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.REM \_

IDENTIFICATION

PRODUCT CODE: AC-E869C-MC  
PRODUCT NAME: CXICACO ICS-11 MODULE  
PRODUCT DATE: SEPTEMBER 1978  
MAINTAINER: DEC/X11 SUPPORT GROUP

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MAIN DEC CHANGE NOTICE  
MAY BE REQUIRED FOR  
PROGRAM TO OPERATE

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1. ABSTRACT:

ICA IS AN IOMOD DESIGNED TO OUTPUT DATA TO THE  
UNUSED ICS-11 ADDRESS AND TO CAUSE THE ICS-11 TO  
INTERRUPT USING THE MAINTENANCE INTERRUPT FACILITIES.

2. REQUIREMENTS:

HARDWARE: ICS-11  
STORAGE:: ICA REQUIRES:  
1. DECIMAL WORDS: 171  
2. OCTAL WORDS: 0253  
3. OCTAL BYTES: 526

3. PASS DEFINITION:

ONE PASS IS DEFINED AS DOING 65,536 (DECIMAL)  
MAINTENANCE INTERRUPTS.

4. EXECUTION TIME:

ICA RUNNING ALONE TAKES APPROXIMATELY ONE MINUTE.

5. CONFIGURATION REQUIREMENTS:

REQUIRED PARAMETERS:

NONE

DEFAULT PARAMETERS:

ADDR: 771776 ADDRESS OF ICS-11-CONTROL REGISTER.  
VECTOR: 234 ICS-11 INTERRUPT VECTOR.  
BR1: 6 ICS-11 INTERRUPT PRIORITY.  
BR2: 6

6. DEVICE/OPTION SETUP:

NONE

7. MODULE OPERATION:

- A. THE PROGRAM OUTPUTS MEMORY DATA TO THE UNUSED ICS-11  
LOCATION. NO DATA CHECK IS MADE.
- B. THE ICS-11 IS PRIMED FOR A MAINTENANCE INTERRUPT BY  
SETTING THE MAINTENANCE BIT AND THE INTERRUPT ENABLE  
BIT IN THE CSR.

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C. ON INTERRUPT, A CHECK IS MADE TO SEE IF THE INTERRUPT  
CAME AS A RESULT OF STEP "B" OR IF THE ICS-11 "RIF"  
(RESET INTERRUPT FLAGS SIGNAL.)  
FUNCTION FAILED TO CLEAR THE INTERRUPT CAUSED BY STEP  
B. AN ERROR IS GENERATED IF THE SECOND CONDITION IS  
TRUE AND THE MODULE RUN IS TERMINATED.  
D. THE PROGRAM ISSUES "RIF" TO THE ICS.  
E. STEPS A-D ARE REPEATED 65,536 (DECIMAL) TIMES.  
F. END PASS IS REPORTED.

8. OPERATING OPTIONS:

NONE

9. NON-STANDARD PRINTOUTS:

NONE

10. FLOW CHART

```
*****  
*          START          *  
*          RESTRT        *  
*          *              *  
*****  
I  
*****  
*          FORM          *  
*          ADDR. OF     *  
*          ICAR, ICSR,  *  
*****  
I  
*****  
*          XFER ADDR.   *  
*          ADDR. OF     *  
*          PATTERNS.   *  
*****  
SENPAT I  
-----  
/  CALL  \ YES  
/  ENDIT \----->*****  
/  \     \ *****  
-----  
I NO  
*****  
*TRANSFER 22 WORDS OF *  
*MEMORY DATA TO ICS-11*  
*  UNUSED ADDRESS    *  
*****  
I
```

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213

```
*****  
* SET *  
* INTERRUPT VECTOR. *  
* CLEAR "ICSINT" *  
*****  
I  
*****  
* SET MAINTENANCE *  
* AND INTERRUPT ENABLE *  
* BITS IN ICSR *  
*****  
I  
*****  
**EXIT **  
*****
```

```
;WHEN WE EXIT TO THE MONITOR  
;AN INTERRUPT FROM THE ICS-11  
;WILL TAKE US TO "ICSRT"
```

