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.REM_
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IDENTIFICATION

PRODUCT CODE: AC-E712E-MC

PRODUCT NAME: CXDPAE0 DEC/X11 DP11 MODULE

DATE: SEPTEMBER 1978

MAINTAINER: DEC/X11 SUPPORT GROUP

1. ABSTRACT

DPA IS AN IOMOD THAT EXERCISES UP TO EIGHT 8-BIT SYNCHRONOUS LINE INTERFACES (DP11) BY TRANSMITTING A STANDARD BINARY COUNT PATTERN USING THE MAINTENANCE MODE FEATURE. THE RECEIVED DATA IS COMPARED WITH THE TRANSMITTED DATA AND ANY ERRORS ARE REPORTED VIA THE CONSOLE TTY. ALL AVAILABLE INTERFACES (UP TO 8) ARE ACTIVATED AND RUNNING SIMULTANEOUSLY.

2. REQUIREMENTS

HARDWARE: DP11 SYNCHRONOUS INTERFACE
STORAGE:: DPA REQUIRES:
1. DECIMAL WORDS: 728
2. OCTAL WORDS: 1330
3. OCTAL BYTES: 2660

3. PASS DEFINITION

ONE PASS OF THE DPA MODULE CONSISTS OF TRANSMITTING AND RECEIVING 128008 8-BIT CHARACTERS (TOTAL)

4. EXECUTION TIME

DPA RUNNING ALONE ON A PDP11/05 PROCESSOR TAKES APPROXIMATELY --- MINUTES TO COMPLETE ONE PASS.

5. CONFIGURATION PARAMETERS

DEFAULT PARAMETERS:

DEVADR: 174770, VECTOR:440, BR1:5, BR2:5, DEVCNT:1

REQUIRED PARAMETERS: NONE

6. DEVICE/OPTION SETUP

NONE: NO DEVICE IS REQUIRED IN MAINTENANCE MODE

7. MODULE OPERATION

TEST SEQUENCE:

A. TEST UP TO 8 POSSIBLE DEVICES FOR SELECTION
B. STORE THE DEVICE NO. OF DEVICES TO BE TESTED AND SET UP THE VECTORS FOR THESE DEVICES
C. TURN ON RECEIVER INTERRUPT ENABLE, TRANSMITTER INTERRUPT ENABLE, AND MAINTENANCE MODE FOR ALL ACTIVE DEVICES.
D. INITIAL TRANSMITTER INTERRUPT SERVICE:

    1.) TEST FOR FALSE INTERRUPT (READY (0)); REPORT ERRORS
    2.) OUTPUT NEXT CHARACTER TO EACH ACTIVE DEVICE
    3.) RETURN TO MONITOR TO WAIT FOR RECEIVER INTERRUPT.

E. RECEIVER INTERRUPT SERVICE:

    1.) TEST FOR FALSE INTERRUPT (DONE (0)); REPORT ERRORS
    2.) COMPARE INPUT/OUTPUT DATA; REPORT ERRORS
    3.) RETURN TO MONITOR TO WAIT FOR TRANSMITTER INTERRUPT

F. REPEAT D AND E UNTIL 12800.(TOTAL) CHARACTERS HAVE BEEN PROCESSED
G. AT END OF PASS TURN OFF ALL ACTIVE DEVICES AND RESTART AT B

8. OPERATION OPTIONS

A. LOCATION DVID1 (DPA 14) MAY BE CHANGED TO SELECT ANY COMBINATION OF DEVICES BIT0=DEV0, BIT1=DEV1 .....BIT7=DEV7
IF DVID1 IS INITIALLY 0 DPA WILL BE DROPPED FROM TEST.

9. NON STANDARD PRINTOUTS

NONE: ALL PRINTOUTS HAVE STANDARD FORMATS AS DESCRIBED IN THE DEC/X11 DOCUMENT.

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                                        .LIST SEQ,BIN
                                        ; SET UP VECTOR (RETURN ADDRESS(PC)) PC = INTR SERV. AREA.
                                
000000'                                         IOMOD   <DPAE >,174770,440,5,,,2000,30
000000'                                         MODULE  140000,DPAE ,174770,440,5,,,2000,30
                                                .TITLE  DPAE DEC/X11 SYSTEM EXERCISER MODULE
                                        ;       DDXCOM  VERSION  6      23-MAY-78
                                                .LIST   BIN
                                        ;*************************************************************************
000000'                                 BEGIN:
000000' 050104  042501      040         MODNAM: .ASCII  /DPAE / ;MODULE NAME.
000005'     000                         XFLAG:  .BYTE   OPEN                    ;USED TO KEEP TRACK OF WBUFF USAGE
000006' 174770                          ADDR:   174770+0                        ;1ST DEVICE ADDR.
000010' 000440                          VECTOR: 440+0                           ;1ST DEVICE VECTOR.
000012'     240                         BR1:    .BYTE   PRTY5+0                 ;1ST BR LEVEL.
000013'     000                         BR2:    .BYTE   PRTY+0                  ;2ND BR LEVEL.
000014' 000001                          DVID1:  +1                              ;DEVICE INDICATOR 1.
000016' 000000                          SR1:    OPEN                            ;SWITCH REGISTER 1
000020' 000000                          SR2:    OPEN                            ;SWITCH REGISTER 2
000022' 000000                          SR3:    OPEN                            ;SWITCH REGISTER 3
000024' 000000                          SR4:    OPEN                            ;SWITCH REGISTER 4
                                        ;*************************************************************************
000026' 140000                          STAT:   140000                          ;STATUS WORD.
000030' 000224'                         INIT:   START                           ;MODULE START ADDR.
000032' 000224'                         SPOINT: MODSP                           ;MODULE STACK POINTER.
000034' 000000                          PASCNT: 0                               ;PASS COUNTER.
000036' 002000                          ICONT:  2000                            ;# OF ITERATIONS PER PASS=2000
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                          RANNUM: 0                               ;HOLDS RANDOM # WHEN RAND MACRO IS CALLED
000056'                                 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'                                 SBADR:                                  ;ADDR OF GOOD DATA, OR
000102' 000000                          ACSR:   OPEN                            ;CONTENTS OF CSR.
000104'                                 WASADR:                                 ;ADDR OF BAD DATA, OR
000104' 000000                          ASTAT:  OPEN                            ;STATUS REG CONTENTS.
000106'                                 ERRTYP:                                 ;TYPE OF ERROR
000106' 000000                          ASB:    OPEN                            ;EXPECTED DATA.
000110' 000000                          AWAS:   OPEN                            ;ACTUAL DATA.
000112' 000246'                         RSTRT:  RESTRT                          ;RESTART ADDRESS AFTER END OF PASS
000114' 000600                          WDTO:   OPEN                            ;WORDS TO MEMORY PER ITERATION
000116' 000000                          WDFR:   OPEN                            ;WORDS FROM MEMORY PER ITERATION
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000120' 000000                          INTR:   OPEN                            ;# OF INTERRUPTS PER ITERATION
000122' 000030                          IDNUM:  30                              ;MODULE IDENTIFICATION NUMBER=30
        000040                                  .REPT   SPSIZ                   ;MODULE STACK STARTS HERE.
                                                .NLIST
                                                .WORD   0
                                                .LIST
                                                .ENDR
000224'                                 MODSP:
                                        ;*************************************************************************
000224' 012767  000016  177662          START:  MOV     #16,WDTO                ;16 WORDS TO MEM
000232' 012767  000016  177656                  MOV     #16,WDFR                ;16 WORDS FROM
000240' 012767  000016  177652                  MOV     #16,INTR                ;16 INTERRUPTS
                                
