

BBAR DEC/X11 SYSTEM EXERCISER MODULE  
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DOCUMENTATION

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•SBTTL DOCUMENTATION  
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IDENTIFICATION

PRODUCT CODE: AC-E881R-MC  
PRODUCT NAME: CXBBAR0 KIT-11D MODULE  
PRODUCT DATE: SEPTEMBER 1978  
MAINTAINER: DEC/X11 SUPPORT GROUP

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1. ABSTRACT  
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BBA IS AN IOMOD THAT EXERCISES THE KIT11D. DURING A SINGLE PASS, IT CHECKS THAT THE KIT WILL PERFORM A PROGRAMMED DATA TRANSFER (PDT) FOLLOWED BY A NON PROCESSOR REQUEST (NPR) TRANSFER. ANY ERRORS DETECTED DURING THE PASS ARE REPORTED ON THE CONSOLE I/TY. THE PROGRAM WILL RUN INDEFINITELY UNTIL HALTED BY THE USER (PROVIDED THAT HARD FAIL SYSTEM ERRORS HAVE NOT BEEN ENCOUNTERED).

2. REQUIREMENTS  
\*\*\*\*\*

HARDWARE: KIT11D AND AA SPECIAL WRAP-AROUND CABLE.  
STORAGE:: BBA REQUIRES:  
1. DECIMAL WORDS: 476  
2. OCTAL WORDS: 0734  
3. OCTAL BYTES: 1670

3. PASS DEFINITION  
\*\*\*\*\*

ONE PASS OF THE KIT11D CONSISTS OF 70000 ITERATIONS 1 PROGRAMMED DATA TRANSFER AND ONE 64 WORDS.

4. EXECUTION TIME  
\*\*\*\*\*

RUNNING ALONE ON A PDP11/05 TAKES APPROXIMATELY 1 MINUTE PER PASS.

5. CONFIGURATION REQUIREMENTS  
\*\*\*\*\*

DEFAULT PARAMETERS:

3R1: 5

3R2: 0

REQUIRED PARAMETERS:  
NONE, EXCEPT FOR THE ADDRESS AND VECTOR MUST BE ASSIGNED AT CONFIGURATION TIME(OR RUN TIME VIA THE MOD COMMAND).  
THE PROGRAM WILL NOT RUN UNLESS YOU SUPPLY THE ADDRESS AND FLOATING VECTOR.

NONE

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6. DEVICE/OPTION SETUP  
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- A. THE KIT11D UNDER TEST MUST CONTAIN THE SPECIAL WRAP-AROUND CABLE FOR THIS TEST. \*\*\*\*\*
- B. THE VECTOR ADDRESS MAY BE SPECIFIED AT RUN TIME BY USING THE FOLLOWING MODIFY COMMAND AT RUN TIME:  
MODIFY KITDO 10(CR)  
THE SYSTEM WILL ISSUE A CR/LF AND PRINT OUT THE PRESENT CONTENTS OF THAT LOCATION (CALLED VECTOR).  
AT THAT TIME, YOU MAY ENTER THE NEW VECTOR ADDRESS AND FOLLOW IT BY A CARRIAGE RETURN (CR).

IF A DEVICE ADDRESS OTHER THAN 160000 IS USED.  
THAT ADDRESS MAY BE UPDATED BY USING THE MODIFY COMMAND:

MODIFY KITDO 6 <CR>

- C. THE MODULE IS SELECTED AT RUN TIME BY TYPING:  
.SEL KITDO <CR>
- D. THE MODULE IS RUN BY TYPING:  
.RUN <CR>  
AT RUN TIME.
- E. A LOAD MAP IS OBTAINED AT RUN TIME BY SAYING:  
.MAP <CR>
- F. PROGRAMMER'S GUIDE TO DECX11 IS AVAILABLE FROM PROGRAM LIBRARY.

7. MODULE OPERATION  
\*\*\*\*\*

- A. INITIALIZE THE PROGRAM TO ALLOW FOR PREVIOUS DEVICE AND/ OR VECTOR ADDRESS MODIFICATIONS.
- B. CLEAR THE CSR AND DBR AND TEST FOR DEVICE READY.
- C. BEGIN (PDT) TEST 1. ENABLE AND CHECK THE INTERRUPT.
- D. TRANSMIT A WORD (#52525) AND CHECK THAT THE INTERRUPT SERVICE ROUTINE WAS ENTERED. (SWITCH ENTERED WILL BE SET WHEN THE SERVICE ROUTINE IS ENTERED).
- E. CHECK THE CSR FOR CORRECT STATUS THEN CHECK THAT THE CORRECT WORD WAS RETURNED. END TFST1.
- F. BEGIN (NPR) TEST2, CHECK THE CSR FOR CORRECT STATUS.