INTERRUPT BEGINS US HERE

```
*****  
**ICSRT **  
*****  
I  
*****  
* COMPLIMENT STATE *  
* OF FLAG *  
* "ICSINT" *  
*****  
I  
-----  
/ ICSINT \ YES  
=0 -----  
\ I NO /  
-----  
*****  
* FORM ADDR ICS THAT *  
* INTERRUPTED BASED *  
* ON CONTENTS OF ICAR *  
*****  
I  
*****  
* ISSUE SIGNAL "RIF" *  
* TO ICS-11 TO CLEAR *  
* MAINT. BIT IN ICSR *  
*****  
I  
*****  
* PIRQ *  
* (RETURN CONTROL *  
* TO MONITOR, *  
*****  
I  
*****
```

```
*****  
*DISABLE ICS-11 SETUP *  
*FOR ERROR TYPEOUT AND*  
* EXECUTE TYPEOUT *  
*****
```

```
I  
*****  
**SENPAT **  
*****
```

```
;THE MONITOR WILL STOP  
;THIS MODULE AFTER 20  
;ERRORS
```

ICAC DEC/X11 SYSTEM EXERCISER MODULE  
XICACO.P11 12-OCT-78 12:00

MACY11 30A(1052) 12-OCT-78 16:38 PAGE 6

SEQ 0005

214  
215  
216  
217

```
* MONITOR TAKES *  
* US BACK TO *  
* "SENPAI" *  
*****
```

```

218
219
220 000000
221 000000
222
223
224
225
226 000000
227 000000
228 000000
229 000000
230 000010
231 000010
232 000010
233 000014
234 000016
235 000020
236 000020
237 000024
238
239 000026
240 000030
241 000030
242 000034
243 000030
244 000040
245 000044
246 000044
247 000046
248 000050
249 000054
250 000054
251 000054
252 000054
253 000060
254 000062
255 000066
256 000066
257 000070
258 000072
259 000072
260 000076
261 000100
262 000102
263 000102
264 000104
265 000104
266 000106
267 000106
268 000110
269 000112
270 000114
271 000116
272 000120
273 000122

```

```

-
IOMOD <ICAC>,171776,234,6,6,,177777,135
MODULE 140000,ICAC,171776,234,6,6,,177777,135
.TITLE ICAC DEC/X11 SYSTEM EXERCISER MODULE
DPIXCOM VERSION 6 23-MAY-78
LIST
;*****
;*****
BEGIN:
MODNAM: .ASCII /ICAC / ;MODULE NAME
XFLAG: .BYTE OPEN ;USED TO KEEP TRACK OF WBUFF USAGE
ADDR: 171776+0 ;1ST DEVICE ADDR.
VECTOR: 234+0 ;1ST DEVICE VECTOR.
BR1: .BYTE PRTV6+0 ;1ST BR LEVEL.
BR2: .BYTE PRTV6+0 ;2ND BR LEVEL.
DVID1: +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.
INT: START ;MODULE START ADDR.
SPOINT: MODSP ;MODULE STACK POINTER.
PASCNT: 0 ;PASS COUNTER.
ICOUNT: 177777 ;LOC TO COUNT ITERATIONS
SOFCNT: 0 ;LOC TO SAVE TOTAL SOFT ERRORS
HRDCHT: 0 ;LOC TO SAVE TOTAL HARD ERRORS
SOFPAS: 0 ;LOC TO SAVE SOFT ERRORS PER PASS
HRDPAS: 0 ;LOC TO SAVE HARD ERRORS PER PASS
SYSCNT: 0 ;# OF SYS ERRORS ACCUMULATED
RANNUM: 0 ;HOLDS RANDOM # WHEN RAND MACRC IS CALLED
CONFIG: 0 ;RESERVED FOR MONITOR USE
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: ;ADDR OF GOOD DATA, OR
ACSR: OPEN ;CONTENTS OF CSR.
WASADR: ;ADDR OF BAD DATA, OR
ASTAT: OPEN ;STATUS REG CONTENTS.
ERRTYP: OPEN ;TYPE OF ERROR.
ASH: OPEN ;EXPECTED DATA.
AWAS: OPEN ;ACTUAL DATA.
RSTRT: RSTRT ;RESTART ADDRESS AFTER END OF PASS
WDTO: OPEN ;WORDS TO MEMORY PER ITERATION
WDPR: OPEN ;WORDS FROM MEMORY PER ITERATION
INTR: OPEN ;# OF INTERRUPTS PER ITERATION
IDNUM: 135 ;MODULE IDENTIFICATION NUMBER=135