000246' 005767  177542                  RESTRT: TST     DVID1                   ;CHECK ANY DPN'S ON LINE
000252' 001002                                  BNE     1$                      ;YES
000254' 104410  000000'                         ENDS,BEGIN                      ;
000260' 005067  002364                  1$:     CLR     TRCNT                   ;INITIALIZE TRANSMIT COUNT
000264' 005067  002362                          CLR     RCCNT                   ;INITIALIZE RECEIVE COUNT
000270' 005067  002360                          CLR     DPDN                    ;NO. DP'S THAT ARE DONE
000274' 005067  002356                          CLR     NO.DP                   ;NO. DP'S SELECTED
000300' 016767  177510  002330                  MOV     DVID1,DVIDA             ;SET UP BINARY COUNT OF DEVICE(S) SELECTED
000306' 016701  177476                          MOV     VECTOR,R1               ;R1 = VECTOR ADDRESS
000312' 012702  002470'                         MOV     #LINKER,R2              ;R2 = LINK: JSR TABLE WITH OFFSET
000316' 012767  000001  002304                  MOV     #1,PNTR                 ;SET UP PNTR TO TEST DEVICE ON LINE
000324' 036767  002300  177462  2$:     BIT     PNTR,DVID1              ;TEST IS THIS DP11 ON LINE
000332' 001422                                  BEQ     3$                      ;NO GO CHANGE DP ADDR & TRY AGAIN
000334' 005267  002316                          INC     NO.DP                   ;COUNT NO. DP'S SELECTED
000340' 010221                                  MOV     R2,(R1)+                ;SET UP VECTOR RETURN ADDRESS(RCV)
000342' 116721  177444                          MOVB    BR1,(R1)+               ;SET UP VECTOR PRIORITY (RCV)
000346' 105721                                  TSTB    (R1)+                   ;INCR. POINTER
000350' 062702  000006                          ADD     #6,R2                   ;UPDATE NEW LINK ADDRESS
000354' 010221                                  MOV     R2,(R1)+                ;SET UP VECTOR RETURN ADDRESS (XMT)
000356' 116721  177430                          MOVB    BR1,(R1)+               ;SET UP VECTOR PRIORITY (XMT)
000362' 105721                                  TSTB    (R1)+                   ;INCR. POINTER
000364' 062702  000006                          ADD     #6,R2                   ;UPDATE NEW LINK ADDRESS
000370' 106367  002234                  4$:     ASLB    PNTR                    ;SET UP FOR NEW DEVICE COMPARE
000374' 103406                                  BCS     START1                  ;HAVE WE TESTED FOR ALL ON LINE
                                                                                ;  DEVICES
000376' 000752                                  BR      2$                      ;NOT DONE GO DO MORE
000400' 062701  000010                  3$:     ADD     #10,R1                  ;UPDATE TO NEW VECTOR ADDRESS
000404' 062702  000014                          ADD     #14,R2                  ;UPDATE TO NEW LINK ADDRESS
000410' 000767                                  BR      4$                      ;GO TEST FOR NEXT DEVICE ON LINE
                                
                                
                                        ; THIS CODE WILL CLEAR ALL OF THE WRITE BUFFER AREA
                                
000412' 012767  000157  002214  START1: MOV     #111.,CNT80             ;COUNT REQUIRED TO GO THRU
                                                                                ;ALL 88 DATA STORAGE BUFFER
000420' 012703  002130'                         MOV     #DPLIN,R3               ;STARTING ADDRESS OF
                                                                                ;  DATA BUFFER LOCATIONS.
000424' 005023                  1$:     CLR     (R3)+                   ;CLEAR DATA BUFF REG
000426' 005367  002202                  DEC     CNT80                   ;ARE THERE MORE TO CLEAR?
000432' 001374                          BNE     1$                      ;NO GO BACK & DO THE REST
                                