153 SET UP THE WORST CASE DATA PATTERN AND LOAD IT INTO  
154 TRANSMIT BUFFER.  
155  
156 G. SET UP THE NPR PARAMETERS AND START THE NPR TRANSFER.  
157 CHECK THAT THE INTERRUPT ROUTINE WAS ENTERED.  
158 CHECK THE CSR FOR CORRECT STATUS.  
159 CHECK THAT ALL 64 WORDS WERE TRANSMITTED AND RECEIVED.  
160 CHECK THAT TRANSMITTED BUFFER MATCHES RECEIVED  
161 BUFFER.  
162  
163 H. IF TEST IS SUCCESSFUL, PRINT OUT "ENDPASS" AFTER 130000  
164 ITERATIONS OF THE TEST, AND LOOP TO BEGINNING OF TEST.  
165  
166  
167 8. OPERATION OPTIONS  
168 \*\*\*\*\*  
169  
170 9. NON-STANDARD PRINTOUTS  
171 \*\*\*\*\*  
172  
173 MOST PRINTOUTS HAVE STANDARD FORMATS AS DESCRIBED IN THE  
174 DEC/X11 DOCUMENT.  
175  
176 THE ONLY EXCEPTION IS THE KIT11D PROGRAM ERROR PRINTOUTS.  
177 ON THESE PRINTOUTS:  
178  
179 THE CSRA WILL INDICATE THE CONTENTS OF THE WORD COUNT REGISTER.  
180 THE ACSR WILL INDICATE THE CONTENTS OF THE CSR AND THE  
181 ASTAT WILL BE THE KIT11D PROGRAM ERROR NUMBER.  
182  
183 10. LOADING THE BINARY (IE., CONFIGURED EXERCISER) PROGRAM  
184 THE PROGRAM IS LOADED VIA THE ABSOLUTE LOADER.  
185  
186 START ADDRESS=200  
187  
188 RESTART ADDRESS=1000  
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195                                         **** KIT 11D *****  

196                                         **** ERROR MESSAGES ****  

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202 THE FORMAT OF KIT11D ERROR PRINTOUTS IS:  

203 NAME PC ASSEMBLED PC PASS # SYSTEM ERROR COUNT  

204 NC REGISTER# CSR CONTENTS PROGRAM ERROR #  

205  

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210 THE POSSIBLE PROGRAM ERRORS ARE:  

211 ***** ERROR ***** EXPLANATION *****  

212  

213      1 CSR NOT 610 OR 210 (PDT) DEVICE NOT READY  

214      2 CSR NOT 710 OR (PDT) INT NOT ENABLED  

215      3 CSR NOT 126510 OR 126110 (PDT)  

216      4 DATA MISMATCH, DBR NOT =52525 (PDT)  

217  

218      5 CSR NOT 710 OR 210 (NPR) CSR NOT READY  

219      6 CSR NOT 310 (NPR) INT OK BUT CSR NOT READY.  

220      7 WORD COUNT NOT ZERO (NPR)  

221      8 ALL WORDS NOT EXPECTED (NPR)  

222      9 DATA MISMATCH (NPR)  

223  

224      10 TIMEOUT ERROR (NO INT OCCURRED) (NPR/PDT)  

225      11 SLAVE SYNCH ERROR (NPR/PDT)  

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229 TXIT/11D EXERCISER MODULE  

230 000000- IONOD PBBAD '1,1,5' 70000,62  

231 000000- MODULE '140000' BBAE '1,1,5' 70000,62  

232 ; TITLE BBAE DEC/XII/ SYSTEM EXERCISER MODULE  

233 ; DDXCDM VERSION 6 23-MAY-78  

234 ; LSTL BTN  

235  

236 000000- BSCIN: ;  

237 000002- 041102 041101 040 MODULE: : ASCII /PBBB / ;MODULE NAME.  

238 000002- 000000 XTRIG: : BYTE OPEN ;USED TO KEEP TRACK OF WBUFF USAGE  

239 000002- 000001 ADDR: : 140 ;1ST DEVICE ADDR.  

240 000010- 000001 VECTCR: : 1+0 ;1ST DEVICE VECTOR.  

241 000012- 240 BR1: : BYTE PRTV5+0 ;1ST BR LEVEL.  

242 000013- 000 BR2: : BYTE PRTV4+0 ;2ND BR LEVEL.  

243 000014- 000001 DVID1: : 1 ;DEVICE INDICATOR 1.  

244 000015- 000000 SRI: : OPEN ;SWITCH REGISTER 1  

245 000020- 000000 SR2: : OPEN ;SWITCH REGISTER 2  

246 000022- 000000 SR3: : OPEN ;SWITCH REGISTER 3  

247 000024- 000000 SR4: : OPEN ;SWITCH REGISTER 4  

248  

249 000026- 140000 STAT: : 140000 ;STATUS WORD.  

