	460#								
V12	001104R	458#	466#							
WASADR	000104R	276#	564*							
WDFR	000116R	283#	299*	307*						
WDT0	000114R	282#	298*	306*						
WDRK	001372R	364#	379	454	470*	471	475*	563	578#	
WLAG	000005R	240#								

- ABS. 000000 000  
 001542 001

ERRORS DETECTED: 0  
 DEFAULT GLOBALS GENERATED: 0

XCBCFO, XCBCFO/SOL/CRP:SYM=DDXCOM, XCBCFO  
 RUN-TIME: 1 2 3 SECONDS  
 RUN-TIME RATIO: 13/4-3.4  
 CORE USED: 7K (13 PAGES)