                                        ; THIS CODE WILL SELECT WHICH LINES (<1:8>) HAVE
                                        ; BEEN SELECTED FOR TEST & TRANSMIT SYNC TO START
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                                        ; TESTING ALL LINES.
                                        ;
000434' 012767  000010  002200  INT:    MOV     #10,COUNT       ;SET COUNT VALUE TO NUMBER OF POSSIBLE DEVICES
000442' 016701  177340          MOV     ADDR,R1         ;R1=174770
000446' 012702  002150'         MOV     #DVAD1,R2       ;R2=DVAD1 ADDR.
000452' 012703  002130'         MOV     #DPLIN,R3       ;LINE BUFFER POINTER
000456' 012704  002250'         MOV     #DPLIN1,R4      ;START OF LINE BUFF
000462' 010122                  1$:     MOV     R1,(R2)+        ;DVADX=DEVICE ADDR. CODE
000464' 010423                  MOV     R4,(R3)+        ;BUFF POINTER HAS START OF LINE
                                                        ;BUFF STORAGE
000466' 062701  177770          ADD     #-10,R1         ;UPDATE
000472' 062704  000020          ADD     #20,R4          ;UPDATE
000476' 005367  002140          DEC     COUNT           ;CNT DOWN
000502' 001367                  BNE     1$              ;NOT DONE GO BACK FOR MORE
                                        ;
                                        ;
000504' 005067  002130          START2: CLR     NODVTS          ;CLEAR NO. OF LINE TESTED
                                                        ;REG.
000510' 016701  177272          MOV     ADDR,R1         ;GET DEVICE ADDRESS
000514' 016702  177266          MOV     ADDR,R2         ;XMT CSR ADDRESS IN R2
000520' 062702  000004          ADD     #4,R2           ;R2=XMT CSR REGISTER 174XX4
000524' 012700  002171'         MOV     #LNSYN1+1,R0    ;SET UP R0 TO POINT TO LNSYN LCC.
000530' 012703  002210'         MOV     #LNCNT1,R3      ;
000534' 012767  000001  002066  MOV     #1,PNTR         ;SET PNTR REG POINTER TO
                                                        ; 1ST DEVICE ON LINE
000542' 036767  002062  177244  D$:     BIT     PNTR,DVID1      ;TEST IS THIS DEVICE ON LINE
000550' 001472                  BEQ     B$              ;NO GO UPDATE ADDRESS
000552' 112710  000004          MOVB    #4,(R0)         ;PLACE SYNC COUNT INTO HIGH
                                                        ;BYTE LNSYN X
000556' 012713  010020          MOV     #10020,(R3)     ;COUNT =16 HIGH BYTE FOR XMT
                                                        ;LOW BYTE FOR RCV
000562' 062700  000002          C$:     ADD     #2,R0           ;UPDATE LNSYN X POINTER
000566' 005723                  TST     (R3)+           ;UPDATE LNCNT X POINTER
000570' 000257                  CCC                     ;CLEAR CARRY BIT (CLR FOR TEST)
000572' 106367  002032          ASLB    PNTR            ;HAS 8 DP11'S BEEN INITIALIZED
000576' 103361                  BCC     D$              ;NO GO BACK SET UP NEXT DP
000600' 012767  000001  002022  MOV     #1,PNTR         ;NEW POINTER
000606' 036767  002016  177200  KCKOFF: BIT     PNTR,DVID1      ;IS THIS LINE ON
000614' 001411                  BEQ     UPDAT           ;GOT UPDATE ADDRESS
000616' 052711  000105          BIS     #105,(R1)       ;SET INTR ENABLE,MAINT. MODE,
                                                        ;& STRIP SYNC
000622' 116761  002004  000003  MOVB    TSYNC,3(R1)     ;LOAD SYNC BUFFER WITH SYNC CHAR.
000630' 052712  000312          BIS     #312,(R2)       ;INITIALIZE XMT STATUS
                                                        ;7=DONE
                                                        ;6=INTR ENABLE
                                                        ;3=XMT SYNC ON INTR
                                                        ;1=IDLE SYNC
000634' 105062  000003          CLRB    3(R2)           ;CLEAR SYNC EXT
000640' 062701  177770          UPDAT:  ADD     #-10,R1         ;UPDATE RCV CSR DEVICE ADDRES
000644' 062702  177770          ADD     #-10,R2         ;UPDATE XMT CSR DEVICE ADDRES
000650' 000257                  CCC                     ;CLEAR CONDITION CODES
000652' 106367  001752          ASLB    PNTR            ;MOVE POINTER FOR NEXT TEST
000656' 103353                  BCC     KCKOFF          ;GO ENABLE NEXT LINE
000660' 012701  000006          WNDOW:  MOV     #6,R1           ;SET UP COUNT FOR NO OF WAIL LOOPS
000664' 005000                  1$:     CLR     R0              ;CLEAR WAIT LOOP COUNTER
000666'                         2$:
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000666' 104407  000000'                BREAK$,BEGIN            ;TEMPORARY RETURN TO MONITOR....
000672' 104407  000000'                BREAK$,BEGIN            ;THEN CONTINUE AT NEXT INSTRUCTION.
000676' 022767  000016  001744          CMP     #16,TRCNT       ;??
000704' 003004                          BGT     3$              ;YES BRANCH TO WAIT FOR NEXT INTR. SEQUENCE
000706' 022767  000016  001736          CMP     #16,RCCNT       ;??
000714' 003406                          BLE     4$              ;??
000716' 005300                  3$:     DEC     R0              ;NO, START WAIT LOOP
000720' 001362                          BNE     2$              ;
000722' 005301                          DEC     R1              ;
000724' 001357                          BNE     1$              ;
000726' 000167  000606                  JMP     INTER           ;REPORT DEVICE FAILED TO INTERRUPT
000732'                         4$:
000732' 104400  000000'                 EXIT$,BEGIN                     ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
                                        ;
000736' 005113                  B$:     COM     (R3)            ;SET LNCNT X FLAG (THIS DP NOT SELECTED)
000740' 005267  001674          INC     NODVTS          ;SET UP DEVICE COUNT
000744' 000706                  BR      C$              ;GO BACK & UPDATE REG.
                                        ;
                                        ;
                                        ;
                                        ;THIS CODE WILL ANSWER THE XMT INTERRUPT REQUEST
                                        ; FOR SERVICE
                                        ;
000746' 010046                  DPXMT:  MOV     R0,-(SP)        ;SAVE REG. 0 ON STACK