250 000030- 000254- INIT: : START ;MODULE START ADDR.

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251 000032 000224* SPOINT: MODSP ;MODULE STACK POINTER.
252 000034 000000 PASCNT: 0 ;PASS COUNTER.
253 000038 000000 ICOUNT: 70000 ;# OF ITERATIONS PER PASS=70000
254 000040 000000 LOCNT: 0 ;LOC TO COUNT ITERATIONS
255 000042 000000 SOFCNT: 0 ;LOC TO COUNT TOTAL SOFT ERRORS
256 000044 000000 HRDCNT: 0 ;LOC TO SAVE TOTAL HARD ERRORS
257 000045 000000 SOPPAS: 0 ;LOC TO SAVE SOFT ERRORS PER PASS
258 000050 000000 HRDPAS: 0 ;LOC TO SAVE HARD ERRORS PER PASS
259 000052 000000 SYSCTN: 0 ;# OF SYS ERRORS ACCUMULATED
260 000054 000000 RNDNUM: 0 ;HOLDS RANDOM # WHEN RAND MACPO IS CALLED
261 000056 000000 CONF: 0 ;RESERVED FOR MONITOR USE
262 000055 000000 RES1: 0 ;RESERVED FOR MONITOR USE
263 000060 000000 RES2: 0 ;RESERVED FOR MONITOR USE
264 000062 000000 SVR0: OPEN ;LOC TO SAVE PO.
265 000064 000000 SVR1: OPEN ;LOC TO SAVE R1.
266 000066 000000 SVR2: OPEN ;LOC TO SAVE R2.
267 000068 000000 SVR3: OPEN ;LOC TO SAVE R3.
268 000072 000000 SVR4: OPEN ;LOC TO SAVE R4.
269 000074 000000 SVR5: OPEN ;LOC TO SAVE R5.
270 000075 000000 SVR6: OPEN ;LOC TO SAVE R6.
271 000100 000000 CSRA: OPEN ;ADDR OF CURRENT CSR.
272 000101 000000 SHADR: OPEN ;ADDR OF GOOD DATA, OR
273 000102 000000 ACMD: OPEN ;CONTENTS OF CSR.
274 000104 000000 MASADR: OPEN ;CODE OR BAD DATA, OR
275 000104 000000 ASTAT: OPEN ;STATUS REG CONTENTS.
276 000106 000000 ERRTYP: OPEN ;TYPE OF ERROR.
277 000105 000000 ASB: OPEN ;EXPECTED DATA.
278 000112 000344* AWAS: OPEN ;ACTUAL DATA.
279 000112 000344* RSTRT: OPEN ;RESTRT ADDRESS AFTER END OF PASS
280 000114 000000 WDFO: OPEN ;WORDS TO MEMORY PER ITERATION
281 000116 000000 WDPR: OPEN ;WORDS FROM MEMORY PER ITERATION
282 000120 000000 INTR: OPEN ;# OF INTERRUPTS PER ITERATION
283 000122 000062 IDNUM: 62 ;MODULE IDENTIFICATION NUMBER=62
284 000040 .REPT SPSIZ ;MODULE STACK STARTS HERE.
285 .LIST
286 .WORD 0
287 .LIST
288 .FENDR
289 000224* MODSP: ****
290
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296
297 000224- 160006          ;LOCATIONS LOCAL TO THIS MODULE.
298 000226- 160004          ;DATA BUFFER REGISTER.
299 000230- 160002          ;CONTROL STATUS REGISTER.
300 000232- 160000          ;BUS ADDRESS REGISTER.
301 000234- 000001          ;WORD COUNT REGISTER.
302 000236- 177700          ;NPR MAX: WORD 1
303                               ;NPR WORST CASE DATA LOOP LIMIT.
304                               ;NPRLMT: WORD -100
305                               ;(NPR) # OF WORDS IN WORST CASE PATTERN
306                               ;64=32x2 TRANSFERS FOR WORD COUNT.
307
308 000240- 000000          ;NPRCTR: WORD 0
309 000242- 000000          ;ERROR: WORD 0
310                               ;NO COUNTER FOR NPR PATTERN.
311                               ;THIS NUMBER IS PRINTED DURING KIT11
312                               ;PROGRAM GENERATED ERROR MESSAGES.
313
314 000244- 000700          ;TLIMIT: WORD 200
315 000246- 000000          ;TFIND: WORD 0
316 000248- 000000          ;ENTERI: WORD 0
317 000252- 000000          ;SLVSYN: WORD 0
318
319 000254- 012767 000002 177636  START: MOV #2_INTR
320 000256- 012767 000100 177624  MOV #100_WDTQ
321 000258- 012767 000100 177620  MOV #100_WDFR
322 000260- 012767 001432-  MOV VECTOR_R1
323 000306- 116721 177500   MOV #KITSRV,(R1)+ ;INFORMATION.
324
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330
331 000312- 016702 177470   MOV ADDR_R2 ;GET BASE ADDRESS.
332 000319- 008492 177710   MOV R2,(R2)+ ;SET UP THE REGISTER ADDRESSES FOR THE KIT-11 D.
333
334 000324- 010267 177700   TST R2,BAR ;RESET ADDRESS.
335 000330- 005722 177670   MOV R2_CSR
336 000332- 010267 177670   TST R2,(R2)+ ;CONTROL STATUS
337 000336- 005722 177660   MOV R2,DBP ;DATA BUFFER REG.
338
339 000340- 010267 177660   RESTRT: CLR #DBR
340 000344- 005077 177654   CLR #CSR ;START OFF BY CLEARING
341 000350- 005077 177652   CLR #CSR ;THE CONTROL STATUS REGISTER.
342 000354- 005067 177650   CLR ENTERI ;ZERO THE "INTERRUPT ENTERED" FLAG.
343 000360- 005067 177656   CLR SLVSYN ;ZERO THE "SLAVE SYNCH" ERROR FLAG.
344
345 000364- 012777 177777- 177640   MOV #-1_AWC
346 000372- 012777 001466- 177630   MOV #BUFFER_BBAR ;SET UP FOR PDT.
347 000400- 022777 000210 177620   CMP #210,_CSR ;SAME AS ABOVE.
348
349
350
351 000406- 001470          ;CHECK TO SEE IF BIT7
352 000416- 001414          ;CAME UP (READY BIT).
353 000420- 004767 000756          ;SBTTL TEST 1 (PDT)
354
355 000424- 012767 000001 000630          ;ERR: JSR PDT1
356 000432- 012767 000003 177446          ;CMP #100_WCSR
357
358 000440- 104405 000000- 000000          ;ERR: JSR PDT1
359
360
361 000446- 000702          ;*****OPTIONAL CASE*****
362
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350
351 000406- 001470          ;*****OPTIONAL CASE*****
352 000416- 001414          ;*****FIRST TIME THRU THIS IS TRUE*****
353 000420- 004767 000756          ;JSR PDT1,_CSR
354
355 000424- 012767 000001 000630          ;JSR PDT1,_CSR=610
356 000432- 012767 000003 177446          ;JSR PDT1,_CSR=610
357
358 000440- 104405 000000- 000000          ;*****PRIORITY TO ERROR CALL*****
359
360
361 000446- 000702          ;*****CONTROLLER NOT READY*****
362
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TEST 1 (PDT)