```

```

274 000040
275
276
277
278
279 000224
280
281 000224
282 000226
283 000230
284 000232
285 000234
286
287
288
289 000236
290 000244
291
292 000252
293 000260
294 000266
295 000274
296 000302
297 000310
298 000316
299
300
301
302
303
304
305 000324
306 000330
307 000332
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309 000336
310 000342
311 000346
312 000350
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314
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316 000352
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320
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324
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327
328 000356
329 000362

```

```

-REPT SPSIZ ;MODULE STACK STARTS HERE.
-NLIST
-WORD 0
-ENDR
MODSP:
;*****
ICAR: 171776 ;ICS-11 CONTROL REGISTER.
ICSR: 171774 ;ICS-11 ADDRESS REGISTER.
ICAD: 171772 ;ICS-11 UNUSED ADDR.
XADR: .WORD 0 ;ADDR. OF DATA PATTERNS.
ICSINT: .WORD 0 ;INDICATES ICS INTERRUPTED IF=1.
;*MODULE INITIALIZATION
START: MOV #1,INTR ;ONE INTERRUPT/ITERATION
MOV #22,WDFR ;22. WORDS FROM MEM/ITERATION
RSTRT: MOV ADDR, ICSR ;GET ADDR. OF ICSR. (CONTROL AND STATUS REGISTER).
MOV ICSR, ICAR ;FORM ADDR. OF ICAR. (ADDRESS REGISTER).
SUB #2,ICAR ;EQUAL TO TWO LESS THAN ICSR.
MOV ICAR, ICAD ;FORM XFERR ADDR. (UNUSED ICS-11 ADDR.)
SUB #2,ICAD ;EQUAL TO TWO LESS THAN ICAR.
MOV #2,RO ;GET CURRENT MEMORY ADDRESS.
MOV RO, XADR ;SET A POINTER TO MEMORY ADDR. 22 WORDS
SUB #10,,XADR ;LESS THAN THIS ADDRESS.
;*TRANSFER 22 WORDS TO ICS UNUSED ADDR.
;SOLELY TO GENERATE MORE NOISE ON THE UNIBUS
SENPAT: TST ICOUNT ;FIRST ITERATION THIS PASS
BEQ 15 ;YES
ENDITS,BEGIN ;SIGNAL END OF ITERATION.
;MONITOR SHALL TEST END OF PASS
15: MOV XADR, R3 ;GET PATTERN ADDR.
28: MOV (3),R1C ;SEND PATTERN.
CMP R3, R7 ;HAVE WE XFERRED MEMORY PATTERNS UP TO THIS ADDRESS?
BLT 25 ;NO - REPEAT.
;*CAUSE AN ICS-INTERRUPT
CLR ICSINT ;CLEAR INTERRUPT INDICATOR.
;ICSINT IS CLEARED BY THIS INSTR.
;THEN THE ICS-11 IS FORCED TO INTR.
;THE INTR. SERVICE ROUTINE COMPLEMENTS
;THIS LOCATION, THUS IF TWO INTERRUPTS
;OCCUR (ONE BY A MAINTANCE INTR
;AND EXTRAS BECAUSE THE MAINTANCE
;INTERRUPT COULD NOT BE CLEARED, ICSINT
;WOULD GO TO ZERO IN THE INTR.
;SERVICE ROUTINE INDICATING AN
;UNEXPECTED INTERRUPT.
MOV VECTOR, R1 ;SET-UP INTERRUPT VECTOR
MOV #ICSRT, (R1)+ ;FOR INTERRUPT AND