000750' 010146                  MOV     R1,-(SP)        ;SAVE REG. 1 ON STACK
000752' 011500                  MOV     (R5),R0         ;R0 HAS LINE NO. OFFSET
000754' 016001  002150'         MOV     DVAD1(R0),R1    ;R1 = R0 WITH OFFSET VALUE
000760' 105761  000004          TSTB    4(R1)           ;TEST IF DONE BIT SET
000764' 100405                  BMI     DPXMT1          ;DONE IS SET CONT. PROGRAM
000766' 112760  000200  002451' MOVB    #200,ERSTT+1(R0);
000774' 000167  001106          JMP     XRUD            ;
                                        ;
                                        ;
001000' 032761  000010  000004  DPXMT1: BIT     #10,4(R1)       ;TEST FOR RESYNC
001006' 001023                  BNE     DPXMT2          ;BRANCH IF IN SYNC
001010' 005267  001634          INC     TRCNT           ;NUMBER OF CHAR. XMITED
001014' 116061  002170' 000006  MOVB    LNSYN1(R0),6(R1);SEND DATA TO ACTIVE DP LINE NO BUFF
001022' 105260  002170'         INCB    LNSYN1(R0)      ;INCRAMENT NEXT DATA WORD
001026' 122760  000026  002170' CMPB    #26,LNSYN1(R0)  ;CHECK IS THIS = TO SYNC CHAR.
001034' 001002                  BNE     DPXMT3          ;OK CONT.
001036' 105260  002170'         INCB    LNSYN1(R0)      ;INC SYNC COUNT CHAR.(THIS IS DONE
                                                        ;SO THAT STRIP SYNC CHAR. WILL
                                                        ;NOT MAKE AN ERROR)
001042' 105360  002211'         DPXMT3: DECB    LNCNT1+1(R0)    ;CHECK HAVE WE XMTED
                                                        ;ALL 16 CHAR., THIS LINE
001046' 001017                  BNE     XMTRTN          ;NO RETURN TO MONITOR
001050' 052711  000010          BIS     #10,(R1)        ;SET RE-SYNC BIT
001054' 000414                  BR      XMTRTN          ;RETURN TO MONITOR.
001056' 116161  000003  000006  DPXMT2: MOVB    3(R1),6(R1)     ;XMT SYNC CHAR. (TSYNC)
001064' 105360  002171'         DECB    LNSYN1+1(R0)    ;DEC SYNC COUNTER
001070' 001006                  BNE     XMTRTN          ;EXIT IF SYNC COUNT NOT ZERO
001072' 112760  000004  002171' MOVB    #4,LNSYN1+1(R0) ;RE-INITIALIZE SYNC COUNTER
001100' 042761  000010  000004  BIC     #10,4(R1)       ;CLEAR SYNC FLAG
001106' 000167  000774          XMTRTN: JMP     XRUD            ;
                                        ;
                                        ; THIS CODE WILL ANSWER THE RCV INTERRUPT
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                                        ; REQUEST FOR SERVICE
                                        ;
001112' 010246                  DPRCV:  MOV     R2,-(SP)        ;SAVE REG. 2 ON STACK
001114' 010346                          MOV     R3,-(SP)        ;SAVE REG. 3 ON STACK
001116' 010446                          MOV     R4,-(SP)        ;SAVE REG. 4 ON STACK
001120' 011503                          MOV     (R5),R3         ;GET OFFSET
001122' 016304  002150'                 MOV     DVAD1(R3),R4    ;R3 = R4 DEVICE CODE OFFSET VALUE
001126' 105714                          TSTB    (R4)            ;IS DONE SET
001130' 100405                          BMI     DPRCV1          ;DONE SET :SERV DONE REQUEST
001132' 112763  000200  002450'         MOVB    #200,ERSTT(R3)  ;
001140' 000167  000752                  JMP     RRUD            ;
                                        ;
001144' 032764  040000  000004  DPRCV1: BIT     #40000,4(R4)    ;IS OVERRUN BIT SET
001152' 001421                          BEQ     READ            ;NO OVERRUN GO READ DATA
001154' 105363  002170'                 DECB    LNSYN1(R3)      ;UPDATE XMT DATA
001160' 105263  002211'                 INCB    LNCNT1+1(R3)    ;  "     "  ACTIVE COUNT
001164' 042764  160000  000004          BIC     #160000,4(R4)   ;CLEAR OVERRUN ERROR BITS
001172' 052763  000010  000004          BIS     #10,4(R3)       ;SET RESYNC FLAG
001200' 042713  004000                  BIC     #4000,(R3)      ;CLEAR RECEIVE ACTIVE
001204' 112763  000100  002450'         MOVB    #100,ERSTT(R3)  ;.
001212' 000167  000700                  JMP     RRUD            ;
                                        ;
001216' 032714  004000          READ:   BIT     #4000,(R4)      ;IS DEVICE ACTIVE
001222' 001441                          BEQ     RCVRTN          ;GET OUT DEVICE NOT READY
001224' 005002                          CLR     R2              ;CLEAR BYTE PNTER
001226' 066302  002230'                 ADD     VRFLG1(R3),R2   ;GET BYTE OFFSET
001232' 066302  002130'                 ADD     DPLIN(R3),R2    ;ADDR=DATA BUFF ADDR
001236' 116412  000002                  MOVB    2(R4),(R2)      ;DATA => DATA BUFF
001242' 122712  000026                  CMPB    #26,(R2)        ;SKP IF SYNC BIT
001246' 001427                          BEQ     RCVRTN          ;
001250' 005267  001376                  INC     RCCNT           ;NO. OF RCV'ED. CHAR.
001254' 105263  002230'                 INCB    VRFLG1(R3)      ;
001260' 105363  002210'                 DECB    LNCNT1(R3)      ;CHECK HAVE WE TRANSFERRED ALL
                                                                ; DATA WORDS.
001264' 001020                          BNE     RCVRTN          ;THIS LINE NOT DONE RECEIVING
                                                                ;ALL DATA TRANSFERS
001266' 005014                          CLR     (R4)            ;CLEAR RCV. CSR REG.
001270' 005064  000004                  CLR     4(R4)           ;CLEAR XMT. CSR. REG.
001274' 005267  001354                  INC     DPDN            ;HAVE WE DONE ALL DP'S SELECTED
001300' 026767  001352  001346          CMP     NO.DP,DPDN      ;COMPARE TO CHCK
001306' 001007                          BNE     RCVRTN          ;BRANCH AND CONTINUE TEST OF OTHER DP'S
001310' 012604                          MOV     (SP)+,R4        ;UPDATE STACK POINTER
001312' 012603                          MOV     (SP)+,R3        ;
001314' 012602                          MOV     (SP)+,R2        ;
001316' 012605                          MOV     (SP)+,R5        ;
                                        ;-----------------------------------------------------------
001320' 000004  000000' 001420'         PIRQ$,BEGIN,CHCK1               ; QUEUE UP TO CONTINUE AT CHCK1 AND RTI
                                        ;-----------------------------------------------------------


