

# Micro Fiche Scan

Name of device(s) tested:

DL11

Test description:

DL11 MODULE

MAINDEC Number or Package Identifier (after SEP 1977):

CXDLAL0

Fiche Document Part Number:

AH-E711L-MC

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DLAL DEC/X11 SYSTEM EXERCISER M MACRO M1200 07-JAN-85 15:20 PAGE 2  
DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

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IDENTIFICATION  
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PRODUCT CODE: AC-E709L-MC  
PRODUCT NAME: CXDLALO DL11 MODULE  
PRODUCT DATE: NOVEMBER 1984  
MAINTAINER: DEC/X11 SUPPORT GROUP

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1. ABSTRACT:

DLA IS AN IOMOD THAT EXERCISES UP TO SIXTEEN DL11 ASYNCHRONOUS INTERFACES. IT IS CAPABLE OF EXERCISING ALL DL11 MODELS. IT USES MAINTENANCE MODE TO TRANSMIT AND RECEIVE A BINARY COUNT PATTERN OUTPUT AND RECEIVED IN 64. CHARACTER BURSTS. THE MAJOR PORTION OF THE ERROR CHECKING IS DEFERRED TO PRIORITY LEVEL 0. ALL LINES SELECTED FOR TEST (UP TO 16 DL11'S WITH CONTIGUOUS ADDRESSES AND VECTORS) ARE ACTIVATED AND RUN CONCURRENTLY. ALL TRANSMIT AND RECEIVE ERRORS ARE REPORTED ON THE CONSOLE TTY.

NOTE:

THIS MODULE IS NOT DESIGNED TO EXERCISE ANY TYPE OF TERMINAL DEVICE. IT IS DESIGNED ONLY TO EXERCISE THE DL. ANY INFORMATION DISPLAYED OR PRINTED IS INCIDENTAL AND SHOULD BE IGNORED. IN MOST CASES THE TERMINAL DEVICE SHOULD BE PLACED IN THE OFF-LINE MODE.

2. REQUIREMENTS:

HARDWARE:

AT LEAST ONE DL11 INTERFACE  
NOTE: FOR THE DLV11, THE TEST CONNECTOR  
MUST BE INSTALLED !

STORAGE:: DLA REQUIRES:

1. DECIMAL WORDS: 959
2. OCTAL WORDS: 1677
3. OCTAL BYTES: 3576

:RG002  
:RG002  
:RG002

3. PASS DEFINITION:

ONE PASS OF THE DLA MODULE CONSISTS OF TRANSMITTING AND RECEIVING SOME CHARACTERS. THE EXACT NUMBER DEPENDS ON THE BAUD RATE

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4. EXECUTION TIME:

-----  
VARIES WITH BAUD RATE BUT SHOULD TAKE ABOUT ONE  
MINUTE TO COMPLETE ONE PASS WHEN RUNNING ALONE.  
SR1 MUST BE SET TO MATCH THE BAUD RATE OR THE  
PASS TIMES WILL BE OFF. SR2 CAN BE SET TO THE  
ITERATION CONSTANT (ICONT) DESIRED REGARDLESS OF  
THE BAUD RATE IF DESIRED. (RS001)

5. CONFIGURATION PARAMETERS:

-----  
DEFAULT PARAMETERS:

DVA: 176500. VCT: 1. BR1: 4. BR2: 0. DVC: 1

REQUIRED PARAMETERS:

AT CONFIGURATION TIME THE USER MUST SPECIFY:

VCT: VECTOR ADDRESS OF FIRST DL11  
DVC: NO OF DL11'S IF GREATER THAN 1

6. DEVICE OPTION SETUP:

-----  
NONE REQUIRED

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7. MODULE OPERATION:  
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## 7.1 TEST SEQUENCE:

- A. START: USING THE DEVICE SELECTION PARAMETER "DVID1" THIS SECTION OF CODE SETS UP THE VECTORS OF ALL SELECTED LINES TO POINT TO THE APPROPRIATE JSR INSTRUCTION IN THE JSR LINKING TABLE.
- B. SETCSR: THIS PIECE OF CODE INSERTS THE PROPER CSR ADDRESS OF EACH ACTIVE LINE INTO THE THIRD WORD OF EACH JSR TABLE ENTRY.
- C. STUP: THIS ROUTINE INITIALIZES ALL TABLES, BUFFERS, FLAGS AND COUNTERS, THEN PROCEEDS TO TURN ON THE INTERRUPTS FOR ALL ACTIVE LINES. IT USES THE CONTENTS OF THE ACTIVE DEVICE TABLE TO FIND OUT WHICH LINES TO KICK OFF. AFTER INITIALIZING ALL LINES IT WAITS FOR COMPLETION OF 64 TRANSMITTER AND RECEIVER INTERRUPTS VIA A BREAK LOOP. IF THE 64 INTERRUPTS HAVE OCCURRED ON BOTH TRANSMITTER AND RECEIVER, OR IF THE BREAK LOOP TIMES OUT, CONTROL PASSES TO ERRCHK.
- D. TINT: THE TRANSMITTER SERVICE ROUTINE SIMPLY QUEUES UP THE REQUEST FOR SERVICE IN A FIFO QUEUE, UPDATES THE POINTER, AND RETURNS CONTROL BACK TO THE MONITOR WITH A PIRQ. THE ELEMENT THAT GETS STORED IN THE QUEUE IS A POINTER TO THE INTERRUPTING CSR ADDRESS. THE ACTUAL SERVICING IS DONE LATER WHERE THE SERVICE CODE IS EXECUTED AT PRIORITY LEVEL 0.
- E. TSERV: THIS CODE RETRIEVES A POINTER FROM THE FIFO QUEUE AND BUILDS THE CSR ADDRESS. THE FOLLOWING SEQUENCE IS EXECUTED:
1. TEST FOR END OF 64. CHAR BURST - IF  
END EXIT - IF NOT GO TO 2
  2. TEST READY FLAG - IF NOT ASSERTED GO  
REPORT FALSE INTERRUPT - IF ASSERTED  
PROCEED TO STEP 3
  3. COUNT THE INTERRUPT FOR INDIVIDUAL  
LINE
  4. GENERATE AND OUTPUT NEXT CHARACTER,  
KEEP TRACK OF THE NUMBER OF CHARACTERS

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OUTPUT ON THE LINE, AND THEN EXIT BACK TO THE MONITOR.

F. RINT: THE RECEIVER SERVICE ROUTINE STORES DATA AND STATUS INFORMATION IN A RECEIVER STARTUP TABLE, TESTS FOR THE END OF A 64. CHAR XFR SEQUENCE AND THEN EXECUTES AN "RTI". IT ALSO COUNTS RECEIVE INTERRUPTS IN A SEPARATE COUNTER FOR EACH LINE. SEPARATE COUNTER.

G. ERRCHK: THE BULK OF THE ERROR CHECKING AND REPORTING IS DONE HERE AT THE END OF EACH 64. CHAR. BURST. THE FOLLOWING SEQUENCE IS EXECUTED:

1. TURN OFF RCVR AND XMTR INTR. ENABLES FOR ALL ACTIVE LINES
2. SCAN THROUGH THE RECEIVER STATUS TABLE (64 ENTRIES OF TWO WORDS EACH) TO CHECK FOR AND REPORT:

A.) PARITY, FRAMING AND OVER-RUN ERRORS.

B.) RCVR FALSE INTERRUPTS

C.) DATA COMPARE ERRORS. ONLY IF A AND B DID NOT OCCUR.

3. CHECK RECEIVER AND TRANSMITTER INTERRUPT COUNTS FOR EACH LINE TO BE SURE THAT NO LINES WERE DROPPED OR HAD TOO MANY INTERRUPTS.

4. GO TO THE ENPS ROUTINE AFTER CHECKING ALL 64 ENTRIES.

H. ENPS: COUNT THE 64. CHAR BURST AND TEST FOR 128. BURSTS (8192 CHARS). IF NOT END OF PASS GO TO I. IF END REPORT END OF PASS AND GO TO C.

I. RESYNC: RESYNC THE DATA BUFFERS AND THEN RESTART AT STEP C.

## 7.2 DESCRIPTION OF TABLES, QUEUES, AND BUFFERS

A. RSTAB: THIS IS A 128. WORD STATUS TABLE CONSISTING OF 64. TWO WORD ENTRIES. IT GETS LOADED DURING RECEIVER INTERRUPT SERVICE AND CHECKED AT THE END OF EACH 64. CHAR BURST. EACH ENTRY HAS THE FOLLOWING FORMAT:

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1ST WORD: CONTENTS OF RCSR

2ND WORD: LO BYTE = RCVD DATA BYTE  
HI BYTE = LINE NUMBER

B. RCNT: 16 BYTE TABLE CONTAINING AN 8 BIT INTERRUPT COUNTER FOR EACH RCVR. THE APPROPRIATE BYTE GETS INCREMENTED DURING RCVR INTR SERVICE AND CHECKED FOR EQUIVALENCE TO THE NUMBER OF CHARACTERS TRANSMITTED.

C. TCNT: 16 BYTE TABLE CONTAINING AN 8-BIT INTERRUPT COUNTER FOR EACH TRANSMITTER. THE APPROPRIATE BYTE GETS INCREMENTED DURING DEFERRED INTR. SERVICE AND CHECKED FOR EQUIVALENCE TO THE NUMBER OF CHARACTERS TRANSMITTED.

D. DLNT: 16 BYTE TABLE CONTAINING AN 8-BIT DATA COUNTER FOR EACH LINE. THE APPROPRIATE BYTE GETS INCREMENTED EACH TIME A CHARACTER IS TRANSMITTED ON THE LINE, AND CLEARED BEFORE THE BEGINNING OF EACH 64. WORD BURST.

E. TQ: 16 WORD FIFO QUEUE FOR TRANSMITTER SERVICE. LOADED DURING XMTR INTERRUPT SERVICE WITH A POINTER TO THE CSR ADDRESS AND UNLOADED DURING DEFERRED XMTR SERVICE.

F. XBUF: 16 BYTE XMTR DATA BUFFERS - ONE BYTE/XMTR

G. RBUF: 16 BYTE RCVR DATA BUFFERS - ONE BYTE/RCVR.

H. JSRTAB: A 128 WORD TABLE THAT CONTAINS 64 JSR INSTRUCTIONS WITH TWO TRAILING ARGUMENTS. EACH RECEIVER AND EACH XMTR HAS AN ASSIGNED JSR IN THE TABLE OF THE FOLLOWING FORMAT:

JSR R5,RINT(TINT)  
O  
N

WHERE THE O GETS OVERLAYED WITH THE ADDRESS OF THE CSR FOR LINE N AND N IS THE LINE NO. IN OCTAL (00-17)

8. OPERATOR OPTIONS:

A. THE USER CAN USE THE "MOD" COMMAND TO DUMP THE TABLES BUFFERS DESCRIBED IN 7.2 TO OBTAIN MORE DETAILED ERROR INFORMATION.