```

```

330 000365* 116711 177420      MOV#   BR1,   (R1)   ;BR LEVEL
331 000372* 012777 000404 177624  MOV#   #404, @ICSR ;SET MAINT. AND INTR. ENABLE.
332 000400* 104400 000000*      EXIT$,BEGIN          ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
333                               ;*HANDLE ICS-INTERRUPTS HERE.
334
335 000404* 005167 177624      ICSRT: COM   ICSINT   ;INDICATE INTERRUPT.
336 000410* 001424 177624      BEQ    IS          ;IF SECOND INTR. THEN REPORT ERROR.
337 000417* 011767 177610 177464  MOV#   @ICAR, ASTAT ;READ ICAR
338 000420* 017704 177602      MOV#   @ICAR, R4    ;FORM ADDR. OF ICS THAT INTERRUPTED.
339                               ;THE ADDR. OF THE ICS-11 THAT INTERRUPTED
340                               ;IS NOT ALLOWED THE BASE ADDR. 171776
341                               ;SO THE "REAL" ADDR. IS FORMED BASED
342                               ;ON THE ICAR CONTENTS. THE ADDR
343                               ;IN THE ICAR IS IN BITS 00-07 AND
344                               ;MUST BE FORMED.
345                               ;ADDR. - TWO TIMES ICAR,
346                               ;MINUS 177400.
347 000424* 006304      ASL    R4          ;PLUS BASE ADDR. OF 171XXX.
348 000426* 042704 177400      BIC    #177400, R4 ;SET ICS RIF BIT.
349 000432* 052704 171000      BIS    #171000, R4 ;ISSUE RIF
350 000436* 052777 000001 177560  BIS    @ICSR      ;"RIF" IS A SIGNAL IN THE
351 000444* 005714      TST    (4)        ;ICS-11 USED TO CLEAR INTERRUPTS
352                               ;AND THE MAINTENANCE BIT IN THE ICSR.
353                               ;TO ISSUE THE "RIF" THE RIF BIT
354                               ;IN THE ICSR MUST BE SET AND
355                               ;AN ADDRESS IN THE ICS MUST BE
356                               ;ADDRESSED USING A "DATI" INSTR.
357
358 000446* 000004 000000* 000324*  PIRQS,BEGIN,SENPAT ; QUEUE UP TO CONTINUE AT SENPAT AND RTI
359
360 ;*IF WE COME HERE RIF DID NOT CLEAR MAINTENANCE BIT
361 ;*AND WE INTERRUPTED TWICE, OR SOME INTERRUPTING OPTION ON THE ICS
362 ;*HAD INTERRUPTED THE ICS WHEN NOT ENABLED.
363
364 000454*                               1$:
365 000454* 000004 000000* 000462*  PIRQS,BEGIN,2$      ; QUEUE UP TO CONTINUE AT 2$ AND RTI
366
367 000462* 016767 177536 177410 2$:
368 000476* 017767 177530 177404  MOV#   ICSR, CSRA ;SET UP FOR ERROR TYPEOUT
369 000476* 017767 177530 177404  MOV#   @ICSR, ACSR ;SET STATUS REGISTER
370 000476* 017767 177524 177400  MOV#   @ICAR, ASTAT ;SET ADDR. REGISTER
371 000504* 005077 177514      CLR    @ICSR      ;STOP ICSR
372 000510* 012767 000011 177370  MOV#   $1,ERRTYP ;ILLEGAL INTERRUPT
373 000516* 104405 000000* 000000*  HDRS$,BEGIN,NULL ;RIF DID NOT CLEAR MAINTENANCE INTERRUPT
374
375 ;*****
376 ;*****
377 ;*****
378 ;*****
379 ;*****
380 ;*****
381 ;*****
382 ;*****
383 ;*****
384 ;*****
385 ;*****
386 ;NOTE: IF ANY OPTION ON THE ICS-11 INTERRUPTS THE
387 ;ICS-11 DURING THE TIME THIS PROGRAM IS RUN, THIS
388 ;ERROR WILL ALSO BE GENERATED. NO OPTION SHOULD
389 ;EXAMINE BITS 00-03 OF THE ICAR. IF THESE BITS ARE
390 ;NON-ZERO THEN AN OPTION DID INTERRUPT AND THE ADDRESS
391 ;OF THE OPTION IS IN BITS 00-07 OF THE ICAR.