001326' 000167  000564          RCVRTN: JMP     RRUD    ;
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001332' 005003                  CHCK:   CLR     R3              ;SET UP OFFSET FOR DEVICE ADDRESS
001334' 012700  002450'                 MOV     #ERSTT,R0       ;GET STARTING ADDRESS OF ERROR STATUS BUFFER
001340' 012701  000014'                 MOV     #DVID1,R1       ;GET NUMBER OF DEVICE SELECTED
001344' 012702  000010                  MOV     #8.,R2          ;GET MAX. DEVICE COUNT
001350' 105720                  1$:     TSTB    (R0)+           ;TEST STATUS WORD ERROR INDICATED
001352' 001402                          BEQ     2$              ;BRANCH IF THIS REV STATUS HAS NO ERROR
001354' 004767  000276                  JSR     PC,RCERR        ;GO REPORT STATUS ERROR
001360' 105720                  2$:     TSTB    (R0)+           ;TEST STATUS WORD ERROR INDICATED
001362' 001402                          BEQ     3$              ;BRANCH IF THIS XMTR STATUS HAS NO ERROR
001364' 004767  000352                  JSR     PC,XTERR        ;
001370' 005721                  3$:     TST     (R1)+           ;UPDATE OFFSET POINTER
001372' 005723                          TST     (R3)+           ;UPDATE DEVICE ADDRESS OFFSET POINTER
001374' 005302                          DEC     R2              ;DECRAMENT COUNT
001376' 001364                          BNE     1$              ;BRANCH IF NOT DONE
001400' 005767  001232                  TST     DVIDA           ;HAVE ALL LINES COMPLETE THEIR XFER'S??????????????????
001404' 001402                          BEQ     4$              ;BRANCH TO CHECK DATA ROUTINE
001406' 104400  000000'                 EXIT$,BEGIN                     ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
001412' 005001                  4$:     CLR     R1              ;
001414' 005002                          CLR     R2              ;
001416' 005000                          CLR     R0              ;CLEAR R0:R0 WILL BE
                                                                ;USED AS OFFSET
001420' 012767  000020  001214  CHCK1:  MOV     #20,COUNT       ;FOR COUNTING NO OF
                                                                ;CHAR. READ
001426' 005002                          CLR     R2              ;CLR BUFF POINTER
001430' 012701  002210'                 MOV     #LNCNT1,R1
001434' 105711                  1$:     TSTB    (R1)
001436' 001402                          BEQ     CHCK2
001440' 022122                          CMP     (R1)+,(R2)+
001442' 000774                          BR      1$
001444' 010200                  CHCK2:  MOV     R2,R0           ;R0 WILL HOLD LINE NO./2
001446' 016202  002130'                 MOV     DPLIN(R2),R2    ;R2=START ADDR. THIS LINE BUFF
001452' 111267  001170                  MOVB    (R2),CHECKR     ;GET FIRST CHAR.
001456' 126722  001164          CONTNU: CMPB    CHECKR,(R2)+    ;CHECK DATA & INCR. POINTER
001462' 001410                          BEQ     1$              ;THIS WORD GOOD GO CHECK MORE
001464' 122767  000026  001154          CMPB    #26,CHECKR      ;WAS IT STRIP CHAR.
001472' 001144                          BNE     ERRPT           ;NO GO REPORT ERROR
001474' 005267  001146                  INC     CHECKR          ;YES UPDATE CHECHR
001500' 005302                          DEC     R2              ;UPDATE DPLIN BUFFER POINTER
001502' 000765                          BR      CONTNU          ;GO BACK & CHECK REAL DATA
001504' 005267  001136          1$:     INC     CHECKR          ;SET UP FOR NEXT BYTE TEST
001510' 005367  001126                  DEC     COUNT           ;ONE MORE BYTE HAS BEEN TESTED
001514' 001360                          BNE     CONTNU          ;NOT DONE YET GO CHECK MORE
001516' 005267  001116                  INC     NODVTS          ;THIS LINE DONE ADD 1 TO
                                                                ;NO. OF DEVICES TESTED
001522' 012711  100777                  MOV     #100777,(R1)
001526' 022767  000010  001104          CMP     #10,NODVTS      ;HAVE ALL LINES BEEN TESTED
001534' 001560                          BEQ     PASS            ;GO TO END PASS CODING
001536' 000730                          BR      CHCK1
                                        ;
                                        ;
                                        ;
001540' 012767  000023  176340  INTER:  MOV     #23,ERRTYP      ;DEV FAILED TO INTERRUPT
                                        ;*****************************************************
001546' 104405  000000' 000000          ERRS,BEGIN,NULL         ;DEVICE FAILED TO INTERRUPT
                                        ;*****************************************************
```