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- B. THE USER CAN MODIFY (DLA 14) "DVID1" TO SELECT OR DESELECT INDIVIDUAL DL11'S.
- C. SR1 IS USED TO SPECIFY THE BAUD RATE AND CHARACTER SIZE WITH WHICH THE DLA MODULE IS TO WORK. THE DEFAULT IS 9600 BAUD WITH AN 8-BIT CHARACTER SIZE.

1. CHAR. SIZE:

| SR1 | BIT1 | BIT0 | CHAR SIZE |
|-----|------|------|-----------|
|     | 0    | 0    | 8-BIT     |
|     | 0    | 1    | 7-BIT     |
|     | 1    | 0    | 6-BIT     |
|     | 1    | 1    | 5-BIT     |

2. BAUD RATE:  
BITS 2-14 ARE USED. ONE AT MOST SHOULD BE SET; IF MORE THAN ONE BIT IS SET, THE RIGHT-MOST WILL BE USED.

| BAUD  | BIT SET |
|-------|---------|
| ----  | -----   |
| 9600  | NONE    |
| 7200  | 2       |
| 4800  | 3       |
| 2400  | 4       |
| 1800  | 5       |
| 1200  | 6       |
| 600   | 7       |
| 300   | 8       |
| 200   | 9       |
| 150   | 10      |
| 134.5 | 11      |
| 110   | 12      |
| 75    | 13      |
| 50    | 14      |

3. EXAMPLES:

SR1=5 MEANS 7-BIT CHARACTER AT 7200 BAUD  
 SR1=12 MEANS 6-BIT CHARACTER AT 4800 BAUD  
 SR1=1000 MEANS 8-BIT CHARACTER AT 200 BAUD  
 SR1=0 (DEFAULT) MEANS 8-BIT CHARACTER AT 9600 BAUD

4. CHANGE ITERATION CONSTANT (ICONT) USING SR2: ;RS001

BIT15 = 1 SET ITERATION CONSTANT (ICONT) WITH VALUE  
 LOADED INTO BITS 14:0.

BIT15 = 0 ICONT SET FROM CNTTBL ACCORDING TO THE BAUD  
 RATE SELECTED BY SR1.

\*NOTE : CHARACTER SIZE UNAFFECTED BY SR2.

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9. NON-STANDARD PRINTOUTS:

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THERE ARE TWO ERROR PRINTOUTS WHICH SUPPLY SPECIAL INFORMATION  
IN THE CSRC AND STATC VALUES (CONSULT LISTING).



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```

383      ;DL11 A-D DEC/X11 EXERCISER MODULE
384
385      IOMOD <DLAL >,176500,1,4,,,0,26
      MODULE 140000,DLAL ,176500,1,4,,,0,26,,,,
      .TITLE DLAL DEC/X11 SYSTEM EXERCISER MODULE
      ;      DDXCOM VERSION 6.4 28-JAN-82
      .LIST  BIN
;*****
0000C0 BEGIN:
000000      104      114      101 MODNAM: .ASCII /DLAL / ;MODULE NAME.
000003      114
000005      000
000006      176500
000010      000001
000012      200
000013      000
000014      000001
000016      000000
000020      000000
000022      000000
000024      000000
      XFLAG: .BYTE OPEN ;USED TO KEEP TRACK OF WBUF USAGE
      ADDR: 176500+0 ;1ST DEVICE ADDR.
      VECTOR: 1+0 ;1ST DEVICE VECTOR.
      BR1: .BYTE PRTY4+0 ;1ST BR LEVEL.
      BR2: .BYTE PRTY+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
;*****
000026      140000 STAT: 140000 ;STATUS WORD.
000030      000226 INIT: START ;MODULE START ADDR.
000032      000224 SPOINT: MODSP ;MODULE STACK POINTER.
000034      000000 PASCNT: 0 ;PASS COUNTER.
000036      000000 ICONI: 0 ;# OF ITERATIONS PER PASS=0
000040      000000 ICOUNT: 0 ;LOC TO COUNT ITERATIONS
000042      000000 SOFCNT: 0 ;LOC TO SAVE TOTAL SOFT ERRORS
000044      000000 HRDCNT: 0 ;LOC TO SAVE TOTAL HARD ERRORS
000046      000000 SOFPAS: 0 ;LOC TO SAVE SOFT ERRORS PER PASS
000050      000000 HRDPAS: 0 ;LOC TO SAVE HARD ERRORS PER PASS
000052      000000 SYSCNT: 0 ;# OF SYS ERRORS ACCUMULATED
000054      000000 RANUM: 0 ;HOLDS RANDOM # WHEN RAND MACRO IS CALLED
000056      000000 CONFIG: ;RESERVED FOR MONITOR USE
000056      000000 RES1: 0 ;RESERVED FOR MONITOR USE
000060      000000 RES2: 0 ;RESERVED FOR MONITOR USE
000062      000000 SVR0: OPEN ;LOC TO SAVE R0.
000064      000000 SVR1: OPEN ;LOC TO SAVE R1.
000066      000000 SVR2: OPEN ;LOC TO SAVE R2.
000070      000000 SVR3: OPEN ;LOC TO SAVE R3.
000072      000000 SVR4: OPEN ;LOC TO SAVE R4.
000074      000000 SVR5: OPEN ;LOC TO SAVE R5.
000076      000000 SVR6: OPEN ;LOC TO SAVE R6.
000100      000000 CSRA: OPEN ;ADDR OF CURRENT CSR.
000102      000000 SBADR: ;ADDR OF GOOD DATA, OR
000102      000000 ACSR: OPEN ;CONTENTS OF CSR.
000104      000000 WASADR: ;ADDR OF BAD DATA, OR
000104      000000 ASTAT: OPEN ;STATUS REG CONTENTS.
000106      000000 ERRTP: ;TYPE OF ERROR
000106      000000 ASB: OPEN ;EXPECTED DATA.
000110      000000 AWAS: OPEN ;ACTUAL DATA.
000112      000552 RSTRT: RESTRT ;RESTART ADDRESS AFTER END OF PASS
000114      000000 WDTO: OPEN ;WORDS TO MEMORY PER ITERATION
000116      000000 WDFR: OPEN ;WORDS FROM MEMORY PER ITERATION
000120      000000 INTR: OPEN ;# OF INTERRUPTS PER ITERATION
000122      000026 IDNUM: 26 ;MODULE IDENTIFICATION NUMBER=26

```

```
.REPT      SPSIZ
.NLIST
.WORD      0
.LIST
.ENDR
```

```

;MODULE STACK STARTS HERE.

```

000224

**MODSP:**

\*\*\*\*\*

386  
387  
388  
389  
390  
391  
392  
393  
394  
395

•  
•  
•  
•  
•  
•