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364 ;\*\*\*\*\* TEST 1 (PDT) \*\*\*\*\*  
365 ;(PDT MEANS "PROGRAMMED DATA TRANSFER")  
366 ;THIS PART ATTEMPTS A SINGLE DATA TRANSFER UNDER  
367 ;PROGRAM CONTROL. A CHARACTER IS WRITTEN INTO  
368 ;OUTPUT BUFFER AND KEPT IN A TIMING LOOP UNTIL  
369 ;THE CHARACTER EVOKE AN "INPUT" INTERRUPT. IF NO  
370 ;INTERRUPT IS GENERATED, AN ERROR IS PRINTED AND A  
371 ;RESTART IS INITIATED.  
372 ;  
373 ;THIS PART OF THE EXERCISER USES A MOVE INSTRUCTION TO  
374 ;LOAD THE DDR.  
375 ;AN INTERRUPT IS NOT EXPECTED UNTIL THE DATA BUFFER  
376 ;REGISTER HAS BEEN LOADED.  
377 ;  
378 381 000450- 052777 000100 177550 PDT1: BIS C4P #100,ACSR ;ENABLE THE INTERRUPT.  
382 000456- 022777 000310 177542 C4P #310,ACSR ;CHECK THE RTT.  
383 ;  
384 000464- 001420 000710 177532 BEQ 25 ;RTT 6 IS UP.  
385 000466- 001414 000710,ACSR ;SECOND CASE TO CHECK.  
386 JSR 25 ;  
387 000475- 004767 000700 JSR #25,SETUP  
388 000502- 012767 000002 000552 MOV #25,ERRORN ;ERROR #2.  
389 000510- 012767 000027 177370 MOV #25,ERRTYP ;INTERRUPT ENABLE NOT WORKING.  
390 ;  
391 000516- 104405 000000- 000000 HRDRS,BEGIN,NULL ;INTERRUPT ENABLE DIDN'T COME UP ---- ERROR #2 ----  
392 ;  
393 000524- 000653 BR START ;RESTART.  
394 ;  
395 ;  
396 ;THE INTERRUPT HAS BEEN ENABLED, XMIT A WORD, START  
397 ;THE TIMER, AND SEE IF THE WORD IS WRAPPED AROUND.  
398 398 000526- 012777 052525 177470 ZS: MOV #52525,ADDR ;XMIT A WORD.  
399 000534- 004767 000524 177470 JSR PC,T14001 ;GO TO THE TIME-OUT  
400 ;DELAY ROUTINE.  
401 ;RETURNS HERE IF THE INTERRUPT OCCURRED.  
402 402 403 000540- 027727 177462 126010 LS: CMP #CSP,\$126010 ;CASE FOR LAST DIRECTION=IN.  
404 000546- 001420 126410 177450 BEQ 35 ;  
405 000552- 001414 126410,ACSR ;CASE FOR LAST DIR=OUT.  
406 JSR 35 ;  
407 000556- 012767 000003 000474 MOV #3,ERRORN ;ERROR 3  
408 000560- 004767 000610 JSR #25,SETUP  
409 000572- 012767 000025 177306 MOV #25,ERRTYP ;BIT STUCK IN REG.  
410 ;  
411 000600- 104405 000000- 000000 HRDRS,BEGIN,NULL ;CSP NOW 126010 OR 126410 ---- ERROR #3----  
412 000506- 000622 000610- 022777 052525 177406 35: BEQ START ;RESTART.  
413 JSR #52525,ADDR ;COMPARE XMITTED  
414 000610- 022777 ;DATA TO RCVD DATA.  
415 ;  
416 ;  
417 ;  
418 000616- 001414 BEQ PDT2 ;YES DATA MATCHED.  
419 000620- 012767 000004 000434 MOV #25,ERRORN ;ERROR #4  
420 JSR PC,SETUP ;  
421 ;  
422 000632- 012767 000025 177246 MOV #25,ERRTYP ;BIT STUCK IN REG.  
423 ;  
424 000640- 104405 000000- 000000 HRDRS,BEGIN,NULL ;DATA MISMATCH DURING PDT ---- ERROR #5----  
425 000646- 000602 RTN1: BR START ;RESTART.  
426 ;  
427 ;SBTTL TEST 2 NRP  
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BBAR DEC/X11 SYSTEM EXERCISER MODULE  
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SEQ 0011