```
001554' 104403  000000' 001574'         MSGN$,BEGIN,1$  ;ASCII MESSAGE CALL WITH COMMON HEADER
001562' 042767  040000  176236          BIC     #40000,STAT     ;ABORTING SELECTION OF THIS MODULE
001570' 104400  000000'                 EXIT$,BEGIN             ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
001574' 001600'                 1$:     TEXT                    ;MESSAGE POINTER
001576' 177777                          177777                  ;  "    TERMINATOR
001600' 020040  042504  044526  TEXT:   .ASCIZ  '  DEVICE FAILED TO INTERRUPT DROPPING MODULE '
001606' 042503  043040  044501
001614' 042514  020104  047524
001622' 044440  052116  051105
001630' 052522  052120  042040
001636' 047522  050120  047111
001644' 020107  047515  052504
001652' 042514  000040

001656' 105740                  RCERR:  TSTB    -(R0)           ;UPDATE OFFSET POINTER
001660' 122700  000100          CMPB    #100,R0         ;TEST FOR DATER OVER RUN ERROR
001664' 001006                  BNE     1$              ;BRANCH IF NOT OVER ?? RUN
001666' 012767  000021  176212  MOV     #21,ERRTYP      ;DATA OVERRUN
                                ;*****************************************************************
001674' 104406  000000' 000000  SOFER$,BEGIN,NULL        ;DATE OVER RUN
                                ;*****************************************************************
001702' 122700  000200          1$:     CMPB    #200,R0         ;TEST FOR FALSE INTERRUPT
001706' 001010                  BNE     2$              ;BRANCH IF NOT FALSE INTERRUPT ERROR
001710' 010167  176164          MOV     R1,CSRA         ;GET DEVICE ADDRESS
001714' 012767  000011  176164  MOV     #11,ERRTYP      ;ILLEGAL INTERRUPT
                                ;*****************************************************************
001722' 104405  000000' 000000  HRDER$,BEGIN,NULL        ;FALSE RECEIVE INTERRUPT
                                ;*****************************************************************
001730' 105720          2$:     TSTB    (R0)+           ;UPDATE OFFSET POINTER
001732' 112763  000377  002210' MOVB    #377,LNCNT1(R3) ;ABORT THIS DEVICE
001740' 000207                  RTS     PC              ;RETURN TO CALL ROUTINE

001742' 105740                  XTERR:  TSTB    -(R0)           ;UPDATE OFFSET POINTER
001744' 122700  000200          CMPB    #200,R0         ;TEST FOR ERROR
001750' 001010                  BNE     1$              ;BRANCH IF THIS IS NOT ERROR
001752' 010167  176122          MOV     R1,CSRA         ;GET DEVICE
001756' 012767  000011  176122  MOV     #11,ERRTYP      ;ILLEGAL INTERRUPT
                                ;*****************************************************************
001764' 104405  000000' 000000  HRDER$,BEGIN,NULL        ;FALSE TRANSMIT INTERRUPT
                                ;*****************************************************************
001772' 105720          1$:     TSTB    (R0)+           ;UPDATE OFFSET
001774' 112763  000377  002211' MOVB    #377,LNCNT1+1(R3);ABORT FURTHER TEST OF THIS DEVICE
002002' 000207                  RTS     PC              ;RETURN TO CALL ROUTINE


002004' 016067  002150' 176066  ERRRT:  MOV     DVAD1(R0),CSRA  ;CSRA=LINE ADDR.
002012' 005302                  DEC     R2              ;UPDATE POINTER TO DATA BUFF
002014' 111267  176070          MOVB    (R2),AWAS       ;BAD DATA BYTE
002020' 005202                  INC     R2              ;UPDATE POINTER TO DATA BUFF
002022' 116767  000620  176056  MOVB    CHECKR,ASP      ;GOOD DATA BYTE
002030' 005267  000612          INC     CHECKR          ;UPDATE FOR NEXT TEST
002034' 005367  000602          DEC     COUNT           ;ONE MORE BYTE HAS BEEN TESTED
```



```
                                ;*****************************************************************
002040' 104404  000000'         DATER$,BEGIN            ;DATA ERROR!!!
                                ;*****************************************************************

002044' 005767  000572  RESTOR: TST     COUNT           ;ARE WE DONE CHECKING DATA ON
                                                        ;ON THIS LINE
002050' 001202                  BNE     CONTNU          ;NOG GO DO THE REST OF THIS LINE
002052' 005267  000562          INC     NODVTS          ;YES THIS LINE DONE ADD 1 TO
                                                        ;NODVTS>NO. OF LINES TESTED
002056' 012711  100777          MOV     #100777,(R1)
002062' 022767  000010  000550  CMP     #10,NODVTS      ;HAVE ALL LINES BEEN TESTED
002070' 001402                  BEQ     PASS            ;GO TO END PASS CODE
002072' 000167  177322          JMP     CHCK1                   ;RETURN TO MONITOR

002076'                 PASS:
002076' 104413  000000'         ENDIT$,BEGIN            ;SIGNAL END OF ITERATION.
                                                        ;MONITOR SHALL TEST END OF PASS
002102' 000167  176116          JMP     START           ;NO GO DO ONE MORE




002106' 012601          XRUD:   MOV     (SP)+,R1        ;XMIT, REGISTER UPDATE
002110' 012600                  MOV     (SP)+,R0        ;
002112' 012605                  MOV     (SP)+,R5        ;
002114' 000002                  RTI                     ;

002116' 012604          RRUD:   MOV     (SP)+,R4        ;RCV. REGISTER UPDATE
002120' 012603                  MOV     (SP)+,R3        ;
002122' 012602                  MOV     (SP)+,R2        ;
002124' 012605                  MOV     (SP)+,R5        ;
002126' 000002                  RTI                     ;


                        ; SYNC WORD STORAGE LOCATIONS (LINE SYNC <1:8>)

002130' 000010          DPLIN:  .BLKW   8.              ;CONTAINS OFFSET POINTER TO DATER STORAGE BUFF
002150' 000010          DVAD1:  .BLKW   8.              ;DEVICE ADDRES < 174770:174700 >
002170' 000010          LNSYN1: .BLKW   8.              ;HIGH BYTE=SYNC COUNT NO.
                                                        ;LOW BYTE =BINARY WORD PATTERN
002210' 000010          LNCNT1: .BLKW   8.              ;HIGH BYTE=NO. XMTED INTERRUPTS
                                                        ;LOW BYTE = NO. RCV. INTERRUPTS
002230' 000010          VRFLG1: .BLKW   8.              ;BYTE OFFSET VALUE FOR READ

                        ;RECEIVE DATA 16 BYTES PER.BUFFER

002250' 000010          DPLIN1: .BLKW   8.              ;DP11 LINE #1 RECEIVE
                                                        ;DATA BUFFER
```