```

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386                               ;IF THE BITS 00-03 OF THE ICAR ARE ZERO, EXAMINE BITS 04
387                               ;OF THE ICAR TO DETERMINE WHICH FILE BOX CONTROLLER THAT
388
389 000524* 000677      BR     SENPAT      ;TRY AGAIN-MONITOR WILL KILL THIS JOB
390                               ;IF WE GET OVER 20 ERRORS.
391
392
393
394 000001      .END

```





ICAC DEC/X11 SYSTEM EXERCISER MODULE  
XICACO.P11 12-OCT-78 12:00  
XFLAG 000005R 228#

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CROSS REFERENCE TABLE -- USER SYMBOLS

SEQ 0012

. ABS. 000000 000  
000526 001

ERRORS DETECTED: 0  
DEFAULT GLOBALS GENERATED: 0

XICACO,XICACO/SOL/CRF:SYM=DDXCOM,XICACO  
RUN-TIME: 1 1.2 SECONDS  
RUN-TIME RATIO: 15/3=5.1  
CORE USED: 7K (13 PAGES)

DIAGNOSTIC ENGINEERING

**digital**

DECO  DEPO  SUBMISSION

FOR RELEASE ENG. USE  
 NEW  CHANGE  DELETE

PRODUCT IDENTIFICATION										
MD	LIBRARY	PRODUCT NUMBER	REV	PATCH	ECO TALLY	PRODUCT DATE	STATUS	DISTRIBUTION	1ST COPY - RIGHT YEAR	LAST COPY - RIGHT YEAR
	ZZ	CXICA	C	1	01	22 JAN 79	OBSOLETE	XXG R	1975	1979

TITLE CXICAC1 TCS-11 MODULE  
 AUTHOR D. RUTENHOF MAINTAINING GROUP DEC/X11 SPT GR2 MAINTAINER D. BUTENHOF SUBMITTING ENGINEER D. BUTENHOF

PRODUCT COMPONENTS						
CK	DESCRIPTION	PRODUCT NO.	REV	CK	DESCRIPTION	PRODUCT NO.
	DOCUMENT				INDEX	
	LISTING				SOURCE MEDIA	
	OBJECT MEDIA				TEST MEDIA	
X	DEPO	AF-E869C-M1				

PRODUCTS OBSOLETE (other than previous version)								
LIBRARY	PRODUCT NUMBER	REV	LIBRARY	PRODUCT NUMBER	REV	LIBRARY	PRODUCT NUMBER	REV
MD			MD			MD		

PRODUCT CHARACTERISTICS																			
PROCESSORS PRODUCT OPERATES WITH (Enter all applicable 2-digit codes representing the Processor the product operates with. See separate instructions.)																			
03	04	05	10	20	21	34	35	40	45	50	55	60	70						
OPERATIONAL CODES (Enter all applicable 2-digit codes that describe the product. See separate instructions.)																			
02	03	04	06	50															
ACT/APT/XXDP	EXT	ACT SEQ NUMBER	ACT/XXDP COMPATIBLE?	APT COMPATIBLE?	1ST PASS RUN TIME	SUBSEQUENT PASS RUN TIME													
INFORMATION FIELD			Y N	Y N	60 SECONDS	60 SECONDS													

DECO/DEPO INFORMATION							
PROBLEM REPORTS CLOSED:							
DEVICE AFFECTED DEC/X11				MULTIMEDIA AFFECTED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			
KIT NUMBERS	ZJ130-RB	ZJ239-RY	ZJ239-RZ	ZJ240-PB	ZJ240-RE	ZJ239-PB	ZJ239-RB
	ZJ239-FR	ZJ240-RB	ZJ240-FR	ZJ240-RZ			

PROBLEM:  
 Module declares end of iteration only if it has already done so.

SOLUTION:  
 It will declare end of iteration even though it has not yet done so. Side effect: it will declare 1 iteration (not a pass) prior to beginning testing.

DEPO PATCH AREA					
CHANGE LOC	FROM	TO	CHANGE LOC	FROM	TO
330	1402	240			

SUBMITTING ENGINEER <i>D. Butenhof</i>	MANUFACTURING ENGINEER <i>William A. Shan</i>	SUPPORT ENGINEER	CHARGE DECO/DEPO TO DISCRETE PROJECT NUMBER Q98-05460
DATE: 23-jan-79	DATE: 21-MAR-79	DATE:	
MAINTAINER <i>D. Butenhof</i>	FIELD SERVICE	WAIVERING MANAGER	COORDINATION NO. MC# 2837
DATE: 23-jan-79	DATE:	DATE:	