```

: THE NEXT LOCATION CONTAINS A NUMBER THAT CAN BE EXAMINED IN CORE TO BE
: SURE THAT THE LISTING AND ACTUAL CODE ARE THE SAME. THIS LOCATION IS TO
: BE INCREMENTED EACH TIME THE SOURCE CODE IS UPDATED. LOCATION 'MODREV'
: IS NOT USED BY THE PROGRAM.

```

MODREV: 1+1+1+1+1+1+1+1+1+1+1+1+0

000224 000014

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397 ;THIS ROUTINE SETS UP THE VECTORS FOR ALL SELECTED LINES TO POINT
398 ;TO THE APPROPRIATE JSR IN THE JSR LINK TABLE AND SETS
399 ;THE ITERATION COUNT TO MATCH BAUD RATE SPEC. IN SR1
400 000226 005000 START: CLR R0 ;GET RID OF JUNK (REV.J0)
401 000230 012767 000100 177656 MOV #64.,WDTO ;64 (10) WORDS PER ITERATION TO MEM
402 000236 012767 000100 177652 MOV #64.,WDFR ;64 (10) WORDS FROM MEM PER ITERATION
403 000244 012767 000200 177646 MOV #128.,INTR ;64 INTERRUPTS PER ITERATION
404 000252 016701 177540 MOV SR1,R1 ;GET SR1 VALUE
405 000256 042701 177774 BIC #177774,R1 ;MASK OUT SIZE PART
406 000262 001406 BEQ 8$ ;DEFAULT SETTING
407 000264 112700 000200 MOVB #200,R0 ;SET UP MASK FOR 7-BIT
408 000270 005301 7$: DEC R1 ;COUNT BITS MASKED
409 000272 001402 BEQ 8$ ;EXIT WHEN DONE
410 000274 006200 ASR R0 ;SHIFT AND REPLICATE HIGH BIT
411 000276 000774 BR 7$ ;AGAIN?
412 000300 010067 002524 8$: MOV R0,SIZE ;SET SIZE MASK
413 000304 005000 CLR R0 ;INIT POINTER
414 000306 016701 177504 MOV SR1,R1 ;GET SR1
415 000312 006201 ASR R1 ;SHIFT SR1 TO
416 000314 006201 ASR R1 ;GET BAUD RATE
417 000316 001405 BEQ 19$ ;9600 BAUD SET
418 000320 062700 000002 18$: ADD #2,R0 ;ELSE BUMP POINTER
419 000324 006001 ROR R1 ;LOOK FOR SR1 BIT
420 000326 103401 BCS 19$ ;LEAVE IF WE FOUND IT
421 000330 000773 BR 18$ ;ELSE DO IT AGAIN
422 000332 005767 177462 19$: TST SR2 ;IF BIT15 SET, LOAD ITERATION CONSTANT IN SR2 ;RS001
423 000336 001407 BEQ 20$ ;ELSE LOAD FROM CNTTBL. ;RS001
424 000340 016704 177454 MOV SR2,R4 ;SAVE SR2 IN WORK AREA ;RS001
425 000344 042704 100000 BIC #100000,R4 ;MASK BIT15 ;RS001
426 000350 010467 177462 MOV R4,ICONT ;LOAD SELECTED ITERATION CONSTANT ;RS001
427 000354 000403 BR 17$ ;BYPASS CNTTBL ICONT VALUES ;RS001
428 000356 016067 001650' 177452 20$: MOV CNTTBL(R0),ICONT ;RS001
429
430 000364 016700 177420 17$: MOV VECTOR,R0 ;SET UP ITER COUNT
431 000370 016701 177420 MOV DVID1,R1 ;SET R0 TO POINT TO THE 1ST VECTOR
432 000374 010167 002574 MOV R1,DVICE ;LOAD R1 WITH DEVICE SELECTION PARAMETER
433 000400 012702 003176' MOV #JSRTAB,R2 ;INITIALIZE TO RECORD ANY LINES DROPPED
434 000404 006201 1$: ASR R1 ;SET UP R2 TO POINT TO JSR TABLE
435 000406 103020 BCC 3$ ;SHIFT SELECT BIT INTO "C"
436 000410 010220 MOV R2,(R0)+ ;BR IF NOT SELECTED
437 000412 116720 177374 MOVB BR1,(R0)+ ;SET UP RCVR INTR POINTER
438 000416 105720 TSTB (R0)+ ;SET UP RCVR PRIORITY LEVEL
439 000420 062702 000010 ADD #10,R2 ;MOVE POINTER
440 000424 010220 MOV R2,(R0)+ ;POINT R2 TO XMTR ENTRY IN JSR TABLE
441 000426 116720 177360 MOVB BR1,(R0)+ ;SET UP XMTR INTR POINTER
442 000432 105720 TSTB (R0)+ ;SET UP XMTR PRIORITY LEVEL
443 000434 062702 000010 ADD #10,R2 ;MOVE POINTER
444 000440 022702 003576' 2$: CMP #JSRTAB+400,R2 ;POINT R2 TO RCVR ENTRY FOR NEXT LINE
445 000444 001357 BNE 1$ ;IS THE POINTER AT THE END OF THE TABLE?
446 000446 000405 BR SETCSR ;BR IF NOT
447 000450 062700 000010 3$: ADD #10,R0 ;GO SET UP CSR ADDRESSES
448 000454 062702 000020 ADD #20,R2 ;UPDATE VECTOR POINTER
449 000460 000767 BR 2$ ;UPDATE JSR TABLE POINTER
450 ;GO CHECK FOR END OF TABLE
451
452 ;THIS ROUTINE SETS UP THE JSR TABLE SUCH THAT THE APPROPRIATE
453 ;CSR ADDRESS IS INCLUDED AS THE 3RD WORD OF EACH ENTRY

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```

454 000462 016700 177320      SETCSR: MOV      ADDR,R0      ;GET THE FIRST CSR ADDRESS INTO R0
455 000466 016701 177322      MOV      DVID1,R1      ;LOAD R1 WITH THE DEVICE SELECTION PARAMETER
456 000472 001002              BNE      1$            ;BR IF DVC OK
457 000474 104410 000000'      END$,BEGIN
458 000500 012702 003202'      1$: MOV      #JSRTAB+4,R2      ;POINT R2 TO CSR ADDRESS ENTRY
459 000504 006201              2$: ASR      R1            ;SHIFT SELECT BIT INTO "C"
460 000506 103014              BCC      4$            ;BR IF LINE NOT SELECTED
461 000510 010012              MOV      R0,(R2)        ;PUT RCVR CSR ADDRESS IN TABLE
462 000512 022020              CMP      (R0)+,(R0)+    ;GENERATE XMTR CSR ADDRESS IN R0
463 000514 062702 000010      ADD      #10,R2        ;POINT TO XMTR SLOT IN JSR TABLE
464 000520 010012              MOV      R0,(R2)        ;PUT XMTR CSR ADDRESS IN THE TABLE
465 000522 022020              CMP      (R0)+,(R0)+    ;GENERATE NEXT RCVR CSR ADDRESS IN R0
466 000524 062702 000010      ADD      #10,R2        ;POINT TO RCVR SLOT IN JSR TABLE
467 000530 022702 003602'      3$: CMP      #JSRTAB+404,R2    ;IS POINTER BEYOND END OF TABLE?
468 000534 001363              BNE      2$            ;BR IF NOT
469 000536 000411              BR       REST          ;GO SET UP ACTIVE DEVICE TABLE.
470 000540 062700 000010      4$: ADD      #10,R0      ;UPDATE CSR ADDRESS
471 000544 062702 000020      ADD      #20,R2        ;UPDATE JSR TABLE POINTER
472 000550 000767              BR       3$            ;GO TEST FOR END OF TABLE
473
474                          ;THIS ROUTINE CLEARS BUFFERS AND TABLES, INITIALIZES FLAGS, AND STARTS
475                          ;UP ALL SELECTED LINES.
476
477 000552 005000              RESTRT: CLR      R0      ;GET RID OF JUNK (REV.J0)
478 000554 005767 177254      TST      PASCNT        ;HAVE WE BEEN THRU START?
479 000560 001622              BEQ      START        ;BR THERE IF WE HAVEN'T
480 000562 004767 002262      REST: JSR      PC,CLRBUF    ;GO CLEAR XMTR. AND RCVR. BUFFERS
481 000566 004767 002312      STUP1: JSR      PC,DTab    ;SET UP THE ACTIVE DEVICE TABLE.
482 000572 004767 002270      JSR      PC,CLRTAB      ;GO CLEAR TABLES AND QUEUES
483 000576 005067 002232      CLR      TXCNT        ;CLEAR TX TOTAL INTERRUPT COUNTER.
484 000602 005067 002230      CLR      RXCNT        ;CLEAR RX TOTAL INTERRUPT COUNTER.
485 000606 012767 002250' 002226      MOV      #RSTAB,SVPTR    ;INITIALIZE RCVR. STATUS TABLE POINTER
486 000614 012767 002730' 002222      MOV      #TQ,OPTR1    ;SET UP XMTR FIFO QUEUE POINTERS
487 000622 012767 002730' 002216      MOV      #TQ,OPTR2
488 000630 016700 002336      MOV      ACTDEV,R0
489 000634 116002 003152'      1$: MOV      DEVTAB(R0),R2    ;GET COUNT OF ACTIVE DEVICES
490 000640 004767 001244      JSR      PC,GETADR      ;GET AN ACTIVE LINE NO.
491 000644 005763 000002      TST      2(R3)        ;GO BUILD CSR ADDRESS IN R3
492 000650 052713 000100      BIS      #100,(R3)      ;READ RCV DBR TO FLUSH DONE BIT
493 000654 052763 000004 000004      BIS      #4,4(R3)    ;ENABLE RECEIVER INTERRUPTS
494 000662 105262 002770'      INCB     XBUF(R2)      ;ENABLE MAINT. MODE
495 000666 116263 002770' 000006      MOV      XBUF(R2),6(R3) ;OUTPUT CHAR ONTO TX.
496 000674 105267 002134      INCB     TXCNT        ;UP COUNT OF CHARS OUTPUT.
497 000700 105262 002710'      INCB     DCNT(R2)      ;COUNT CHARACTERS OUTPUT ON THIS LINE
498 000704 052763 000100 000004      BIS      #100,4(R3)  ;ENABLE TX INTERRUPTS.
499 000712 005300              DEC      R0            ;COUNT ONE KICKED OFF
500 000714 100347              BPL      1$            ;GO TEST FOR NEXT ONE
501 000716 012767 000006 002114      MOV      #6,CNTR    ;INITIALIZE COUNTER TO WAIT AT LEAST
502                          ;30 SECONDS BEFORE TIMING OUT
503 000724 005004              10$: CLR      R4
504 000726              2$:
505 000726 104407 000000'      BREAK$,BEGIN
506 000732 104407 000000'      BREAK$,BEGIN
507 000736 122767 000100 002071      CMPB     #64.,TXCNT+1    ;TEMPORARY RETURN TO MONITOR....
508 000744 003004              BGT      3$            ;THEN CONTINUE AT NEXT INSTRUCTION.
509 000746 022767 000100 002062      CMP      #64.,RXCNT    ;64 TRANSMITTER INTERRUPTS?
510 000754 003405              BLE      4$            ;NO- BRANCH TO WAIT
511                          ;YES- 64 RECEIVER INTERRUPTS?
512                          ;YES- GO CHECK FOR ERRORS

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509 000756 005304          34:  DEC      R4          ;TIMEOUT?
510 000760 001362          BNE      24          ;NO- WAIT SOME MORE
511 000762 005367 002052    DEC      CNTR        ;EACH PASS OF THE SMALL LOOP TAKES
512                                     ;AT LEAST 5 SECONDS
513 000766 001356          BNE      104         ;BRANCH IF NOT DONE WITH 6 PASSES OF
514                                     ;THE SMALL COUNTER
515 000770 000167 000306    44:  JMP  ERRCHK
516
517 ;TRANSMITTER INTERRUPT SERVICE - ENTERED VIA APPROPRIATE JSR TABLE
518 ;ENTRY WITH R5 POINTING TO THE CSR ADDRESS. - CONTENTS OF R5
519 ;GETS QUEUED UP IN FIFO QUEUE AND ROUTINE RETURNS CONTROL BACK TO
520 ;THE MONITOR VIA A PIRQ TO DEFER SERVICING XMITTER AT LEVEL 0
521
522 000774 010577 002044    TINT:  MOV      R5,QPTR1      ;STORE CONTENTS OF R5 IN THE QUEUE
523 001000 062767 000002 002036  ADD      #2,QPTR1      ;UPDATE THE QUEUE POINTER
524 001006 022767 002770' 002030  CMP      #TQ-40,QPTR1  ;POINTER AT END OF QUEUE?
525 001014 001003          BNE      14          ;BR IF NOT
526 001016 012767 002730' 002020  MOV      #TQ,QPTR1      ;RESET THE POINTER
527 001024 012605          14:  MOV      (R6)+,R5      ;RESTORE THE OTHER GUY'S R5
528
529 001026 000004 000000' 001034'  PIRQ4,BEGIN,TSERV      ;QUEUE UP TO CONTINUE AT TSERV AND RTI
530                                     ;-----
531 ;DEFERRED XMTR SERVICE - THIS ROUTINE RETRIEVES POINTER TO CSR ADDRESS
532 ;FROM THE FIFO QUEUE AND SERVICES THE LINE AT LEVEL 0
533
534 001034 017700 002006    TSERV:  MOV      QPTR2,R0      ;GET POINTER FROM THE QUEUE
535 001040 062767 000002 002000  ADD      #2,QPTR2      ;UPDATE THE QUEUE POINTER
536 001046 022767 002770' 001772  CMP      #TQ-40,QPTR2  ;POINTER AT HIGH LIMIT
537 001054 001003          BNE      14          ;BR IF NOT
538 001056 012767 002730' 001762  MOV      #TQ,QPTR2      ;RESET THE POINTER
539 001064 012001          14:  MOV      (R0)+,R1      ;MOV CSR ADDRESS INTO R1
540 001070 105267 001741      MOV      (R0),R0      ;MOV LINE # INTO R0
541 001074 105260 002670'    INCB      TXCNT+1      ;COUNT TOTAL TX INTERRUPTS.
542 001100 105711          INCB      TCNT(R0)      ;COUNT THE INTERRUPT
543 001102 100017          TSTB      (R1)          ;XMTR READY FLAG ASSERTED?
544 001104 122767 000100 001722  BPL      44          ;BR IF NOT
545 001112 001427          CMPB      #64,,TXCNT      ;64 CHARACTERS TRANSMITTED?
546 001114 105260 002770'    BEQ      54          ;YES- BRANCH TO EXIT
547 001120 116061 002770' 000002  INCB      XBUF(R0)      ;GENERATE NEXT DATA BYTE
548 001126 105267 001702      MOV      XBUF(R0),2(R1)  ;LOAD THE XMTR BUFFER
549 001132 105260 002710'    INCB      TXCNT      ;UP TOTAL COUNT OF CHARS OUTPUT.
550 001136 104400 000000'    INCB      DCNT(R0)      ;COUNT CHARACTERS OUTPUT ON THIS LINE
551 001142 010167 176732      EXIT4,BEGIN      ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
552 001146 011167 176730      44:  MOV      R1,CSRA      ;SAVE CSR ADDRESS
553 001152 142711 000100      MOV      (R1),ACSR      ;SAVE CONTENTS OF THE CSR
554 001156 012767 000011 176722  BICB      #100,(R1)  ;DISABLE XMTR INTERRUPT
555                                     ;ILLEGAL INTERRUPT
556 001164 104405 000000' 000000  ;*****
557                                     ;ORDER4,BEGIN,NULL      ;XMTR FALSE INTERRUPT
558                                     ;*****
559
560 001172 104400 000000'    54:  EXIT4,BEGIN      ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
561
562 ;RECEIVER INTERRUPT SERVICE-ENTERED VIA APPROPRIATE JSR TABLE ENTRY
563 ;STORES PERTINENT INFORMATION IN THE RECEIVER STATUS TABLE THAT WILL
564 ;BE CHECKED IF 64. CHARACTERS HAVE BEEN RECEIVED