```
                                                        ;LOW BYTE HAS 1ST CHAR
                                                        ;HIGH BYTE HAS 2ND CHAR. ETC.
002270' 000010          DPLIN2: .BLKW   8.              ;DP11 LINE #2 RECEIVE
002310' 000010          DPLIN3: .BLKW   8.              ;DP11 LINE #3 RECEIVE
002330' 000010          DPLIN4: .BLKW   8.              ;DP11 LINE #4 RECEIVE
002350' 000010          DPLIN5: .BLKW   8.              ;DP11 LINE #5 RECEIVE
002370' 000010          DPLIN6: .BLKW   8.              ;DP11 LINE #6 RECEIVE
002410' 000010          DPLIN7: .BLKW   8.              ;DP11 LINE #7 RECEIVE
002430' 000010          DPLIN8: .BLKW   8.              ;DP11 LINE #8 RECEIVE


002450' 000010          ERSTT:  .BLKW   8.              ;STORAGE OF STATUS TYPE OF ERROR


                        ; SERVICE CODE FOR LINKING A PARTICULER DEVICE
                        ; TO A COMMON XMT OR RCV SERVICE ROUTINE.

002470' 004567 176416   LINKER: JSR     R5,DPRCV        ;ANSWER LINE 1 RCV INTR
002474' 000000                  0                       ;OFFSET FOR LINE 1
002476' 004567 176244           JSR     R5,DPXMT        ;ANSWER LINE 1 XMT INTR
002502' 000000                  0                       ;OFFSET FOR LINE 1
002504' 004567 176402           JSR     R5,DPRCV        ;ANSWER LINE 2 RCV INTR
002510' 000002                  2                       ;OFFSET FOR LINE 2
002512' 004567 176230           JSR     R5,DPXMT        ;ANSWER LINE 2 XMT INTR
002516' 000002                  2                       ;OFFSET FOR LINE 2
002520' 004567 176366           JSR     R5,DPRCV        ;ANSWER LINE 3 RCV INTR
002524' 000004                  4                       ;OFFSET FOR LINE 3
002526' 004567 176214           JSR     R5,DPXMT        ;ANSWER LINE 3 XMT INTR
002532' 000004                  4                       ;OFFSET FOR LINE 3
002534' 004567 176352           JSR     R5,DPRCV        ;ANSWER LINE 4 RCV INTR
002540' 000006                  6                       ;OFFSET FOR LINE 4
002542' 004567 176200           JSR     R5,DPXMT        ;ANSWER LINE 4 XMT INTR
002546' 000006                  6                       ;OFFSET FOR LINE 4
002550' 004567 176336           JSR     R5,DPRCV        ;ANSWER LINE 5 RCV INTR
002554' 000010                  10                      ;OFFSET FOR LINE 5
002556' 004567 176164           JSR     R5,DPXMT        ;ANSWER LINE 5 XMT INTR
002562' 000010                  10                      ;OFFSET FOR LINE 5
002564' 004567 176322           JSR     R5,DPRCV        ;ANSWER LINE 6 RCV INTR
002570' 000012                  12                      ;OFFSET FOR LINE 6
002572' 004567 176150           JSR     R5,DPXMT        ;ANSWER LINE 6 XMT INTR
002576' 000012                  12                      ;OFFSET FOR LINE 6
002600' 004567 176306           JSR     R5,DPRCV        ;ANSWER LINE 7 RCV INTR
002604' 000014                  14                      ;OFFSET FOR LINE 7
002606' 004567 176134           JSR     R5,DPXMT        ;ANSWER LINE 7 XMT INTR
002612' 000014                  14                      ;OFFSET FOR LINE 7
002614' 004567 176272           JSR     R5,DPRCV        ;ANSWER LINE 8 RCV INTR
002620' 000016                  16                      ;OFFSET FOR LINE 8
002622' 004567 176120           JSR     R5,DPXMT        ;ANSWER LINE 8 XMT INTR
002626' 000016                  16                      ;OFFSET FOR LINE 8

002630' 000000          PNTR:   OPEN                    ;PNTR REG TO TEST DEVICE ON LINE
002632' 013426          TSYNC:  13426                   ;SYNC CODE
002634' 000000          CNTBO:  OPEN                    ;USED FOR COUNTER OF 64.
002636' 000000          DVIDA:  OPEN                    ;POINTER FLAG WHICH WILL BRANCH TO
                                                        ;TEST STATUS OF ALL LINES AFTER
```



```

002640' 000000          NODVTS: OPEN                    ;COMPLETING ONE LINE DATA TRANSFER
002642' 000000          COUNT:  OPEN                    ;WHEN =8 ALL LINES HAVE BEEN TESTED
                                                        ;COUNTS DOWN FROM 16 WHEN CHECKING
002644' 000000          RCVDAT: 0                       ;DATA BUFFER REG.
002646' 000000          CHECKR: 0                       ;WORD USED TO INCRAMENT XMTED DATA
002650' 000000          TRCNT:  0                       ;STORES WORD BEING CHECKED
002652' 000000          RCCNT:  0                       ;XMT COUNT
002654' 000000          DPDN:   OPEN                    ;RECEIVE COUNT
002656' 000000          NO.DP:  OPEN                    ;DP'S DONE COUNTER
        000001                  .END                    ;NO. DP'S SELECTED
```