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436  
437 000650- 042777 002000 177350 PDT2: BIC #2000 &CSR ;CLEAR BIT 10. (INPUT BIT)  
438 000655- 021221 177344 000210 CSD CSR, #210 ;READY BIT UP?  
439 000660- 021221 177344 000210 CMP CSR, #610 ;CHECK FOR 2ND CASE.  
440 000674- 001415 177334 000610 BEQ NPR1 ;YES BIT READY.  
441 000676- 012767 000005 000356 MOV #5, ERRORN ;ERROR #5.  
442 000704- 004767 000472 JSR PC, SETUP ;GET READY FOR ERROR MESSAGE.  
443 000710- 012767 000003 177170 MOV #14, ERRTYP ;CONTROLLER NOT READY.  
444 000716- 104405 000000- 000000 HRDPR, BEGIN, NULL ;CSR NOT READY AFTER PDT ---- ERROR #3----  
445 000724- 000167 177324 JMP START ;AND RETURN.

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SEQ 0012

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458 ;SET UP THE WORST CASE DATA PATTERN AND  
459 ;XMIT IT UNDER NPR CONTROL.  
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503  
504 ;SET UP THE WORST CASE DATA PATTERN BELOW:  
;(THIS PATTERN WILL BE LOADED INTO ODD LOCATIONS)  
WORD: PATTERN:  
1 177776  
3 1  
5 177775  
7 2  
11 177763  
13 4  
15 177767  
17 10  
21 177757  
23 20  
:::  
75 077777  
77 100000  
NPR1: MOV #BUFFER, R1 ;BUFFER ADDRESS FOR  
;TRANSMITTED/RCVD DATA.  
NPR1A: CLR NPrCTR ;START WITH FRESH COUNTER  
NPR1A: MOV #1, R0 ;START FORMING DATA ITS  
;COMPLEMENT.  
NPR2: COM R0 ;INVERT IT(NEG #).  
MOV R0, (R1)+ ;OPEN A SPOT INTO ADDRESS AT R1  
CLR (R1)+ ;RETURNED DATA (FREE LOCATION).  
COM R0, (R1)+ ;INVERT IT AGAIN (POS #) AND  
MOV R0, (R1)+ ;OPEN A FREE SPOT FOR  
CLR (R1)+ ;RETURNED DATA (TO BE USED LATER).  
;  
;WE HAVE FORMED A NEGATIVE NUMBER AND ITS  
;POSITIVE COMPLEMENT IN THE BUFFER. WE HAVE ALSO  
;STAGGERED THE BUFFER TO ALLOW EACH NUMBER FORMED  
;TO BE FOLLOWED BY A FREE LOCATION DUE TO THE  
;NATURE OF THE "WRAP-AROUND" CABLE USED IN THIS  
;TEST.  
;  
;THUS OUR BUFFER WILL CONTAIN DATA TRANSMITTED INTERLAVED