```

## DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

```

561
562 001176 010046          RINT:  MOV    R0,-(R6)      ;SAVE R0 AND R1 ON THE STACK
563 001200 010146          MOV    R1,-(R6)
564 001202 022767 000100 001626  CMP    #64.,RXCNT    ;64 CHAR'S RECEIVED?
565 001210 003422          BLE     1#                ;YES- BRANCH
566 001212 016700 001624    MOV    SVPTR,R0          ;NO- GET RCVR STATUS TABLE POINTER
567 001216 011501          MOV    (R5),R1            ;GET RCVR CSR ADDRESS
568 001220 011120          MOV    (R1),(R0).          ;SAVE THE RCSR CONTENTS
569 001222 106260 177777    ASRB    -1(R0)           ;SHIFT ERROR WORD
570 001226 156160 000003 177777  BISB    3(R1),-1(R0)    ;GET MORE ERROR STATUS
571 001234 116120 000002    MOVB    2(R), (R0).        ;SAVE THE RCVD DATA
572 001240 156160 000002 177775  BISB    2(R1),-3(R0)    ;REREAD CSR IN CASE ERROR SET BETWEEN THE
573                                     ;LAST TWO INSTRUCTIONS
574 001246 116520 000002    MOVB    2(R5),(R0).        ;SAVE THE LINE NUMBER
575 001252 010067 001564    MOV    R0,SVPTR          ;SAVE THE UPDATED STATUS TABLE POINTER
576 001256 016505 000002    1#:    MOV    2(R5),R5      ;GET LINE NO. INTO R5
577 001262 105255 002650    INCB    RCNT(R5)          ;COUNT THE INTERRUPT FROM THIS LINE
578 001266 005267 001544    INC     RXCNT             ;INCREMENT RX INTERRUPT TOTAL COUNT.
579 001272 012601 2#:    MOV    (R6)+,R1             ;RESTORE THE OTHER GUY'S REGISTER
580 001274 012600          MOV    (R6)+,R0
581 001276 012605          MOV    (R6)+,R5
582 001300 000002          RTI                        ;RETURN CONTROL BACK TO OTHER GUY
583
584          ;RECEIVER ERROR CHECKING AND CLEANUP ROUTINES
585
586          ;THIS ROUTINE DISABLES INTERRUPTS FROM ALL ACTIVE LINES
587
588 001302 016700 001664    ERRCHK: MOV    ACTDEV,R0    ;GET COUNT OF ACTIVE DEVICES
589 001306 116002 003152'  1#:    MOVB    DEVTAB(R0),R2 ;GET ACTIVE LINE NO.
590 001312 004767 000572    JSR     PC,GETADR          ;GO BUILD ADDRESS IN R3
591 001316 042713 000100    BIC     #100,(R3)          ;TURN OFF RECEIVER.
592 001322 042763 000100 000004  BIC     #100,4(R3)      ;TURN OFF TRANSMITTER.
593 001330 005300          DEC     R0                  ;COUNT ONE GUY OFF
594 001332 100365          BPL     1#                  ;BR TIL ALL OFF
595
596          ;THIS ROUTINE SCANS THROUGH THE 64 ENTRY RECEIVER STATUS TABLE
597          ;CHECKING FOR AND REPORTING ANY ERRORS
598
599 001334 026727 001476 000100  CHK1:  CMP    RXCNT,#64.    ;MAKE SURE COUNT IS NO LARGER THAN TABLE
600 001342 003403          BLE     1#
601 001344 012767 000100 001464    MOV    #64.,RXCNT
602 001352 012701 002250'  1#:    MOV    #RSTAB,R1      ;GET STATUS TABLE POINTER
603 001356 005000 2#:    CLR     R0                    ;INDICATE NO HARDWARE FAILURES YET.
604 001360 116102 000003    MOVB    3(R1),R2          ;GET LINE NO. INTO R2
605 001364 005711          TST     (R1)                ;ERROR SET?
606 001366 100047          BPL     5#                  ;BRANCH IF NOT
607 001370 011104          MOV    (R1),R4              ;GET THE DEVICE STATUS INFORMATION
608 001372 004767 000602    JSR     PC,RCVERR          ;GO SETUP TO REPORT ERROR
609 001376 005067 176504    CLR     ERRTP
610 001402 006104          ROL     R4                  ;PLACE THE OVERRUN BIT...
611 001404 006104          ROL     R4                  ;...IN THE CARRY BIT
612 001406 103011          BCC     3#                  ;IF NO ERROR, GO CHECK THE NEXT BIT
613 001410 012767 000021 176470    MOV    #21,ERRTP    ;OVERRUN ERROR
614          ;*****
        001416 104406 000000' 000000    SOFER#,BEGIN,NULL ;OVERRUN ERROR
        ;*****
615 001424 104403 000000' 001706'    MSGN#,BEGIN,OVERUN ;ASCII MESSAGE CALL WITH COMMON HEADER

```

## DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

SEQ 0016

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616 001432 006104          3:  ROL    R4          ;PLACE THE FRAME BIT IN THE CARRY BIT      ;RG002
617 001434 103011          BCC    4:          ;IF NO ERROR, GO CHECK THE NEXT BIT      ;RG002
618 001436 012767 000022 176442  MOV    #22,ERRTYP  ;FRAMING ERROR                      ;RG002
619          001444 104406 000000' 000000          ;*****
        SOFER$,BEGIN,NULL          ;FRAMING ERROR
        ;*****
620 001452 104403 000000' 001732'  MSGN$,BEGIN,FRAME  ;ASCII MESSAGE CALL WITH COMMON HEADER
621 001460 006104          4:  ROL    R4          ;CHECK FOR A PARITY ERROR          ;RG002
622 001462 103011          BCC    5:          ;IF NO ERROR, GO RESTORE THE REGISTERS ;RG002
623 001464 012767 000023 176414  MOV    #23,ERRTYP  ;PARITY ERROR                      ;RG002
624          001472 104406 000000' 000000          ;*****
        SOFER$,BEGIN,NULL          ;PARITY ERROR
        ;*****
625 001500 104403 000000' 001756'  MSGN$,BEGIN,PARITY  ;ASCII MESSAGE CALL WITH COMMON HEADER
626 001506 105711          5:  TSTB   (R1)        ;POINT TO LO BYTE OF CSR          ;RG002
627 001510 100410          BMI    6:          ;BR IF DONE WAS SET              ;RG002
628 001512 004767 000462          JSR    PC,RVERR  ;SETUP FOR ERROR REPORT
629 001516 012767 000011 176362  MOV    #11,ERRTYP  ;ILLEGAL INTERRUPT
630          001524 104405 000000' 000000          ;*****
        HRDR$,BEGIN,NULL          ;RECEIVER FALSE INTERRUPT
        ;*****
631 001532 105262 003010'          6:  INCB   RBUF(R2)    ;BUMP EXPECTED DATA              ;RG002
632 001536 005700          TST    R0          ;HARDWARE ERRORS?
633 001540 001014          BNE    7:          ;DO NOT REPORT DATA ERRORS THEN. ;RG002
634 001542 146762 001262 003010'  BICB   SIZE,RBUF(R2) ;MASK OFF BITS <7:5> TO CHECK ONLY
635 001550 146761 001254 000002  BICB   SIZE,2(R1)   ; SPECIFIED SIZE.
636 001556 126261 003010' 000002  CMPB   RBUF(R2),2(R1) ;DID RCVD DATA CHECK OK?
637 001564 001402          BEQ    7:          ;BR IF YES                      ;RG002
638 001566 004767 000334          JSR    PC,DATBAD ;GO REPORT DATA ERROR
639 001572 022121          7:  CMP     (R1),.(R1).  ;POINT R1 TO NEXT TABLE ENTRY   ;RG002
640 001574 005367 001236          DEC    RXCNT    ;ALL CHARS RECEIVED CHECKED?
641 001600 001266          BNE    2:          ;NO- GO CHECK NEXT ENTRY
642
643          ;THIS ROUTINE REPORTS ANY LINE RECEIVING AN INCORRECT NUMBER OF INTERRUPTS
644
645 001602 016701 001364          CKLINS: MOV    ACTDEV,R1    ;GET ACTIVE DEVICE COUNT
646 001606 116102 003152'          3:  MOVB   DEVTAB(R1),R2 ;GET ACTIVE DEVICE LINE NO.
647 001612 126262 002650' 002710'  CMPB   RCNT(R2),DCNT(R2)
648          BEQ    4:          ;CORRECT NUMBER OF RECVR INTERRUPTS?
649 001620 001402          BEQ    4:          ;BR IF YES
650 001622 004767 000154          JSR    PC,BADR   ;GO REPORT BAD RCVR
651 001626 126262 002670' 002710'  4:  CMPB   TCNT(R2),DCNT(R2)
652          BEQ    5:          ;CORRECT NUMBER OF XMTR INTERRUPTS?
653 001634 001402          BEQ    5:          ;BR IF YES
654 001636 004767 000202          JSR    PC,BADT   ;GO REPORT BAD XMTR
655 001642 005301          5:  DEC     R1          ;COUNT ONE GUY CHECKED
656 001644 100360          BPL    3:          ;BR TIL ALL CHECKED
657 001646 000564          BR     ENPS          ;GO CHECK FOR END OF PASS
658
659          ;TABLE USED FOR DIFFERENT BAUD RATES
660
661 001650 001450          CNTTBL: 1450
662 001652 001140          1140
663 001654 000621          621
664 001656 000310          310
665 001660 000230          230
666 001662 000141          141