```
ACSR    000102R           184#
ADDR    000006R           150#  252     267     268
ADDR22= 001000            202#
ASB     000106R           188#  526*
ASTAT   000104R           186#
AWAS    000110R           189#  524*
BEGIN   000000R           147#  208     305     306     317     408     433     471     473     475     493     500     513
                          530   546
BIT0  = 000001            202#
BIT1  = 000002            202#
BIT10 = 002000            202#
BIT11 = 004000            202#
BIT12 = 010000            202#
BIT13 = 020000            202#
BIT14 = 040000            202#
BIT15 = 100000            202#
BIT2  = 000004            202#
BIT3  = 000010            202#
BIT4  = 000020            202#
BIT5  = 000040            202#
BIT6  = 000100            202#
BIT7  = 000200            202#
BIT8  = 000400            202#
BIT9  = 001000            202#
BREAK$= 104407            202#  305     306
BR1     000012R           152#  221     225
BR2     000013R           153#
BTOD$ = 104421            202#
BS      000736R           275   319#
CDATA$= 104412            202#
CHCK    001332R           417#
CHCK1   001420R           408   438#    464     542
CHCK2   001444R           443   446#
CHECKR  002646R           448*  449*    451     453*    456*    526     527*    646#
CNT80   002634R           239*  244*    638#
CONFIG  000056R           172#
CONTNU  001456R           440#  455     458     536
COUNT   002642R           251*  261*    438*    457*    528*    534     643#
CSRA    000100R           182#  497*    510*    522*
CS      000562R           280#  321
DATCK$= 104411            202#
DATER$= 104404            202#  530
DPDN    002654R           211*  400*    401     649#
DPLIN   002130R           241   254     388     447     573#
DPLIN1  002250R           255   583#
DPLIN2  002270R           587#
DPLIN3  002310R           588#
DPLIN4  002330R           589#
DPLIN5  002350R           590#
DPLIN6  002370R           591#
DPLIN7  002410R           592#
DPLIN8  002430R           593#
DPRCV   001112R           363#  603     607     611     615     619     623     627     631
DPRCV1  001144R           369   373#
DPXMT   000746R           328#  605     609     613     617     621     625     629     633
DPXMT1  001000R           333   338#
```



```
DPXMT2  001056R           339   353#
DPXMT3  001042R           344   348#
DVAD1   002150R           253   331     367     522     574#
DVIDA   002636R           213*  431     639#
DVID1   000014R           154#  206     213     217     274     286     419
DS      000542R           274#  284
ENDIT$= 104413            202#  546
END$  = 104410            202#  208
ERRRT   002004R           452   522#
ERRTYP  001106R           187#  469*    491*    498*    511*
ERSTT   002450R           334#  370*    380*    418     597#
EXIT$ = 104400            202#  317     433     475
GETPA$= 104415            202#
GWBUF$= 104414            202#
HRDCNT  000044R           167#
HRDER$= 104405            202#  471     500     513
HRDPAS  000050R           169#
ICONT   000036R           164#
ICOUNT  000040R           165#
IDNUM   000122R           194#
INIT    000030R           161#
INT     000434R           251#
INTER   001540R           315   469#
INTR    000120R           193#  204*
KCKOFF  000606R           286#  301
LINKER  002470R           215   603#
LNCNT1  002210R           271   348#    376*    394*    441     503*    516*    577#
LNSYN1  002170R           270   341     342*    343     345*    354*    356*    375*    575#
MAP22$= 104416            202#
MODNAM  000000R           148#
MODSP   000224R           162   200#
MSCN$ = 104403            202#  473
MSGS$ = 104402            202#
MSGS  = 104401            202#
NODVTS  002640R           265*  320*    459*    462     537*    540     642#
NO.DP   002656R           212*  219*    401     650#
NULL  = 000000            202#  471     493     500     513
OPEN  = 000000            149   155     156     157     158     175     176     177     178     179     180     181     182
                          184   186     188     189     191     192     193     202#    636     638     639     642     643
                          649   650
OTOA$ = 104420            202#
PASCNT  000034R           163#
PASS    002076R           463   541     545#
PIRQ$ = 000004            202#  408
PNTR    002630R           216*  217     228*    272*    274     283*    285*    286     300*    636#
POPSP = 005726            202#
POPSP2= 022626            202#
PRTY  = 000000            153   202#
PRTY0 = 000000            202#
PRTY1 = 000040            202#
PRTY2 = 000100            202#
PRTY3 = 000140            202#
PRTY4 = 000200            202#
PRTY5 = 000240            152   202#
PRTY6 = 000300            202#
PRTY7 = 000340            202#
```

```
PS      = 177776            202#
PSW     = 177776            202#
PUSH    = 005746            205#
PUSH2   = 024646            202#
RANDS   = 104417            202#
RANNUM  000054R             171#
RCCNT   002652R             210*    309     392*    648#
RCERR   001656R             423     488#
RCVDAT  002644R             645#
RCVRTN  001326R             385     391     396     402     413#
READ    001216R             374     384#
RESTOR  002044R             534#
RESTRT  000246R             190     206#
RES1    000056R             173#
RES2    000060R             174#
RRUD    002116R             371     381     413     562#
RSTRT   000112R             190#
SBADR   000102R             183#
SOFCNT  000042R             166#
SOFERS= 104406              202#    493
SOFPAS  000046R             168#
SPUINT  000032R             162#
SPSIZ =     40              1#      195
SR1     000016R             155#
SR2     000020R             156#
SR3     000022R             157#
SR4     000024R             158#
START   000224R             161     202#    548
START1  000412R             229     239#
START2  000504R             265#
STAT    000026R             160#    474*
SVR0    000062R             175#
SVR1    000064R             176#
SVR2    000066R             177#
SVR3    000070R             178#
SVR4    000072R             179#
SVR5    000074R             180#
SVR6    000076R             181#
SYSCNT  000052R             170#
TEXT    001600R             476     478#
TRCNT   002650R             209*    307     340*    647#
TRPDFD= 000022              202#
TSYNC   002632R             290     637#
UPDAT   000640R             287     297#
VECTOR  000010R             151#    214
VRFLG1  002230R             387     393*    579#
WASADR  000104R             185#
WDFR    000116R             192#    203*
WDTO    000114R             191#    202*
WNDOW   000660R             302#
XFLAG   000005R             149#
XMTRTN  001106R             350     352     355     358#
XRUD    002106R             335     350     556#
XTERR   001742R             426     507#
.       = 002660R           573#    574#    575#    577#    579#    583#    587#    588#    589#    590#    591#    592#    593#
                            597#
```



```
. ABS.  000000      000
        002660      001

ERRORS DETECTED:  0
DEFAULT GLOBALS GENERATED:  0

XDPAE0,XDPAE0/SOL/CRF:SYM=DDXCOM,XDPAE0
RUN-TIME: 1 2 .3 SECONDS
RUN-TIME RATIO: 15/4=3.6
CORE USED:  7K  (13 PAGES)
```