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TEST 2 NPR

SEQ 0013

505 ;WITH THE DATA THAT WAS RECEIVED.  
506 000760\* 006300 ;ASL R0 ;START SHIFTING R0 TO FORM  
508 ;THE NEXT SET OF DATA TO BE  
509 ;LOADED.  
510 000762\* 001370 ;BNE NPr2 ;UP COUNTER TO  
511 000764\* 005267 177250 INC NPrCTR ;LOOP X TIMES TO  
512 ;OBTAIN 32 WORDS  
513 ;WORDS TO XFER.  
514 ;  
515 000770\* 026767 177240 177242 ;CMP NPrMAX,NPrCTR ;X TIMES THRU LOOP?  
516 000776\* 001360 ;BNE NPrIA ;IF XFERRED, X=1.  
517 ;NO, SO DO IT AGAIN.  
518 ;YES, THE XMIT BUFFER HAS BEEN SET UP.  
519 ;

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TEST 2 NPR

SEQ 0014

523 ;NOW SETUP THE TRANSFER (NPR) PARAMETERS.  
524 ;  
525 ;  
526 001000\* 016777 177232- 177224 MOV NPrLWT,BNC ;2X WORDS  
527 ;SET UP THE ADDRESS  
528 ;OF THE BUFFER.  
529 ;  
530 001014\* 052777 000103 177204 ;START THE ACTUAL TRANSFER HERE.  
531 ;BTS #103,@CSR ;SET IN AND OUT.  
532 ;ENABLE THE INTERRUPT.  
533 001022\* 004767 000236 JSR PC,TIMOUT ;CHECK THE INTERRUPT SERVICE  
534 ;ROUTINE VIA TIME-  
535 ;OUT LOOP.  
536 ;  
537 ;  
538 ;AT THIS POINT, WE HAVE VERIFIED THAT AN INTERRUPT HAS  
539 ;OCCURRED. CHECK THE CSR FOR ERRORS.  
540 ;  
541 ;  
542 001026\* 027727 177174 000210 IS: CMP QCSR,#210 ;CSR=310?  
543 001034\* 001415 BEQ NPr4A ;YES, GOTO WORD COUNT OVERFLOW CHECK  
544 001036\* 012767 000006 000216 MOV #1,ERRORN ;ERROR #6  
545 001044\* 004767 000332 JSR PC,SETUP ;NO, GET READY TO REPORT ERROR.  
546 ;  
547 001050\* 012767 000025 177030 MOV #25,ERRTYP ;1ST STUCK IN RPG.  
548 ;\*\*\*\*\*#25,ERRTYP\*\*\*\*\*  
549 001056\* 104405 000000\* 000000 HRDRRS,BEGIN,NULL ;CSR NOT 310 ---- ERROR #6----  
550 ;\*\*\*\*\*#10,ERRTYP\*\*\*\*\*  
551 001064\* 000167 177164 JMP START ;RESTART.  
552 ;  
553 ;NOW CHECK THE BAR TO MAKE SURE THAT THE  
554 ;INTERRUPT WAS NOT DUE TO A PREMATURE WC OVERFLOW.  
555 ;  
556 001070\* 005777 177136 NPr4A: TST BNC ;  
557 001074\* 001413 BEQ NPr4 ;  
558 001076\* 012767 000007 000156 MOV #1,ERRORN ;ERROR 7.  
559 001104\* 012767 000011 176774 MOV #11,ERRTYP ;ILLEGAL INTERRUPT.  
560 ;\*\*\*\*\*#11,ERRTYP\*\*\*\*\*  
561 001112\* 104405 000000\* 000000 HRDRRS,BEGIN,NULL ;WORD COUNT NOT ZERO ---- ERROR #7----  
562 ;\*\*\*\*\*#11,ERRTYP\*\*\*\*\*  
563 001120\* 000167 177130 JMP START ;RESTART.  
564 ;  
565 ;NOW CHECK TO MAKE SURE THAT 100 WORDS WERE TRANSFERRED.  
566 ;THE BAR SHOULD BE EQUAL TO BUFFER START ADDRESS PLUS 200.  
567 ;  
568 001124\* 017767 177100- 177114 NPr4: MOV BRAB,TTEMP ;SAVE BAR.  
569 001125\* 0162767 001456- 177106 SUB BUFFER,TTEMP ;GET THE OFFSET.  
570 001140\* 026727 177102 000200 CMP TTEMP,#200 ;ALL WORDS XFERRED?  
571 001146\* 001415 BEQ NPr5 ;YES.  
572 001150\* 012767 000010 000104 MOV #10,ERRORN ;ERROR #10  
573 001156\* 004767 000220 JSR PC,SETUP ;NO  
574 001162\* 012767 000011 176716 MOV #11,ERRTYP ;ILLEGAL INTERRUPT.  
575 ;\*\*\*\*\*#11,ERRTYP\*\*\*\*\*  
576 001170\* 104405 000000\* 000000 HRDRRS,BEGIN,NULL ;ALL WORDS NOT TRANSFERRED ---- ERROR #10----