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## DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

```

667 001664 000065          65
668 001666 000030          30
669 001670 000020          20
670 001672 000014          14
671 001674 000013          13
672 001676 000011          11
673 001700 000006          6
674 001702 000004          4
675 001704 000004          4 ;NOT A LEGAL SR1 SETTING
676
677 001706 001712'          OVERUN: M.OVER          ;RG002
678 001710 177777          -1                      ;RG002
679                                     ;RG002
680 001712 045 117 126 M.OVER: .ASCIZ /%OVERRUN ERROR%/ ;RG002
    001715 105 122 122
    001720 125 116 040
    001723 105 122 122
    001726 117 122 045
    001731 000
681                                     .EVEN          ;RG002
682                                     ;RG002
683 001732 001736'          FRAME: M.FRAME          ;RG002
684 001734 177777          -1                      ;RG002
685                                     ;RG002
686 001736 045 106 122 M.FRAME: .ASCIZ /%FRAMING ERROR%/ ;RG002
    001741 101 115 111
    001744 116 107 040
    001747 105 122 122
    001752 117 122 045
    001755 000
687                                     .EVEN          ;RG002
688                                     ;RG002
689 001756 001762'          PARITY: M.PAR          ;RG002
690 001760 177777          -1                      ;RG002
691                                     ;RG002
692 001762 045 120 101 M.PAR: .ASCIZ /%PARITY ERROR%/ ;RG002
    001765 122 111 124
    001770 131 040 105
    001773 122 122 117
    001776 122 045 000
693                                     .EVEN          ;RG002
694
695 ;ROUTINE TO REPORT BAD LINES (TOO MANY OR TOO FEW INTERRUPTS)
696
697 002002 004767 000102      BADR: JSR PC.GETADR ;GO BUILD CSR ADDRESS
698 002006 010367 176066      MOV R3,CSRA ;SAVE CSR ADDRESS
699 002012 116267 002710' 176062 MOVB DCNT(R2),ACSR ;CHARACTERS XMTD
700 002020 116267 002650' 176056 MOVB RCNT(R2),ASTAT ;# OF RCVR INTERRUPTS
701
702 002026 012767 000014 176052 MOV #14,ERRTYP ;WRONG # OF INTERRUPTS
703 002034 104405 000000' 000000 ;*****
    ;HDRER$,BEGIN,NULL ;INCORRECT NUMBER OF RCVR INTERRUPTS
    ;*****
    ;NOTE THAT CSRC VALUE IS # OF CHARACTERS
    ;TRANSMITTED, AND STATC VALUE IS # OF
    ;RECEIVER INTERRUPTS
704
705
706
707

```

## DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

```

708 002042 000207          RTS      PC          ;RETURN TO CALLER
709
710 002044 004767 000040    BADT:  JSR      PC,GETADR      ;GO BUILD CSR ADDRESS
711 002050 022323          CMP      (R3)+,(R3)+      ;MAKE IT A XMTR CSR ADDRESS
712 002052 010367 176022    MOV      R3,CSRA          ;SAVE CSR ADDRESS
713 002056 116267 002710' 176016  MOVVB   DCNT(R2),ACSR      ;CHARACTERS XMITTED
714 002064 116267 002670' 176012  MOVVB   TCNT(R2),ASTAT ;# OF XMTR INTERRUPTS
715
716 002072 012767 000014 176006  MOV      #14,ERRTYP      ;WRONG # OF INTERRUPTS
717 002100 104405 000000' 000000  HRDR$,BEGIN,NULL      ;INCORRECT NUMBER OF XMTR INTERRUPTS
;*****
;NOTE THAT CSRC VALUE IS # OF CHARACTERS
;TRANSMITTED, AND STATC VALUE IS # OF
;TRANSMITTER INTERRUPTS
718
719
720
721
722 002106 000207          RTS      PC          ;RETURN TO CALLER
723
724 002110 010203          GETADR: MOV      R2,R3          ;GET LINE NO.
725 002112 006303          ASL      R3              ;BUILD CSR ADDRESS
726 002114 006303          ASL      R3
727 002116 006303          ASL      R3
728 002120 066703 175662    ADD      ADDR,R3
729 002124 000207          RTS      PC          ;RETURN TO CALLER
730
731          ;ROUTINE TO REPORT RCVR DATA COMPARE ERRORS
732
733 002126 004767 177756    DATBAD: JSR      PC,GETADR      ;GO BUILD CSR ADDRESS
734 002132 010367 175742    MOV      R3,CSRA          ;SAVE CSR ADDRESS
735 002136 116167 000002 175744  MOVVB   2(R1),AWAS      ;SAVE BAD DATA
736 002144 005721          TST      (R1)+          ;GENERATE RCVR DATA ADDRESS
737 002146 010167 175732    MOV      R1,WASADR      ;SAVE ADDRESS OF BAD DATA
738 002152 005741          TST      -(R1)          ;RESET R1
739 002154 012705 003010'    MOV      #RBUF,R5          ;GENERATE ADDRESS OF GOOD DATA
740 002160 060205          ADD      R2,R5
741 002162 111567 175720    MOVVB   (R5),ASB          ;SAVE GOOD DATA
742 002166 010567 175710    MOV      R5,SBADR          ;SAVE ADDRESS OF GOOD DATA
743          ;*****
002172 104404 000000'    DATER$,BEGIN      ;DATA ERROR!!!
;*****
744 002176 000207          RTS      PC          ;RETURN TO CALLER
745
746          ;ROUTINE TO SETUP FOR RECEIVER ERROR PRINTOUTS
747
748 002200 005200          RCVERR: INC      R0          ;INDICATE HARDWARE ERROR.
749 002202 004767 177702    JSR      PC,GETADR      ;GO BUILD CSR ADDRESS
750 002206 010367 175666    MOV      R3,CSRA          ;STUFF IT IN CSRA
751 002212 011167 175664    MOV      (R1),ACSR      ;GET CONTENTS IN ACSR
752 002216 000207          RTS      PC          ;RETURN TO CALLER
753
754          ;THIS ROUTINE CHECKS FOR AND REPORTS END OF PASS
755 002220          ENPS:      ENDIT$,BEGIN      ;SIGNAL END OF ITERATION.
002220 104413 000000'          ;MONITOR SHALL TEST END OF PASS
756
757          ;THIS ROUTINE RESTARTS EACH 64 CHAR XFR SEQUENCE
758

```

## DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

```

759 002224 012700 003010'    RESYNC: MOV    #RBUF,R0    ;RESYNC DATA FOR NEXT PASS
760 002230 012701 002770'    MOV    #XBUF,R1
761 002234 112021             1$:    MOVB   (R0)+,(R1)+
762 002236 022700 003030'    CMP    #RBUF+20,R0    ;DONE 16 BYTES?
763 002242 001374             BNE     1$    ;BR IF NOT
764 002244 000167 176316     JMP     STUP1    ;RESUME.
765
766    ;TABLES AND BUFFERS
767
768 002250    RSTAB: .BLKW 128.    ;128 WORD(64 ENTRIES)RCVR STATUS TABLE
769 002650    RCNT:  .BLKW 8.      ;RCVR INTERRUPT COUNTERS
770 002670    TCNT:  .BLKW 8.      ;XMTR INTERRUPT COUNTERS
771 002710    DCNT:  .BLKW 8.      ;CHARACTER COUNTERS
772
773 002730    TQ:    .BLKW 16.     ;16 WORD XMTR FIFO QUEUE
774
775 002770    XBUF:  .BLKW 8.      ;16 BYTE XMTR DATA BUFFERS
776 003010    RBUF:  .BLKW 8.      ;16 BYTE RCVR DATA BUFFERS
777
778    ;POINTERS, CONSTANTS, AND VARIABLES
779
780 003030 000000    SIZE:  OPEN    ;LOW BYTE IS MASK FOR VARIABLE 5-8 BIT COMPARE
781 003032 000000    COUNT: OPEN    ;END OF PASS COUNTER
782 003034 000000    TXCNT: OPEN    ;TX TOTAL INTERRUPTS COUNTER (HIGH BYTE).
783                                     ;TOTAL CHARACTERS TRANSMITTED (LOW BYTE)
784 003036 000000    RXCNT: OPEN    ;RX TOTAL INTERRUPTS COUNTER.
785 003040 000000    CNTR:  OPEN    ;BREAK LOOP COUNTER
786 003042 000000    SVPTR: OPEN    ;TEMP STORAGE FOR RSTAB POINTER
787 003044 000000    QPTR1: OPEN    ;XMTR FIFO QUEUE POINTER - LOAD
788 003046 000000    QPTR2: OPEN    ;XMTR FIFO QUEUE POINTER - UNLOAD
789
790
791    ;SUBROUTINE TO CLEAR DATA BUFFERS AT BEGINING OF EACH NEW PASS
792
793 003050 012700 002770'    CLRBUF: MOV    #XBUF,R0    ;SET UP R0 TO POINT TO BEGINING
794 003054 005020             1$:    CLR     (R0)+    ;CLEAR A WORD
795 003056 022700 003030'    CMP    #RBUF+20,R0    ;END OF RCVR BUFFER?
796 003062 001374             BNE     1$    ;BR TIL ALL CLEAR
797 003064 000207             RTS     PC    ;RETURN TO CALLER
798
799    ;SUBROUTINE TO CLEAR TABLES AND QUEUES
800
801 003066 012700 002250'    CLRTAB: MOV    #RSTAB,R0    ;SET UP R0 TO POINT TO BEGINING
802 003072 005020             1$:    CLR     (R0)+    ;CLEAR A WORD
803 003074 022700 002770'    CMP    #TQ+40,R0    ;END?
804 003100 001374             BNE     1$    ;BR IF NOT
805 003102 000207             RTS     PC    ;RETURN TO CALLER
806
807    ;THIS ROUTINE SETS UP AN ACTIVE DEVICE TABLE TO REMEMBER HOW MANY
808    ;AND WHICH LINES WERE ACTIVE DURING TEST - IT IS USED DURING THE
809    ;ERROR CHECKING ROUTINES FOR VARIOUS PURPOSES
810
811 003104 005000    DTAB:  CLR     R0    ;SET UP R0 AS TOTAL LINE COUNTER
812 003106 005100    COM     R0    ;INITIALLY SET TO MINUS ONE
813 003110 005001    CLR     R1    ;SET UP R1 AS ACTIVE LINE COUNTER
814 003112 005101    COM     R1    ;INITIALLY SET TO MINUS ONE
815 003114 016702 000054    MOV    DVICE,R2    ;GET DEVICE SELECTION PARAMETER

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## DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