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SEQ 0015

```
579      *****  
580  001176* 000167  177052          JMP     START      ;RESTART.  
581  
582  
583      ;ALL X WORDS HAVE BEEN XFERRED.  
584      ;CHCK THE XMITTED/RCVD DATA.  
585      ;CONTENTS OF BUFFER LOCATION X SHOULD EQUAL  
586      ;CONTENTS OF X+2.  
587  
588  001202* 012701  001466*          NPR5:  MOV     #BUFFER,R1    ;GET THE STARTING  
589          NPR5A: CMP     (R1)+(R1)+  ;ADDRESS OF  
590          B20      NPR5   ;NO MATCH.  
591  001210* 001415  000011  000042    MOV     #11,ERRORN ;ERROR #11.  
592  
593  001212* 012767  000001          JSR     PC,SETUP   ;NO MATCH.  
594  
595  001220* 004767  000156          MOV     #1,ERRTYP  ;DATA ERROR  
596          NDR5: BEGIN, NULL    ;DATA MISMATCH ;NPR CHECK ----ERROR #11----  
597  001224* 012767  000001          HRSR5: BEGIN, NULL    ;DATA MISMATCH ;NPR CHECK ----ERROR #11----  
598  001232* 104405  000000* 000000    JMP     START      ;RESTART.  
599  
600  001240* 000167  177010          ;LOOP UNTIL ENTIRE BUFFER HAS BEEN CHECKED.  
601  
602  001244* 020127  001666*          NPR5B: CMP     R1,#BUFFER+200 ;HAVE WE CHECKED THE ENTIRE BUFFER?  
603          BMI     NPR5A    ;SFT PTRS AND  
604          B20      CHECK THEM UNTIL  
605          B20      ALL HAVE BEEN CHECKED.  
606  
607  
608  
609  
610      ;TEST RAN SUCCESSFULLY. TYPE OUT A MESSAGE  
611      ;OF "ENDPASS" AND THEN RE-RUN THE TEST.  
612  
613      ;LET 70000 PASSES THROUGH THE KIT EXERCISER.  
614      ;BE EXECUTED BEFORE PRINTING ENDPASS MESSAGE.  
615  
616  
617      ;ELSE PRINT OUT THE MESSAGE AND RESTART THE EXERCISER.  
618      ;A PASS HAS BEEN COMPLETED.  
619  
620  
621  
622  
623  
624  001252* 104413  000000*          NPR6: ENDITS,BEGIN   ;SIGNAL END OF ITERATION,  
625          001252* 104407  000000*          ;MONITOR SHALL TEST END OF PASS  
626  
627  001256* 000167  177062          RESTRT: JMP    RESTRT   ;COMES HERE IF NOT YET 70000 ITERATIONS OF THE EXERCISER  
628  001262* 000000  .SBTTL  SUBROUTINES ;FERROR NUMBER.  
629  
630
```