```

816 003120 005200          1$: INC      R0          ;COUNT ONE DEVICE
817 003122 022700 00002C    CMP      #20,R0       ;16 LINES CHECKED?
818 003126 001003          BNE      2$           ;BR IF NOT
819 003130 010167 000036    MOV      R1,ACTDEV     ;SAVE THE COUNT OF ACTIVE LINES
820 003134 000207          RTS      PC           ;RETURN TO CALLER
821 003136 006202          2$: ASR      R2         ;SHIFT SELECT BIT INTO "C"
822 003140 103367          BCC      1$           ;BR IF NOT SELECTED
823 003142 005201          INC      R1           ;COUNT ACTIVE LINE
824 003144 110061 003152'   MOVB     R0,DEV TAB(R1) ;STORE ACTIVE LINE NO. IN THE TABLE
825 003150 000763          BR       1$         ;GO TEST NEXT LINE
826
827 003152          DEV TAB: .BLKW    8.         ;16 BYTE ACTIVE DEVICE TABLE
828 003172 000000          ACT DEV: OPEN        ;STORES COUNT OF NO. OF ACTIVE LINES MINUS ONE
829 003174 000000          DVICE: OPEN        ;DEVICE SELECTION INDICATOR
830
831          ;JSR LINK TABLE CONSISTING OF 32 JSR'S (16 RCVR AND 16 XMTR) THAT
832          ;LINK THE INTERRUPTS TO THE COMMON SERVICE ROUTINES
833
834 003176 004567 175774    JSR TAB: JSR      R5,RINT ;RECEIVER LINK FOR LINE 0
835 003202 000000          0              ;SET UP WITH RCVR CSR ADDRESS
836 003204 000000          0              ;LINE NUMBER
837 003206 004567 175562    JSR      R5,TINT     ;XMTR LINK FOR LINE 0
838 003212 000000          0              ;SET UP WITH XMTR CSR ADDRESS
839 003214 000000          0              ;LINE NUMBER
840 003216 004567 175754    JSR      R5,RINT     ;LINK FOR LINE 1
841 003222 000000          0
842 003224 000001          1
843 003226 004567 175542    JSR      R5,TINT
844 003232 000000          0
845 003234 000001          1
846 003236 004567 175734    JSR      R5,RINT     ;LINK FOR LINE 2
847 003242 000000          0
848 003244 000002          2
849 003246 004567 175522    JSR      R5,TINT
850 003252 000000          0
851 003254 000002          2
852 003256 004567 175714    JSR      R5,RINT     ;LINK FOR LINE 3
853 003262 000000          0
854 003264 000003          3
855 003266 004567 175502    JSR      R5,TINT
856 003272 000000          0
857 003274 000003          3
858 003276 004567 175674    JSR      R5,RINT     ;LINK FOR LINE 4
859 003302 000000          0
860 003304 000004          4
861 003306 004567 175462    JSR      R5,TINT
862 003312 000000          0
863 003314 000004          4
864 003316 004567 175654    JSR      R5,RINT     ;LINK FOR LINE 5
865 003322 000000          0
866 003324 000005          5
867 003326 004567 175442    JSR      R5,TINT
868 003332 000000          0
869 003334 000005          5
870 003336 004567 175634    JSR      R5,RINT     ;LINK FOR LINE 6
871 003342 000000          0
872 003344 000006          6

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## DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

|     |        |        |        |     |         |                   |
|-----|--------|--------|--------|-----|---------|-------------------|
| 873 | 003346 | 004567 | 175422 | JSR | R5,TINT |                   |
| 874 | 003352 | 000000 |        | 0   |         |                   |
| 875 | 003354 | 000006 |        | 6   |         |                   |
| 876 | 003356 | 004567 | 175614 | JSR | R5,RINT | ;LINK FOR LINE 7  |
| 877 | 003362 | 000000 |        | 0   |         |                   |
| 878 | 003364 | 000007 |        | 7   |         |                   |
| 879 | 003366 | 004567 | 175402 | JSR | R5,TINT |                   |
| 880 | 003372 | 000000 |        | 0   |         |                   |
| 881 | 003374 | 000007 |        | 7   |         |                   |
| 882 | 003376 | 004567 | 175574 | JSR | R5,RINT | ;LINK FOR LINE 10 |
| 883 | 003402 | 000000 |        | 0   |         |                   |
| 884 | 003404 | 000010 |        | 10  |         |                   |
| 885 | 003406 | 004567 | 175362 | JSR | R5,TINT |                   |
| 886 | 003412 | 000000 |        | 0   |         |                   |
| 887 | 003414 | 000010 |        | 10  |         |                   |
| 888 | 003416 | 004567 | 175554 | JSR | R5,RINT | ;LINK FOR LINE 11 |
| 889 | 003422 | 000000 |        | 0   |         |                   |
| 890 | 003424 | 000011 |        | 11  |         |                   |
| 891 | 003426 | 004567 | 175342 | JSR | R5,TINT |                   |
| 892 | 003432 | 000000 |        | 0   |         |                   |
| 893 | 003434 | 000011 |        | 11  |         |                   |
| 894 | 003436 | 004567 | 175534 | JSR | R5,RINT | ;LINK FOR LINE 12 |
| 895 | 003442 | 000000 |        | 0   |         |                   |
| 896 | 003444 | 000012 |        | 12  |         |                   |
| 897 | 003446 | 004567 | 175322 | JSR | R5,TINT |                   |
| 898 | 003452 | 000000 |        | 0   |         |                   |
| 899 | 003454 | 000012 |        | 12  |         |                   |
| 900 | 003456 | 004567 | 175514 | JSR | R5,RINT | ;LINK FOR LINE 13 |
| 901 | 003462 | 000000 |        | 0   |         |                   |
| 902 | 003464 | 000013 |        | 13  |         |                   |
| 903 | 003466 | 004567 | 175302 | JSR | R5,TINT |                   |
| 904 | 003472 | 000000 |        | 0   |         |                   |
| 905 | 003474 | 000013 |        | 13  |         |                   |
| 906 | 003476 | 004567 | 175474 | JSR | R5,RINT | ;LINK FOR LINE 14 |
| 907 | 003502 | 000000 |        | 0   |         |                   |
| 908 | 003504 | 000014 |        | 14  |         |                   |
| 909 | 003506 | 004567 | 175262 | JSR | R5,TINT |                   |
| 910 | 003512 | 000000 |        | 0   |         |                   |
| 911 | 003514 | 000014 |        | 14  |         |                   |
| 912 | 003516 | 004567 | 175454 | JSR | R5,RINT | ;LINK FOR LINE 15 |
| 913 | 003522 | 000000 |        | 0   |         |                   |
| 914 | 003524 | 000015 |        | 15  |         |                   |
| 915 | 003526 | 004567 | 175242 | JSR | R5,TINT |                   |
| 916 | 003532 | 000000 |        | 0   |         |                   |
| 917 | 003534 | 000015 |        | 15  |         |                   |
| 918 | 003536 | 004567 | 175434 | JSR | R5,RINT | ;LINK FOR LINE 16 |
| 919 | 003542 | 000000 |        | 0   |         |                   |
| 920 | 003544 | 000016 |        | 16  |         |                   |
| 921 | 003546 | 004567 | 175222 | JSR | R5,TINT |                   |
| 922 | 003552 | 000000 |        | 0   |         |                   |
| 923 | 003554 | 000016 |        | 16  |         |                   |
| 924 | 003556 | 004567 | 175414 | JSR | R5,RINT | ;LINK FOR LINE 17 |
| 925 | 003562 | 000000 |        | 0   |         |                   |
| 926 | 003564 | 000017 |        | 17  |         |                   |
| 927 | 003566 | 004567 | 175202 | JSR | R5,TINT |                   |
| 928 | 003572 | 000000 |        | 0   |         |                   |
| 929 | 003574 | 000017 |        | 17  |         |                   |

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SEQ 0022

DEC/X11 SYSTEM EXERSIZER MACRO DEFINITION MODULE

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000001

.END

SYMBOL TABLE

|          |         |          |         |          |         |          |          |         |         |
|----------|---------|----------|---------|----------|---------|----------|----------|---------|---------|
| ACSR     | 000102R | CKLINS   | 001602R | INDPAR=  | 000040  | PRTY0 =  | 000000   | SIZE    | 003030R |
| ACTDEV   | 003172R | CLKPRE=  | 000001  | INIT     | 000030R | PRTY1 =  | 000040   | SOFCNT  | 000042R |
| ADDR     | 000006R | CLKSP\$= | 104422  | INTR     | 000120R | PRTY2 =  | 000100   | SOFR\$= | 104406  |
| ADDR22=  | 001000  | CLRBUF   | 003050R | JSRTAB   | 003176R | PRTY3 =  | 000140   | SOPAS   | 000046R |
| APTPRE=  | 000200  | CLRTAB   | 003066R | KTPRES=  | 000400  | PRTY4 =  | 000200   | SPOINT  | 000032R |
| ASB      | 000106R | CNTR     | 003040R | KTXTND=  | 040000  | PRTY5 =  | 000240   | SPSIZ = | 000040  |
| ASTAT    | 000104R | CNTTBL   | 001650R | MAP22\$= | 104416  | PRTY6 =  | 000300   | SR1     | 000016R |
| AUTO =   | 000010  | CONFIG   | 000056R | MODNAM   | 000000R | PRTY7 =  | 000340   | SR2     | 000020R |
| AWAS     | 000110R | COUNT    | 003032R | MODREV   | 000224R | PS       | = 177776 | SR3     | 000022R |
| BADR     | 002002R | CSRA     | 000100R | MODSP    | 000224R | PSW      | = 177776 | SR4     | 000024R |
| BADT     | 002044R | DATBAD   | 002126R | MSGN\$ = | 104403  | PUSH     | = 005746 | START   | 000226R |
| BEGIN    | 000000R | DATCK\$= | 104411  | MSG\$ =  | 104402  | PUSH2 =  | 024646   | STAT    | 000026R |
| BIT0 =   | 000001  | DATER\$= | 104404  | MSG\$ =  | 104401  | PWRFLG=  | 000002   | STUP1   | 000566R |
| BIT1 =   | 000002  | DCNT     | 002710R | M.FRAME  | 001736R | QMON22=  | 000010   | SVPTR   | 003042R |
| BIT10 =  | 002000  | DEVTAB   | 003152R | M.OVER   | 001712R | QPTR1    | 003044R  | SVR0    | 000062R |
| BIT11 =  | 004000  | DTAB     | 003104R | M.PAR    | 001762R | QPTR2    | 003046R  | SVR1    | 000064R |
| BIT12 =  | 010000  | DVICE    | 003174R | NCPUP=   | 000020  | RAND\$ = | 104417   | SVR2    | 000066R |
| BIT13 =  | 020000  | DVID1    | 000014R | NOPTY=   | 000002  | RANUM    | 000054R  | SVR3    | 000070R |
| BIT14 =  | 040000  | ECCMEM=  | 000100  | NULL =   | 000000  | RBUF     | 003010R  | SVR4    | 000072R |
| BIT15 =  | 100000  | ENDIT\$= | 104413  | OPEN =   | 000000  | RCNT     | 002650R  | SVR5    | 000074R |
| BIT2 =   | 000004  | END\$ =  | 104410  | OTOA\$ = | 104420  | RCVERR   | 002200R  | SVR6    | 000076R |
| BIT3 =   | 000010  | ENPS     | 002220R | OVERUN   | 001706R | REST     | 000562R  | SYSCNT  | 000052R |
| BIT4 =   | 000020  | ERRCHK   | 001302R | PARITY   | 001756R | RESTRT   | 000552R  | TCNT    | 002670R |
| BIT5 =   | 000040  | ERRTYP   | 000106R | PARPRE=  | 002000  | RESYNC   | 002224R  | TINT    | 000774R |
| BIT6 =   | 000100  | EXIT\$ = | 104400  | PASCNT   | 000034R | RES1     | 000056R  | TQ      | 002730R |
| BIT7 =   | 000200  | FRAME    | 001732R | PDPF11=  | 000002  | RES2     | 000060R  | TRPDFD= | 000023  |
| BIT8 =   | 000400  | GETADR   | 002110R | PDPLSI=  | 020000  | RH70 =   | 001000   | TSERV   | 001034R |
| BIT9 =   | 001000  | GETPA\$= | 104415  | PDP44 =  | 100000  | RINT     | 001176R  | TXCNT   | 003034R |
| BREAK\$= | 104407  | GMBUF\$= | 104414  | PDP60 =  | 004000  | RSTAB    | 002250R  | USTACK= | 000001  |
| BR1      | 000012R | HRDCNT   | 000044R | PDP70 =  | 010000  | RSTRT    | 000112R  | VECTOR  | 000010R |
| BR2      | 000013R | HRDER\$= | 104405  | PIRQ\$ = | 000004  | RXCNT    | 003036R  | WASADR  | 000104R |
| BTOD\$ = | 104421  | HRDPAS   | 000050R | POPSP =  | 005726  | R6       | =#000006 | WDFR    | 000116R |
| CAPRES=  | 000004  | ICONT    | 000036R | POPSP2=  | 022626  | R7       | =#000007 | WDT0    | 000114R |
| CDATA\$= | 104412  | ICOUNT   | 000040R | PRHMS\$= | 000002  | SBADR    | 000102R  | XBUF    | 002770R |
| CHK1     | 001334R | IDNUM    | 000122R | PRTY =   | 000000  | SETCSR   | 000462R  | XFLAG   | 000005R |
| CKHNG\$= | 000001  |          |         |          |         |          |          |         |         |