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SEQ 0016

```
631      *****  
632      ***** TIME OUT ROUTINE *****  
633  
634  
635      ;THIS IS A CLOSE (TIGHT) LOOP TO SERVICE OTHER DEVICES.  
636      ;THE ONLY WAY THIS LOOP CAN BE BROKEN OUT OF IS VIA  
637      ;AN INTERRUPT FROM THE KIT111 MODULE.  
638      ;AN ERROR IS PRODUCED IF THE INTERRUPT DOES NOT OCCUR  
639      ;WITHIN LIMITS.  
640  
641  001264* 016767  176754  176754    TIMEOUT: MOV    TLIMIT,TTEMP ;SET THE TIMEOUT WAIT LIMIT.  
642  
643      ;WHEN AN INTERRUPT IS SERVICED, "ENTER1"  
644      ;WILL BE SET. THIS SOFTWARE SWITCH WILL EXIT US OUT OF  
645      ;THE BREAK LOOP  
646  
647  001272* 104407  000000*          TIM1: BREAKS,BEGIN    ;TEMPORARY RETURN TO MONITOR----.  
648          001276* 104407  000000*          BREAKS,BEGIN    ;THEN CONTINUE AT NEXT INSTRUCTION.  
649  
650  001302* 005767  176742          TST    ENTER1    ;CHECK TO SEE IF AN INTERRUPT  
651          B20      HAS OCCURRED.  
652  
653  
654  001306* 001021          BNE    TIMOK    ;AN INTERRUPT DID OCCUR--BRANCH  
655  
656  001310* 005367  176732          DEC    TTEMP    ;DOWN THE WAIT COUNTER.  
657  001314* 001366  .SBTTL  TIM1    ;NO CONTINUE ON.  
658  001316* 012767  000012  177736    MOV    #12,ERRORN ;FERROR #12.  
659  
660  001324* 004767  000052          JSR    PC,SETUP   ;TAKE AN RTS TO CLEAN UP THE STACK  
661  001330* 005726  .SBTTL  TST    (#6)*    ;POP THE STACK TO  
662  001332* 012767  000023  176546    BNE    ERRTYP  ;MISSING INTERRUPT  
663  
664  001340* 104405  000000* 000000    HRSR5: BEGIN, NULL    ;TIMEOUT ERROR ---- ERROR #12----  
665  
666  001346* 000167  176702          JMP    START      ;RESTART  
667  
668  001352* 005067  176672          TIMOK: CLR    ENTER1    ;RESET THE FLAG TO ZERO.  
669  001356* 005767  176670          TST    SLVSYN    ;TEST FOR A POSSIBLE SLAVE SYNCH  
670          B20      FERRON  ;IF FERRON  
671          TST    SLVSYN  ;IF SLAVE SYNCH DOESN'T COME BACK  
672          B20      WITHIN 20 US, BIT 14 WILL GENERATE AN INTERRUPT.  
673  
674  001362* 001406  .SBTTL  B20      1$      ;BRANCH IF NOT SLAVE SYNCH.  
675  001372* 005796  000013  177670    MOV    #1$+ERRORN ;TAKE AN RTS TO CLEANUP STACK  
676  001374* 000167  176654          JMP    START      ;RESTART.  
677  
678  001400* 000207          LS:    RTS    PC      ;RETURN TO MAIN PROGRAM.  
679          B20      ;(NORMAL RETURN.)  
680  
681
```

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SUBROUTINES

SEQ 0017

```
682
683
684
685
686
687
688
689
690
691 001402* 017767 176624 176470 SETUP: MOV     @WC,CSRA      ;SAVE THE CSP.
692 001410* 017167 176612 176464    MOV     @CSP,ACSR      ;SAVE CONTENTS OF CSR.
693 001416* 016767 176640 176460    MOV     @ERRR,ASTAT    ;GET ERROR.
694 001424* 005077 176576          CLR     @CSR           ;CLEAR THE (INTERRUPT ENABLE)CSR
695 001430* 000207          RTS     PC            ;AND RETURN.
696
697 .SBTTL INTERRUPT SERVICE ROUTINE
```

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INTERRUPT SERVICE ROUTINE

SEQ 0018

```
698
699
700
701
702
703
704
705
706 001432* 042777 000100 176566 KITSRV: BIC     #100,ACSR      ;DISABLE THE INTERRUPT.
707 001440* 012767 000001 176602    MOV     #1,ENTERI    ;SET THE "INTERRUPT ENTERED" FLAG.
708 001446* 032777 040000 176552    BIT     #40000,ACSR    ;20 US SLAVE SYNCH FAILURE??
709 001454* 001403 000001 176566    BEQ     LS           ;BRANCH IF NOT.
710          001456* 012767 000001 176566    MOV     #1,SLVSYN    ;ELSE SET THE SLAVE ERROR FLAG.
711
712 001464* 000002 LS:      RTI           ;RETURN TO THE TIMEOUT ROUTINE.
713
714
715
716
717
718 001466* 000100 .SBTTL DATA BUFFER
719 001666* 000000 BUFFER: .WORD 100
720          000001 .END
```

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XBBAR0.P11 12-OCT-78 11:45 CROSS REFERENCE TABLE -- USER SYMBOLS

SEQ 0019

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XRBAB0.P11 12-OCT-78 11:45 CROSS REFERENCE TABLE -- USER SYMBOLS

SEQ 0020

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SEQ 0021

```
ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

XBBAR0,XBBAB0/SOL/CR:SYM=DDXCOM,XBBAB0
RUN-TIME: 1.2 .3 SECONDS
RUN-TIME RATIO: 19/4=4.4
CORE USED: 7K (13 PAGES)
```