. ABS. 000000 000  
003576 001  
ERRORS DETECTED: 0

VIRTUAL MEMORY USED: 13133 WORDS ( 52 PAGES)  
DYNAMIC MEMORY: 19748 WORDS ( 75 PAGES)  
ELAPSED TIME: 00:00:56  
DLA,DLA/CR/-SP=DDXCOM,DLA

SYMBOL CROSS REFERENCE

CREF V02

| SYMBOL  | VALUE    | REFERENCES |        |        |        |        |        |        |       |       |
|---------|----------|------------|--------|--------|--------|--------|--------|--------|-------|-------|
| ACSR    | 000102 R | #8-385     | *9-552 | *9-699 | *9-713 | *9-751 |        |        |       |       |
| ACTDEV  | 003172 R | 9-488      | 9-588  | 9-645  | *9-819 | #9-828 |        |        |       |       |
| ADDR    | 000006 R | #8-385     | 9-454  | 9-728  |        |        |        |        |       |       |
| ADDR22  | = 001000 | #8-385     |        |        |        |        |        |        |       |       |
| APTPRE  | = 000200 | #8-385     |        |        |        |        |        |        |       |       |
| ASB     | 000106 R | #8-385     | *9-741 |        |        |        |        |        |       |       |
| ASTAT   | 000104 R | #8-385     | *9-700 | *9-714 |        |        |        |        |       |       |
| AUTO    | = 000010 | #8-385     |        |        |        |        |        |        |       |       |
| AWAS    | 000110 R | #8-385     | *9-735 |        |        |        |        |        |       |       |
| BADR    | 002002 R | 9-650      | #9-697 |        |        |        |        |        |       |       |
| BADT    | 002044 R | 9-654      | #9-710 |        |        |        |        |        |       |       |
| BEGIN   | 000000 R | #8-385     | 9-457  | 9-504  | 9-504  | 9-528  | 9-550  | 9-555  | 9-556 | 9-614 |
|         |          | 9-615      | 9-619  | 9-620  | 9-624  | 9-625  | 9-630  | 9-703  | 9-717 | 9-743 |
|         |          | 9-755      |        |        |        |        |        |        |       |       |
| BIT0    | = 000001 | #8-385     |        |        |        |        |        |        |       |       |
| BIT1    | = 000002 | #8-385     |        |        |        |        |        |        |       |       |
| BIT10   | = 002000 | #8-385     |        |        |        |        |        |        |       |       |
| BIT11   | = 004000 | #8-385     |        |        |        |        |        |        |       |       |
| BIT12   | = 010000 | #8-385     |        |        |        |        |        |        |       |       |
| BIT13   | = 020000 | #8-385     |        |        |        |        |        |        |       |       |
| BIT14   | = 040000 | #8-385     |        |        |        |        |        |        |       |       |
| BIT15   | = 100000 | #8-385     |        |        |        |        |        |        |       |       |
| BIT2    | = 000004 | #8-385     |        |        |        |        |        |        |       |       |
| BIT3    | = 000010 | #8-385     |        |        |        |        |        |        |       |       |
| BIT4    | = 000020 | #8-385     |        |        |        |        |        |        |       |       |
| BIT5    | = 000040 | #8-385     |        |        |        |        |        |        |       |       |
| BIT6    | = 000100 | #8-385     |        |        |        |        |        |        |       |       |
| BIT7    | = 000200 | #8-385     |        |        |        |        |        |        |       |       |
| BIT8    | = 000400 | #8-385     |        |        |        |        |        |        |       |       |
| BIT9    | = 001000 | #8-385     |        |        |        |        |        |        |       |       |
| BREAK\$ | = 104407 | #8-385     | 9-504  | 9-504  |        |        |        |        |       |       |
| BR1     | 000012 R | #8-385     | 9-437  | 9-441  |        |        |        |        |       |       |
| BR2     | 000013 R | #8-385     |        |        |        |        |        |        |       |       |
| BTOD\$  | = 104421 | #8-385     |        |        |        |        |        |        |       |       |
| CAPRES  | = 000004 | #8-385     |        |        |        |        |        |        |       |       |
| CDATA\$ | = 104412 | #8-385     |        |        |        |        |        |        |       |       |
| CHK1    | 001334 R | #9-599     |        |        |        |        |        |        |       |       |
| CKHNG\$ | = 000001 | #8-385     |        |        |        |        |        |        |       |       |
| CKLINS  | 001602 R | #9-645     |        |        |        |        |        |        |       |       |
| CLKPRE  | = 000001 | #8-385     |        |        |        |        |        |        |       |       |
| CLKSP\$ | = 104422 | #8-385     |        |        |        |        |        |        |       |       |
| CLRBUF  | 003050 R | 9-480      | #9-793 |        |        |        |        |        |       |       |
| CLRTAB  | 003066 R | 9-482      | #9-801 |        |        |        |        |        |       |       |
| CNTR    | 003040 R | *9-501     | *9-511 | *9-785 |        |        |        |        |       |       |
| CNTTBL  | 001650 R | 9-428      | #9-661 |        |        |        |        |        |       |       |
| CONFIG  | 000056 R | #8-385     |        |        |        |        |        |        |       |       |
| COUNT   | 003032 R | #9-781     |        |        |        |        |        |        |       |       |
| CSRA    | 000100 R | #8-385     | *9-551 | *9-698 | *9-712 | *9-734 | *9-750 |        |       |       |
| DATBAD  | 002126 R | 9-638      | #9-733 |        |        |        |        |        |       |       |
| DATCK\$ | = 104411 | #8-385     |        |        |        |        |        |        |       |       |
| DATER\$ | = 104404 | #8-385     | 9-743  |        |        |        |        |        |       |       |
| DCNT    | 002710 R | *9-497     | *9-549 | 9-647  | 9-651  | 9-699  | 9-713  | #9-771 |       |       |

## SYMBOL CROSS REFERENCE

CREF V02

| SYMBOL  | VALUE    | REFERENCES                                                     |
|---------|----------|----------------------------------------------------------------|
| DEVTAB  | 003152 R | 9-489 9-589 9-646 *9-824 #9-827                                |
| DTAB    | 003104 R | 9-481 #9-811                                                   |
| DVICE   | 003174 R | *9-432 9-815 #9-829                                            |
| DVID1   | 000014 R | #8-385 9-431 9-455                                             |
| ECCMEM  | = 000100 | #8-385                                                         |
| ENDIT\$ | = 104413 | #8-385 9-755                                                   |
| END\$   | = 104410 | #8-385 9-457                                                   |
| ENPS    | 002220 R | 9-657 #9-755                                                   |
| ERRCHK  | 001302 R | 9-515 #9-588                                                   |
| ERRTYP  | 000106 R | #8-385 *9-554 *9-609 *9-613 *9-618 *9-623 *9-629 *9-702 *9-716 |
| EXIT\$  | = 104400 | #8-385 9-550 9-556                                             |
| FRAME   | 001732 R | 9-620 #9-683                                                   |
| GETADR  | 002110 R | 9-490 9-590 9-697 9-710 #9-724 9-733 9-749                     |
| GETPA\$ | = 104415 | #8-385                                                         |
| GWBUF\$ | = 104414 | #8-385                                                         |
| HRDCNT  | 000044 R | #8-385                                                         |
| HRDER\$ | = 104405 | #8-385 9-555 9-630 9-703 9-717                                 |
| HRDPAS  | 000050 R | #8-385                                                         |
| ICONT   | 000036 R | #8-385 *9-426 *9-428                                           |
| ICOUNT  | 000040 R | #8-385                                                         |
| IDNUM   | 000122 R | #8-385                                                         |
| INDPAR  | = 000040 | #8-385                                                         |
| INIT    | 000030 R | #8-385                                                         |
| INTR    | 000120 R | #8-385 *9-403                                                  |
| JSRTAB  | 003176 R | 9-433 9-444 9-458 9-467 #9-834                                 |
| KTPRES  | = 000400 | #8-385                                                         |
| KTXTND  | = 040000 | #8-385                                                         |
| MAP22\$ | = 104416 | #8-385                                                         |
| MODNAM  | 000000 R | #8-385                                                         |
| MODREV  | 000224 R | #8-394                                                         |
| MODSP   | 000224 R | 8-385 #8-385                                                   |
| MSGN\$  | = 104403 | #8-385 9-615 9-620 9-625                                       |
| MSG\$   | = 104402 | #8-385                                                         |
| MSG\$   | = 104401 | #8-385                                                         |
| M.FRAME | 001736 R | 9-683 #9-686                                                   |
| M.OVER  | 001712 R | 9-677 #9-680                                                   |
| M.PAR   | 001762 R | 9-689 #9-692                                                   |
| NCPUOP  | = 000020 | #8-385                                                         |
| NOPTY   | = 000002 | #8-385                                                         |
| NULL    | = 000000 | #8-385 9-555 9-614 9-619 9-624 9-630 9-703 9-717               |
| OPEN    | = 000000 | 8-385 8-385 8-385 8-385 8-385 8-385 8-385 8-385 8-385 8-385    |
|         |          | 8-385 8-385 8-385 8-385 8-385 8-385 8-385 8-385 8-385 8-385    |
|         |          | 8-385 8-385 8-385 8-385 8-385 8-385 8-385 8-385 8-385 8-385    |
|         |          | 9-787 9-788 9-828 9-829                                        |
| OTOA\$  | = 104420 | #8-385                                                         |
| OVERUN  | 001706 R | 9-615 #9-677                                                   |
| PARITY  | 001756 R | 9-625 #9-689                                                   |
| PARPRE  | = 002000 | #8-385                                                         |
| PASCNT  | 000034 R | #8-385 9-478                                                   |
| PDPF11  | = 000002 | #8-385                                                         |
| PDPLSI  | = 020000 | #8-385                                                         |
| PDP44   | = 100000 | #8-385                                                         |

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SEQ 0026

## SYMBOL CROSS REFERENCE

CREF V02

| SYMBOL  | VALUE    | REFERENCES                                             |
|---------|----------|--------------------------------------------------------|
| PDP60   | = 004000 | #8-385                                                 |
| PDP70   | = 010000 | #8-385                                                 |
| PIRQ\$  | = 000004 | #8-385 9-528                                           |
| POPSP   | = 005726 | #8-385                                                 |
| POPSP2  | = 022626 | #8-385                                                 |
| PRHMS\$ | = 000002 | #8-385                                                 |
| PRTY    | = 000000 | 8-385 #8-385                                           |
| PRTY0   | = 000000 | #8-385                                                 |
| PRTY1   | = 000040 | #8-385                                                 |
| PRTY2   | = 000100 | #8-385                                                 |
| PRTY3   | = 000140 | #8-385                                                 |
| PRTY4   | = 000200 | 8-385 #8-385                                           |
| PRTY5   | = 000240 | #8-385                                                 |
| PRTY6   | = 000300 | #8-385                                                 |
| PRTY7   | = 000340 | #8-385                                                 |
| PS      | = 177776 | #8-385                                                 |
| PSW     | = 177776 | #8-385                                                 |
| PUSH    | = 005746 | #8-385                                                 |
| PUSH2   | = 024646 | #8-385                                                 |
| PWRFLG  | = 000002 | #8-385                                                 |
| QMON22  | = 000010 | #8-385                                                 |
| QPTR1   | 003044 R | *9-486 9-522 *9-523 9-524 *9-526 #9-787                |
| QPTR2   | 003046 R | *9-487 9-533 *9-534 9-535 *9-537 #9-788                |
| RAND\$  | = 104417 | #8-385                                                 |
| RANNUM  | 000054 R | #8-385                                                 |
| RBUF    | 003010 R | *9-631 *9-634 9-636 9-739 9-759 9-762 #9-776 9-795     |
| RCNT    | 002650 R | *9-577 9-647 9-700 #9-769                              |
| RCVERR  | 002200 R | 9-608 9-628 #9-748                                     |
| REST    | 000562 R | 9-469 #9-480                                           |
| RESTR   | 000552 R | 8-385 #9-477                                           |
| RESYNC  | 002224 R | #9-759                                                 |
| RES1    | 000056 R | #8-385                                                 |
| RES2    | 000060 R | #8-385                                                 |
| RH70    | = 001000 | #8-385                                                 |
| RINT    | 001176 R | #9-562 9-834 9-840 9-846 9-852 9-858 9-864 9-870 9-876 |
| RSTAB   | 002250 R | 9-882 9-888 9-894 9-900 9-906 9-912 9-918 9-924        |
| RSTR    | 000112 R | 9-485 9-602 #9-768 9-801                               |
| RXCNT   | 003036 R | *9-484 9-507 9-564 *9-578 9-599 *9-601 *9-640 #9-784   |
| R6      | =#000006 | #8-385 *9-527 *9-562 *9-563 *9-579 *9-580 *9-581       |
| R7      | =#000007 | #8-385                                                 |
| SBADR   | 000102 R | #8-385 *9-742                                          |
| SETCSR  | 000462 R | 9-446 #9-454                                           |
| SIZE    | 003030 R | *9-412 9-634 9-635 #9-780                              |
| SOFCNT  | 000042 R | #8-385                                                 |
| SOFR\$  | = 104406 | #8-385 9-614 9-619 9-624                               |
| SOPAS   | 000046 R | #8-385                                                 |
| SPOINT  | 000032 R | #8-385                                                 |
| SPSIZ   | = 000040 | #1-29 8-385                                            |
| SR1     | 000016 R | #8-385 9-404 9-414                                     |
| SR2     | 000020 R | #8-385 9-422 9-424                                     |
| SR3     | 000022 R | #8-385                                                 |

SEQ 0027

SYMBOL CROSS REFERENCE

CREF V02

| SMBOL    | VALUE    | REFERENCES                                                                                                                                                                                                                                                                                                                                                           |
|----------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SR4      | 000024 R | #8-385                                                                                                                                                                                                                                                                                                                                                               |
| STAT I   | 000226 R | 8-385 #9-400 9-479                                                                                                                                                                                                                                                                                                                                                   |
| STAI     | 000026 R | #8-385                                                                                                                                                                                                                                                                                                                                                               |
| STUP1    | 000566 R | #9-481 9-764                                                                                                                                                                                                                                                                                                                                                         |
| SVPTR    | 003042 R | *9-485 9-566 *9-575 #9-786                                                                                                                                                                                                                                                                                                                                           |
| SVRO     | 000062 R | #8-385                                                                                                                                                                                                                                                                                                                                                               |
| SVR1     | 000064 R | #8-385                                                                                                                                                                                                                                                                                                                                                               |
| SVR2     | 000066 R | #8-385                                                                                                                                                                                                                                                                                                                                                               |
| SVR3     | 000070 R | #8-385                                                                                                                                                                                                                                                                                                                                                               |
| SVR4     | 000072 R | #8-385                                                                                                                                                                                                                                                                                                                                                               |
| SVR5     | 000074 R | #8-385                                                                                                                                                                                                                                                                                                                                                               |
| SVR6     | 000076 R | #8-385                                                                                                                                                                                                                                                                                                                                                               |
| SYSCNT   | 000052 R | #8-385                                                                                                                                                                                                                                                                                                                                                               |
| TCNT     | 002670 R | *9-541 9-651 9-714 #9-770                                                                                                                                                                                                                                                                                                                                            |
| TINT     | 000774 R | #9-522 9-837 9-843 9-849 9-855 9-861 9-867 9-873 9-879<br>9-885 9-891 9-897 9-903 9-909 9-915 9-921 9-927                                                                                                                                                                                                                                                            |
| TQ       | 002730 R | 9-486 9-487 9-524 9-526 9-535 9-537 #9-773 9-803                                                                                                                                                                                                                                                                                                                     |
| TRPDFD - | 000023   | #8-385 8-385 8-385 #8-385 8-385 8-385 #8-385 8-385 8-385<br>#8-385 8-385 8-385 #8-385 8-385 8-385 #8-385 8-385 8-385<br>#8-385 8-385 8-385 #8-385 8-385 8-385 #8-385 8-385 8-385<br>#8-385 8-385 8-385 #8-385 8-385 8-385 #8-385 8-385 8-385<br>#8-385 8-385 8-385 #8-385 8-385 8-385 #8-385 8-385 8-385<br>#8-385 8-385 8-385 #8-385 8-385 8-385 #8-385 8-385 8-385 |
| TSERV    | 001034 R | 9-528 #9-533                                                                                                                                                                                                                                                                                                                                                         |
| TXCNT    | 003034 R | *9-483 *9-496 9-505 *9-540 9-544 *9-548 #9-782                                                                                                                                                                                                                                                                                                                       |
| USTACK - | 000001   | #8-385                                                                                                                                                                                                                                                                                                                                                               |
| VECTOR   | 000010 R | #8-385 9-430                                                                                                                                                                                                                                                                                                                                                         |
| MASADR   | 000104 R | #8-385 *9-737                                                                                                                                                                                                                                                                                                                                                        |
| MDFR     | 000116 R | #8-385 *9-402                                                                                                                                                                                                                                                                                                                                                        |
| WDTO     | 000114 R | #8-385 *9-401                                                                                                                                                                                                                                                                                                                                                        |
| XBUF     | 002770 R | *9-494 9-495 *9-546 9-547 9-760 #9-775 9-793                                                                                                                                                                                                                                                                                                                         |
| XFLAG    | 000005 R | #8-385                                                                                                                                                                                                                                                                                                                                                               |

## MACRO CROSS REFERENCE

CREF V02

| MACRO NAME | REFERENCES                                             |
|------------|--------------------------------------------------------|
| BKMOD      | 01-125                                                 |
| BREAK      | 01-223 9-504                                           |
| BTOD       | 01-247                                                 |
| CKDATA     | 01-283                                                 |
| CLKSP      | 01-150                                                 |
| DATACK     | 01-292                                                 |
| DATERR     | 01-176 9-743                                           |
| DFSEVN     | 01-315 8-385 8-385 8-385 8-385 8-385 8-385 8-385 8-385 |
|            | 8-385 8-385 8-385 8-385 8-385 8-385 8-385 8-385        |
| DSEVNT     | 01-325 8-385 8-385 8-385 8-385 8-385 8-385 8-385       |
| END        | 01-213 9-457                                           |
| ENDIT      | 01-204 9-755                                           |
| ENDMOD     | 01-209                                                 |
| EQUATS     | 01-331 8-385                                           |
| EXIT       | 01-158 9-550 9-556                                     |
| GETPA      | 01-274                                                 |
| GMBUFF     | 01-262                                                 |
| HLFBRK     | 01-228                                                 |
| HRDR       | 01-166 9-555 9-630 9-703 9-717                         |
| IOMOD      | 01-121 8-385                                           |
| IOMODP     | 01-145                                                 |
| IOMODR     | 01-141                                                 |
| IOMODX     | 01-137                                                 |
| MAP22      | 01-278                                                 |
| MODULE     | 01-30 8-385                                            |
| MSG        | 01-192                                                 |
| MSGN       | 01-196 9-615 9-620 9-625                               |
| MSGS       | 01-200                                                 |
| NBKMOD     | 01-133                                                 |
| OTOA       | 01-233                                                 |
| PIRQ       | 01-217 9-528                                           |
| RAND       | 01-162                                                 |
| SBKMOD     | 01-129                                                 |
| SOFR       | 01-182 9-614 9-619 9-624                               |